Property D1	2005/03	145000		
Property E	2008/05	99500	Yes	+$9,500
Property E1	2004/05	90000		
Property F	2007/12	131000	Yes	-$4,000
Property F1	2005/06	135000		
Property G	2008/04	152500	Yes	+$12,500
Property G1	2007/11	140000		
Property H	2009/05	79900	Yes	-$5,100
Property H1	2003/09	85000		
Property I	2009/05	70500	Yes	+$6,500
Property I1	2007/01	64000		
Property J	2009/01	65000	Yes	-$52,000
Property J1	2004/12	117000		
Property K	2007/03	95000	No	-$15,000
Property K1	2005/04	110000		
Property L	2007/09	325000	Yes	+$177,000
Property L1	2005/10	148000		
Property M	2007/05	200000	Yes	-$95,000
Property M1	2005/04	295000		
Property N	2008/09	105000	Yes	+$30,000
Property N1	2006/07	75000		

14 pairs of identical properties were found to have sold over the last 5 years. These were in fact re-sale of the same properties. Out of the 14 re-sales, 13 were re-sales that were in the viewshed and 1 re-sale outside of the viewshed. If the “re-sales” are taken at face value, there are 8 re-sales in which their values have increased over time and 6 that have shown a decrease in value. It is interesting to note that the sale that is not in the viewshed showed a decrease in value. Since the element of time is constant and had no effect on sale price, there had to be a reason for the differences in the sale prices within the “re-sales”. The interpretation of the “re-sales” has identified some of the reasons for the differences in the sale prices.

Property A sold in 2008 on the MLS®. At that time the home was in good condition and had some updates. There was no MLS® listing on the property when it sold in 2003. However, we did find a 2002 MLS® listing that indicated that the property had received some renovations. In other words, the change in the sale price levels between 2003 and 2005 was not due to a difference in the condition of the home. Everything else seemed identical. So what was the real cause of the increase in value?

Property B sold on the MLS® in 2003. It required updating and it was not in the same condition when it sold in 2009. This might explain the +$41,500 increase between the sale dates 2003 and 2009.

Property C, when it sold in 2006 appeared to be in better condition then when it sold in 2008 at a loss. This could explain the price difference between the sale dates.

Property D revealed no MLS® listing when it sold in 2003. The 2008 MLS® sale indicated that the house was in good repair at the time of the sale. It is not known if there was any difference in the property between the two sale dates.

Property E sold in 2006 and 2008. On both MLS® listings of the property, it indicated that the property had not changed and was in good condition when sold each time. The cause for the property to increase in value by $9,500 is not known.

Property F sold in 2005 and 2007. In both instances the home was in good repair yet it sold for a loss. The rationale for the loss is unknown.

Property G sold in 2007 and 2008. The 2007 sale indicated that the home needed some work. The 2008 sale reflected the improvements made to the property that is why it sold for a profit.

Property H sold in 2003 and in then in 2009 for a loss. Each of the MLS® listings indicated the home was in average condition and no changes had been made to the home. The rationale for loss in value is not known.

Property I sold in 2007 and again in 2009 for an increase of $6,500. When the property sold in 2007 it had some updates and was in a good state of repair. When it sold in 2009, it sold in “as is” condition which suggests some type of a problem. However, it sold at an increased price in 2009.

Property J sold with a loss of $53,000 between 2004 and 2009. There was no 2004 MLS® listing for this property, but there was an expired 2006 listing. According to the 2006 MLS® listing the home appeared to be in average condition. However, when it sold in 2009 the MLS® listing reports the house being sold “as Is” condition which suggests some type of a issue. This could explain a large portion of the loss.

Property K, which was just outside of the viewshed, sold in 2005 and in 2007 for a loss of $15,000. A review of both MLS® listings at the time of these sales, disclosed no evidence of any changes to the property. There is no rationale as to why the property sold for less in 2007.

Property L sold in 2005 and 2007 for an increase of $177,000. The MLS® indicates that the home had been substantially updated at the time of the 2007.

Property M sold in April 2005 for $295,000 and resold in May 2007 for $200,000. This appears to indicate a loss of $95,000. When this property sold in April 2005 it sold under a power of sale and in "as is" condition. When it sold in May 2007 it had a new septic system and was in average condition. The difference in the selling prices between the dates was the result that a lot had been severed off the property after the purchase in 2005. The original lot size of the property in April 2005 was larger than when it sold in May 2007. Thus the price differential was the result of the lot size difference and is not related to the wind turbines.

Property N sold in 2006 and in 2008 for a profit of $30,000. There was no MLS® listing found when it sold in 2006 and the 2008 listing basically showed that it was in average condition. There is no rationale as to why this property sold at an increased price.

Even using “re-sales” as a point of entry in determining the impact of wind farms on property values does not show any casual relationship. With the “re-sales” that were found in the data set, there was more evidence on the outset that property values have increased despite the existence of wind farms. Yet in many instances there was no explanation of why these “re-sales” increased or decreased in value.

The problem of using “Paired Sales” or even “re-sales” as a model for determining the effect on real estate of a given property characteristic is very simple. These types of analysis cannot hold these physical differences between properties constant. In order to understand what groups of data are telling us we need to code the data. The “re-sales” “Paired Sales” methods do not allow for any coding nor do they allow for any levels of measurement.

Discussions with the realtors, buyers and sellers involve tend to be bias and skews results. A tool is required that is capable of holding constant all the variables, is capable of categorizing the variables, and finally, is capable of labeling the characteristics that impede on value.

The only real estate model that can actually hold constant all the variables that interact on price in a given real estate market place is Multiple Regression Analysis. This is the basis of this analysis and the authors have made every attempt to draw any inference, negative or positive, from the data procured from the marketplace as to the relationship of wind turbines and the sale price of nearby rural residential properties.

SUMMARY AND CONCLUSION

Sales prices of property in a given area provide the best source of evidence to establish market value. In attempting to establish the extent of a specific influence on the value of real estate, the available data must be divided and analysed into two groups; those exposed to the influence and those not. In the case of wind farms, it is appropriate to group the available sales data into those within the viewshed of the wind farms and those not.

When residential properties within a viewshed (viewshed group) are compared to those not in a viewshed (control group), there will be differences in selling prices between the two groups that are not related to the wind farms. The authors adopted a basic regression modeling in attempting to rationalize these differences as it allows for the introduction of multiple variables.

An initial exploratory analysis helps to demonstrate that point. On page 41 there is a visual presentation of the average sale prices of data within the “control group” and the “viewshed” group. This graph shows a 7.5% decrease between the average sale prices of each group. On the initial examination it would appear that sales located in the “viewshed” sold “on average” 7.5% lower. It would be wrong to assume that the -7.5% is the result of the wind turbines because the average sale price from each group represents the unexplained functions of all the variables.

Through a review of the MLS® data sheets and other records, as well as ground proofing inspections, the variables were identified and placed into the spreadsheet for regression modeling. These variables include such features as lot size, location, garage, basement finish, house condition, age etc. These variables can help to explain the differences in the selling prices of the dataset to allow for a more probative focus on the influence of the wind farms on those property sales within the viewshed.

The initial regression run showed that the variable “viewshed” returned a negative coefficient of 13%. In regression analysis, a coefficient or value will always be returned in the results. The quantum of the result indicates whether or not the coefficient is statistically significant. In this application, the “viewshed” variable returned, what is commonly referred to as a “Standard Error”, that could be inferred to be fairly wide. The word “Error” may be misleading to some, in that it is not really an error. The error in the sampling is the difference between the data drawn and the total data population. In this case the total population of data is really hypothetical since the “Error” is the calculation of the fact that one is working with a sample not the entire population. There will always be some difference. In the case of the Standard Error in this analysis, it was .059 or 6.0%. Thus the 13% negative coefficient could have returned a value between -19% and -7% which is a very wide spread. It was also noted that the “T” value which measures statistical strength was a -2 which really signifies the weakness of the returned coefficient of -13%. In our opinion, this suggests that there was no consistency in this -13% coefficient being generated by the regression model.

Our exploratory data analysis was not limited to regression modeling on the whole data set. Since we know there are differences between the rural residential sales of each group we were able to segregate the data into closely matched datasets taken from each group. Once they were separated into like datasets, regression analysis could be re-applied to these smaller but more like sales to determine the effect of wind turbines on property values. On page 49 of the report there are four graphs. On the left side of the page are graphs (lower and upper) showing the Raw Treated and Raw Control groupings of data. By matching these sales from the data set as shown on the right side of the page (matched Treated and Control groups) we were able to create a fairly close match or analysis.

The output of the regression modeling on page 47 of the matched data sets using the “optimal” method returned a -9.0% coefficient for the variable “viewshed” with a high standard of error and a very low T value. This suggests that the coefficient returned by this regression run is not statistically significant.

We then extended the matching analysis to include the “CEM” method. The “CEM” method segregates data from two groups using a different technique then the “optimal” method. It must be remembered that both the “CEM” and the “Optimal” method does not consider sale price as a matching variable. The regression run using the “CEM” method is shown on page 52. Once again, a -7% coefficient is found for the variable “viewshed” returned by this model. The “Error” was very wide and the T value was extremely low. The conclusion is that the coefficient that “viewshed” returned is not deemed to be statistically significant.

The last considered approach was to take raw data in the form of paired sales. These paired sales were taken from the data inputs. This data set is located on page 54 of the report. Our examination of this data set was simply to determine the price differences of the same properties regardless of whether or not the residual price was negative or positive. By simply viewing the raw data without any formal analysis, no relationship could be determined between the presence of wind turbines and rural residential properties.

It is of paramount importance to note that any diminution in market value may be as a result of influences other than wind turbines. For example, a vendor may be motivated to accept a price lower that expected or even lower than their own earlier purchase price. Such motivations may be due to job loss, corporate transfer with employer compensation for price loss, ill health, old age or death.

The three regression models in this study returned a similar negative coefficient for the variable “viewshed” supported by a wide Standard Error and low T scores that clearly show that those coefficient results could not be relied upon as being statistically significant. It could not be said that rural residential houses located in a viewshed sold for lower prices.

RECOMMENDATIONS FOR FUTURE STUDIES

The study of wind farms and their effect on property values is, and will likely continue to be a subject of debate for many years. Central to any future studies will be the methodology chosen for such a task. As pointed out earlier, the analytical options are limited. Furthermore, the real estate market is not perfect. It is comprised of individuals who hold differing ideals and objectives.

The motivations for buying and selling can vary significantly and can be influenced by numerous factors including, but not limited to financial capabilities, family criteria influences including physical and health limitations, employment etc. It can also be influenced by external factors such as the number of competing listings of properties available for sale, the price of gasoline vis-à-vis travelling distances, and prevailing economic conditions. As a result the data available for analysis will be imperfect, resulting in unpredictable differences and conclusions. Seeking perfection in analytical results can be an elusive and perhaps unattainable objective.

Most competent analysts will acknowledge that a large volume of well researched data, when properly analysed, is more likely to produce a more reliable result than a small selection of data. The commonly used “paired sales” analysis relies on only a few observations and frequently adopts “ad hoc” methods of rationalizing variances. This technique has been used since the 1930’s in real estate appraisal practice and can often be proven to be unreliable by rendering biased results due to flawed adjustments and insufficient support. It is for this reason that a “paired sales” analysis, using only a few sales transactions, that are unlikely to be ideally comparable, is a statistically inferior approach.

Some studies on wind farm influences to date have relied exclusively on interviews of area residents. Such interview formats as a basis by reaching a conclusion can be misleading for several reasons. Bias can be built in by the way the questions to be asked are framed. The questions asked are rarely if ever presented with the results for review. The answers given by the respondents may not be truthful for a variety of reasons. Interview format studies are not evidence, they are unsubstantiated opinions, and as such are not empirical or reliable.

The authors believe that the Multiple Regression Analysis technique is the preferred choice in the analysis of data for several reasons. It utilizes a large volume of market derived observational data, and is capable of minimizing the element of bias. MRA can extract a detailed view of the primary influencing variables on price and examined them on a micro level (assuming the data is available).

In future studies of the overall impact of wind farms on nearby property values, the many variables having independent influences must be carefully grouped for analysis. In addition to the usual adjustment for property differences, the following areas are suggested for possible groupings for analysis:

- the distance to a wind turbine;
- the number of visible turbines;
- angle/direction of visibility;
- the influence of visibility of a hilly terrain or bush cover;
- noise measurements at different times of the day;
- noise measurements under different wind conditions;
- the influence of vibrations;
- volume of competing listings of properties available for sale;
- length of exposure time prior to consummation of a sale; and
- the time of year.

Although distance is an important element that needs to be incorporated in any future design program, it must be carefully related to the other influences. If a negative effect becomes evident, then it may be necessary to study the distance at which the impact is no longer measurable. An attempt was made in this study modeling by incorporation this variable into the MRA equation. There was an insufficient volume of sales in order to provide any concrete evidence as to the distance of influence on property prices.

The mandatory minimum noise set back distance, based on the new Ontario guideline from wind turbines to the closest Point of Reception (neighbouring house), is 550 meters. This new set back distance may differ with set backs in other locales. The present suggested setback distance was arbitrarily determined. Absent concrete data gleaned from the market place in terms of the minimal distance of influence (if there is one) it seems unreasonable to some developers that increased boundary lines be set.

A more detailed scoring system to encompass the subtle differences may be required. The site inspection of the sale properties disclosed varying degrees of influence. For example; some had visible views of wind turbines from the driveway and others only from the rear yard. Some had views of wind turbines only when approaching or leaving a property. Some properties were proximate to wind turbines but they were not visible or audible as they were separated by trees. These subtle differences may play a role in analyzing the effect of wind farms on property values. Close proximity to a wind farm development may be a factor, but in future studies the criterion used for scoring the degree of influence requires careful consideration.

If turbine noise is deemed to be a factor to be scored, the relationship of the prevailing winds to the nearby properties may also have to be taken into account. The relationship of wind speed to turbine noise may also need study. Future studies may require mapping the sound measurement results within the viewshed of the wind farms located within the area under study. Wind turbine attributes may also need to be considered in the future.

At a public hearing attended by the authors, a neighbouring complainant suggested that vibrations from the turbines were bothersome. If vibrations are found to be a factor to be analysed, the nature of the subsoil conditions may have to be considered for their influence on the transmission of the vibrations. A clayey subsoil material may have a different influence on the transmission of vibrations than say bedrock.

The proximity of a wind farm development to a property sale may show improvement by using a more comprehensive scoring system, but its reliability is ultimately base in the volume of supporting market driven data.

When a sale property near a wind farm is consummated, an important question in future studies may be the volume of available of competing listings of a similar nature, and their influence on the buyer's decision. Were there a number of listings available to the buyer at the time of the sale within the area of the viewshed, and what influence might they have had on the sale price?

In future wind farm studies specific attention to the influence on the price paid by a buyer of the length of time the property was exposed for sale on the market may be required. The exposure/listing times of the sale properties may need to be examined in the sales groupings, both in and out of the viewshed. As noted earlier in this report, there are many factors that can influence the length of marketing exposure. It may be necessary to consider these factors and determine, if possible, if a lower selling price was related to any specific factor or simply if the property became "stale" on the market. Extended listing times can lead buyers to perceptions of problems that may not exist.

The sale date of the property within the viewshed relative to the time of the year may be worthy of further study. During the summer months property owners and buyers are more mobile or spend more time out of doors. During winter months there can be less tree foliage making the turbines more visible, yet there may be less emphasis on surroundings and a greater focus on other amenities that a given property offers. An analysis to consider if buyers are more sensitive to wind farms during different periods in a given year may be worthy of consideration.

APPLICABILITY OF STUDY RESULTS TO OTHER REGIONS

This study focused only on the influence of wind farm development along the north shore of Lake Erie in the Chatham-Kent area of Ontario. The study results derived from market evidence in this area may not be relevant to other regions of Ontario or Canada. Differences may arise due to variations in:

- socio-economic influences
- Wind directions
- subsoil conditions
- tower heights
- turbine models
- turbine age

- volume of competing listing of properties available for sale
- jurisdictional set back requirements from property lines or neighbouring properties
- area topography
- tree lines and bush lots

As a result of differences in some of these variables there may well be dissimilar study results. Caution should be used before suggesting that similar results would be found in other areas.

CONTINGENT AND LIMITING CONDITIONS

1. This consulting report is not valid unless original signatures are evident.

2. It is assumed that the market considers the sub-soil as good and acceptable. No responsibility has been assumed for the requirements of government, public or private bodies.

3. The presence of any potentially hazardous materials on the properties studied was not apparent or evident during the property inspection. Unless expressly noted, no on-site soil investigation has been undertaken on behalf of the authors, nor are they aware of any test results obtained in the past by others. Unless stated otherwise, the authors assume there are no unusual subsoil conditions or hazardous waste contaminants, which would adversely affect any future use of these sites, or adversely impact on the health of occupants, and no warranty or representation is made as to the environmental integrity of the subject parcels. We are not qualified to detect the existence of such substances.

4. All data used and described herein whether provided for this appraisal or obtained in the market place is assumed to be correct and reliable.

5. Property rights being studied are those of the “Fee Simple” interest. The authors assume no responsibility for matters, which are legal in character. The legal description is assumed to be correct.

6. The authors are not required to give testimony or attendance in court by reason of the appraisal, with reference to this study or the properties analysed therein, unless arrangements have been made previously.

7. Maps, plans, and surveys, etc. that may be in this report are included to assist the reader in visualizing the information and are not warranted as to their accuracy.

8. It is assumed that the properties comply in all material respects with all the requirements of law, including zoning, land classification, building, planning, fire and health by-laws, rules, regulations, orders, Acts and codes of all federal, provincial, regional, and municipal governmental authorities having jurisdiction with respect thereto.

9. It is assumed that, save and except for encumbrances as may be permitted, and explained in this report, there are no easements, rights-of-way, building restrictions or other restrictions so affecting the properties referenced herein as to prevent or adversely affect their operation or so as to materially and adversely affect market value.

10. This report has been prepared on behalf of the Canadian Wind Energy Association. No other third party may rely on this report unless they receive written permission by the study authors. Any liability from unauthorized use is strictly denied. The authors of this report, George Canning and Canning Consultants Inc. and L. John Simmons and John Simmons Realty Services Ltd., accept no warranties, expressed or implied, with respect to the use or interpretation of this report by any third party. Any questions related to this report should be directed to the Canadian Wind Energy Association.

CERTIFICATION

RE: WIND FARM STUDY – IMPACT ON REAL ESTATE VALUES

We certify that to the best of our knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, opinions and conclusions.
- We have no present or prospective interest in the parcels that are the subject of this report, and have no personal interest with respect to the parties involved.
- We have no bias with respect to the properties that are the subject of this report or to the parties involved with this assignment.
- Our engagement in and compensation for this assignment were not contingent upon developing or reporting of predetermined results, the amount of the value estimates, or a conclusion favouring the client.
- Our analyses, opinions, and conclusions were developed, and this Consulting Report has been prepared, in conformity with the *Canadian Uniform Standards of Professional Appraisal Practice*. The Appraisal Institute of Canada retains the right to review this report.
- We have the knowledge and experience to complete the assignment competently.
- As of the date of this report both, L. J. (John) Simmons, AACI and George Canning, AACI, have fulfilled the requirements of The Appraisal Institute of Canada Mandatory Recertification Program for designated members.
- The undersigned inspected the properties identified herein on various dates in the months of May and June 2009.

By reason of our investigation and by virtue of our experience, we have been able to form and have formed the opinions set out in this report.

Using the time period June 2009, the estimated impact on the property values, as analysed herein simply states that: No empirical evidence can be drawn from the Chatham-Kent market place to suggest that wind turbines have a negative effect on the sale prices of rural residential properties

By reason of our investigation and by virtue of our experience, we have been able to complete a Consulting Report setting out opinions and property sales evidence to assist the addressee herein in considering the impacts on certain property values. This report should ***not*** be construed as an appraisal report setting out an opinion of Market Value, and should ***not*** be relied upon by others for any reason except as provided for herein.

The findings set out in this report are subject to the Critical and Extraordinary Assumptions, as well as the usual limiting conditions and underlying assumptions as outlined herein. The authors reserve the right to revise the opinions in light of any facts and conditions that become known subsequent to the date of this report, which have an impact on the conclusions reached.

John Simmons Realty Services Ltd.

L. J. (John) Simmons, AACI, FRI, CMR, PLE
Dated: February 4, 2010

Canning Consultants Inc.

George Canning, AACI, P.App, PLE
Dated: February 4, 2010

ADDENDUM "A" – PRIVACY STATEMENT

PRIVACY STATEMENT

John Simmons Realty Services Ltd. and **Canning Consultants Inc** have privacy policies in accord with legislation as it affects the **Personal Information Protection and Electronic Documents Act (PIPEDA)**. In general, the firms deal with the collection, use, and distribution of commercial rather than personal information. In the event that personal or sensitive data may be required to properly complete an assignment, the policies recognizes that consent is required for information that:

1. permits someone to learn sensitive, private information;
2. relates to a natural person; and
3. permits the identification of that person.

In accord with corporate policy, therefore, information provided by our clients will be used, secured and maintained based on criteria which include:

- limited use, only the data needed to complete the assignment is required.
- obtaining consent with respect to use of sensitive personal information about an identifiable individual (does not include the name, title, business address, or telephone number of an employee of an organization).
- non-disclosure of files, (subject to Law, or review by authorized representative of ***Appraisal Institute of Canada*,** the Courts, Provincial or Federal agencies that have appropriate jurisdiction).
- the use of facts in the public domain as part of the appraisal process.
- information retained in our database that is relevant only to the subject property.
- tight control in the production of reports, and distribution only as authorized by the Client.

ADDENDUM "B" – AUTHORS QUALIFICATIONS

CANNING CONSULTANTS, INC

The firm has been in existence for seven years. Its principal, George Canning has been in the appraisal/real estate consulting business for 25 years and was a partner in one of the largest real estate firms in Southwestern Ontario. Recognizing that the needs of the clients were not being met by traditional valuation methodologies, this firm was organized to provide specialty consulting services. Solutions to complex real estate problems using modern techniques are now required to address those real estate issues that in the past could not be reliably solved.

Canning Consultants, Inc. is one of a very few fee based real estate consulting Companies that employs modern statistical methods and modeling tools with a common sense approach based upon many years of analyzing real estate.

George Canning, AACI, PAPP, PLE

2006 Designated Ontario Land Economist.

2006 Received designation of DAC.

2005 Elected as Regional Director to the Association of the Appraisal Institute of Canada-Ontario.

2004 Wrote a long distance learning course for the American Institute of Appraisers on Quality Point-a Direct Comparison Approach to Value.

2004 Appointed to the Professional Development Committee for the Ontario Association of the Appraisal Institute of Canada-Ontario for a one year term.

2004 Appointed to the Professional Steering Committee for the Appraisal Institute of Canada to chart the future course of the industry.

2004 Guest speaker at the 2004 world joint AIC/USA Appraisal Conference to be held in Toronto, Ontario June 24-27, 2004.

2004	Guest Lecturer in Kingston on March 5, 2004. Quality Point Analysis, on behalf of the Appraisal Institute of Canada.
2003	Guest Lecturer in Hamilton November 7, 2003. Quality Point, Exploratory Data Analysis, and AMV, on behalf of the Appraisal Institute of Canada.
2003	Guest Lecturer in Ottawa November 21, 2003. Regression Analysis on behalf of the Appraisal Institute of Canada.
2002 to 2004	Elected to the Board of Directors-National Governing Council.
2002	Guest Lecturer in Ottawa, Ontario on the behalf of the Appraisal Institute of Canada. The topic is an Introduction to Regression Analysis and Qualitative and Quantitative Comparative Analysis.
2002	Guest Lecturer in Halifax, Ontario on the behalf of the Appraisal Institute of Canada. The topic is an Introduction to Regression Analysis and Qualitative and Quantitative Comparative Analysis.
2001	Contributed to a new text book on Real Estate Appraising through the University of British Columbia. The material is on Automatic Valuation Models.
2001	Guest Lecturer at Trent University on the behalf of the Appraisal Institute of Canada. The topic is about Qualitative and Quantitative Comparative Analysis.
2000	Teaching 'Introduction to Linear Regression' through Fanshawe College's London and Middlesex Continuing Education Course Program.
1999	Teaching 'Introduction to Linear Regression' through Fanshawe College's London and Middlesex Continuing Education Course Program.
1998-Pres	Teaching 'Investing In Real Estate' through Fanshawe College's London and Middlesex Continuing Education Course Program.
1998 - Pres	Associated Member of the London St. Thomas Real Estate Board

1997 Granted Professional Appraiser by the Appraisal Institute of Canada (P.App)

1997 National Investigations Committee for the Appraisal Institute of Canada (One Year Term)

1996 to 1998 Appointed Executive Director of the London Chapter of the Appraisal Institute of Canada

1994 to Present Provincial Admissions Committee for CRA and AACI candidates (Appraisal Institute of Canada)

1988 to 1998 Certified Instructor for the Ontario Real Estate Association (Real Estate Appraisal Course)

1987 Granted AACI Designation (Accredited Appraiser Canadian Institute)

1983 Granted CRA Designation (Canadian Residential Appraiser)

STUDIES & PUBLISHED ARTICLES

The following list involved studies in which Regression analysis was used:

Studied the Effects of Potential Real Estate Loss on Housing in Cambridge, Ontario as a result of a Gas Spill.

Studied the Impact of Urea Formaldehyde on Residential Housing in London, Ontario.

Determine the Effect on Value over the Loss of On Site Parking of a Dental Building in London, Ontario.

Determined the Impact of the Loss of Front Yard Depth on Residential Housing for Expropriation in London, Ontario.

Determined the Impact of the Loss of Trees on Residential Housing for Expropriation in London, Ontario.

Determined the Impact of the Increase in Traffic Flow as a Result of the Taking of Land for Road Widening in London, Ontario.

Determined the Impact on Value of Subdivision Lots that Back onto Green Space in London, Ontario.

Determined the Impact of Underground Easements on Residential Property Values in London, Ontario.

Determined the Impact of Mutual Driveways on Residential Property Values in London, Ontario.

Determined the Contribution to Old Farm Buildings on Rural Property Values in South Western Ontario.

Contributed to summary results of the impact of tainted water on Walkerton, Ontario.

Determined the Impact of Property Values in Proximity to Garbage Dumps.

Determined the Loss in Value as a result of a new home being hit by an unattended semi trailer truck.

Determined the Impact on Value of Hydro Easements on Farm Properties in the Lambton County.
Determined the Change in Price Levels of Housings with Selling Prices between $400,000 to $600,000 in the City of London between 2001 and 2005.

Completed a province wide study in conjunction with the University of Waterloo on the impact of heritage designations of real property.

In addition,

Co-wrote courses on Data Analysis and Investigation presented through the AIC.

Co-wrote courses on Regression Analysis presented through the AIC.

Published articles include the "Impact on Hydro Lines" and a "20 Year Study of the Apartment Market in the City of London". Other articles have been written for private organizations such as the Canadian Car Wash Association of Ontario and the Ontario Private Campground Association. The topics were valuing car washes, and valuing public recreational campgrounds.

An article was written for the Appraisal Institute of Canada on the" Contemporary Direct Comparison Approach to Value". It was published in the Canadian Appraiser Fall 2000. It was recently published in "Readings in Real Estate", Fourth Edition.

Based upon the application of the multiple regression technique, a major assessment appeal case was won regarding the valuation of many office buildings in London, Ontario. The result was a saving of $1,000,000 in tax for the clients.

L. JOHN SIMMONS, AACI, FRI, CMR, PLE

Memberships and Affiliations

Accredited Member of the Appraisal Institute of Canada #723. (February 1969)

Fellow of the Real Estate Institute of Canada – Marketing. (January 1971)

Charter Member of the Association of Ontario Land Economists. (April 1970)

Active Member of the London & St. Thomas Real Estate Board. (April 1971)

Licensed Real Estate Broker. (April 1971)

Associate Member of the Canadian Association of Real Estate Boards.

Director of the St. Clair Region Conservation Foundation.

Past Regional Vice President of the Ontario Expropriation Association.

Background

Real Estate Appraisal Courses of the Appraisal Institute of Canada at Toronto 1963 to 1965.

Courses in Business Law, Sociology, Industrial Real Estate, at York University, 1967 to 1970.

Obtained Real Estate Sales Licence 1967. Broker since 1971.

Arbitration Courses I & II (AMIO) at University of Western Ontario 1996/97. Has acted as a sole arbitrator.

Past lecturer for Real Estate Appraisal courses at the University of Western Ontario on behalf of the Appraisal Institute of Canada.

Past Chairman and Director of the London & District Chapter of the Real Estate Institute of Canada.

Past member of AIC Professional Standards Investigating Committee.

Past Chairman of the London Chapter of the Appraisal Institute of Canada, 1986.

L. John Simmons – Overview of Professional Experience

Founder of the L. J. Simmons Group and its predecessor companies. President of John Simmons Realty Services Ltd. Has provided Real Estate Consulting and Fee Appraisal services continuously since 1962 for clients, including:

- Federal Government Departments and Corporations;
- Provincial Government Ministries, Departments, and Agencies;
- Various First Nation Councils;
- Power and Utility Corporations;
- Various Conservation Authorities;
- Counties, Cities, Towns, and other Municipal Corporations;
- Various Universities, and Boards of Education;
- Various National and International Corporations, Developers, Lawyers, Industries, Accountants; and
- Banks and financial and lending institutions.

Appraisal and Consulting services provided to the Corporation's clients have included the following:

- expert witness testimony before various courts, boards, and other tribunals;
- case analysis for damage, loss of use and injurious affection claims;
- valuation estimates for property purchase and sale;
- multi property land assembly projects;
- municipal redevelopment and rehabilitation projects;
- natural resource and recreational land valuations;
- utility corridors, right of way and flood easement acquisition and expropriation appraisals;
- subdivision of land;
- public and private institutional property valuations;
- senior citizens housing projects;
- feasibility studies and market analyses;
- investment analyses, benefit and cost studies;
- leasehold valuations and rental property analyses;
- assessment review;
- valuation estimates for relocation and mortgage financing;
- industrial and commercial property valuations;
- valuations of equipment, machinery and industrial assets;
- divorce and estate settlements; and
- property and fire insurance claim appraisals;
- forensic reviews of appraisal reports and purchase agreements; and
- structuring agreements of purchase and sale.

IBI GROUP

ELECTRICAL ENERGY RELATED EXPERIENCE

Enbridge Wind Power Project
In 2006, IBI Group was retained by Enbridge Ontario Wind Power L.P. to undertake land use planning approvals for the Kincardine Wind Farm that involved 120 wind turbines and the production of 181.5 Megawatts of power on 4,100 hectares of farm land located east of the Lake Huron shoreline. This undertaking involved preparing zoning by-law regulations, preparing background reports, and presenting at public meetings. As large scale wind farms are a relatively new land use throughout Ontario, community acceptance of the wind farms has been mixed. As a result, the Kincardine project was appealed to the Ontario Municipal Board for adjudication. For the Hearing, IBI Group undertook and was responsible for OMB Witness Statement, evidence preparation, individual turbine setback analysis, shadow flicker impact analysis, ice throw impact analysis, noise impact analysis, zoning by-law amendment revisions, emergency procedures, and dispute resolution protocol.

Township of Malahide and Municipality of Bayham: Wind Energy Official Plan Policies
The development of electrical wind energy systems is growing in southern Ontario. The prevailing winds along the Great Lakes shoreline are a natural resource with investment opportunity for commercial wind farm development. Wind farm development provides economic and tax benefits to the local municipality. IBI Group has researched wind generation systems for Council, municipal staff and community members of both the Township of Malahide and Municipality of Bayham, and developed Official Plan policies, Zoning regulations and Site Plan Agreements that meet community needs. These planning tools balance the environmental and economic benefits with potential site specific impacts of the turbine.

Ontario Power Authority – Planning for Electrical Infrastructure: A Review of Selected Municipalities in Southern Ontario

IBI Group was retained by the Ontario Power Authority (OPA) in November, 2008 to provide “The Services of An Urban Planner” within the following three streams of work:

Municipal Specific Infrastructure Siting Research;

Advice and Counsel in respect to urban planning issues; and

- Advice and Counsel in the development of a workshop aimed at improving the knowledge of municipal planners in respect to generic electricity infrastructure project siting.

Through a comprehensive evaluation of current Provincial, Regional and local policies and Zoning By-Laws, and planning approval processes, this report is intended to assist the OPA in identifying opportunities and constraints within the overall planning framework for developing a new cogeneration natural gas-fired electrical generation facility and possible transmission upgrades within Study Area 1 (Southwest Toronto, Southern Mississauga, Southeast Oakville) and Study Area 2 (Waterloo, Kitchener, Cambridge, Township of North Dumfries, Township of Woolwich, Guelph).

North Dumfries Energy Centre: Peaking Power Generation Facility

The North Dumfries Energy Centre site is located on Dundas Street South in the Township of North Dumfries. This project is being proposed by CPV Canada Development in attempt to address the increased load growth in the Region of Waterloo. IBI Group's responsibilities include the overall project management of the planning process and planning approvals including Amendment to the Township Official Plan, Amendment to the Township Zoning By-Law, and final Site Plan Approval. IBI Group's responsibilities also included planning and public consultation, on-site analysis with respect to site specific land use compatibility and good planning practices.

Nanticoke Energy Centre: Combined Cycle Facility

The Nanticoke Energy Centre site is located on Haldimand Road 55, north of the Nanticoke settlement area. This project is being proposed by CPV Canada Development in attempt to address the need for an additional supply of electricity, and a renewal of significant components of the province's electricity generation infrastructure. For this project, IBI Group's responsibilities include the overall project management of the planning process and planning approvals including Amendment to the County Official Plan, Amendment to the local Zoning By-Law, and final Site Plan Approval. IBI Group's responsibilities also included planning and public consultation as well as on-site analysis with respect to site specific land use compatibility and good planning practices.

ADDENDUM "C" – REFERENCED STUDIES

Reports Reviewed

1. Noise Radiation from Wind Turbines Installed Near Homes: Effect on Health; Barbara J Frey, BA, MA, and Peter J Hadden, BSc, FRICS, Feb 2007

2. Poletti and Associates, Inc. January 2007 - A Real Estate Study of the Proposed White Oak Wind Energy Center, McLean and Woodford Counties, Illinois.

3. Bard College Study April 2006 Madison New York.

4. Land Value Impact of Wind Farm Development – Crookwell New South Wales (Australia); Henderson & Horning Pty Ltd. February 2006.

5. Impact of wind farms on the value of residential property and agricultural land; RICS survey.

6. Wind Turbines and Infrasound; Howe Castmeier Chapnik Limited, November 29, 2006.

7. Property Value Study: The Relationship of Windmill Development and Market Prices; Peter Bobechko, AACI, P. App, of Blake, Matlock and Marshall Ltd. September 2006.

8. Living with the Impact of Windmills. (Slide presentation) Chris Luxemburger, real estate agent with Sutton Group.

9. Impact of Wind Turbines on Market value of Texas Rural Land. (Slide presentation) Derry T. Gardner of Gardner Appraisal Group Inc. Feb 15, 2009.

10. Property Stigma – Just the latest Fashion : Wind Farms & House Prices in the UK; Sally Sims and Peter Dent (Oxford University) September 2007.

11. Modelling the impact of wind farms on house prices in the UK. Sally Sims & Peter Dent, December 2008.

12. The effect of Wind Development on Local Property Values. Renewable Energy Policy Project study; George Sterzinger, Frederic Beck and Damian Kostiuk. May 2003.

ADDENDUM "D" – ONTARIO GOVERNMENT DOCUMENTS

Documents Reviewed

1. The Green Energy Act, 2009.

2. Noise Guidelines for Wind Farms: Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities. Ministry of the Environment, October 2008.

3. Noise Modelling Approach for On-Shore Wind Farms; June 2009.

4. Proposed content for Renewable Energy Approval Regulation under the Environmental Protection Act. June 9, 2009.

The Potential Health Impact of Wind Turbines

Chief Medical Officer of Health (CMOH) Report

May 2010

Summary of Review

This report was prepared by the Chief Medical Officer of Health (CMOH) of Ontario in response to public health concerns about wind turbines, particularly related to noise.

Assisted by a technical working group comprised of members from the Ontario Agency for Health Protection and Promotion (OAHPP), the Ministry of Health and Long-Term Care (MOHLTC) and several Medical Officers of Health in Ontario with the support of the Council of Ontario Medical Officers of Health (COMOH), this report presents a synopsis of existing scientific evidence on the potential health impact of noise generated by wind turbines.

The review concludes that while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying.

1

Introduction

In response to public health concerns about wind turbines, the CMOH conducted a review of existing scientific evidence on the potential health impact of wind turbines in collaboration and consultation with a technical working group composed of members from the OAHPP, MOHLTC and COMOH.

A literature search was conducted to identify papers and reports (from 1970 to date) on wind turbines and health from scientific bibliographic databases, grey literature, and from a structured Internet search. Databases searched include MEDLINE, PubMed, Environmental Engineering Abstracts, Environment Complete, INSPEC, Scholars Portal and Scopus. Information was also gathered through discussions with relevant government agencies, including the Ministry of the Environment and the Ministry of Energy and Infrastructure and with input provided by individuals and other organizations such as Wind Concerns Ontario.

In general, published papers in peer-reviewed scientific journals, and reviews by recognized health authorities such as the World Health Organization (WHO) carry more weight in the assessment of health risks than case studies and anecdotal reports.

The review and consultation with the Council of Ontario Medical Officers of Health focused on the following questions:

- What scientific evidence is available on the potential health impacts of wind turbines?
- What is the relationship between wind turbine noise and health?
- What is the relationship between low frequency sound, infrasound and health?
- How is exposure to wind turbine noise assessed?
- Are Ontario wind turbine setbacks protective from potential wind turbine health and safety hazards?
- What consultation process with the community is required before wind farms are constructed?
- Are there data gaps or research needs?

The following summarizes the findings of the review and consultation.

2 Wind Turbines and Health

2.1 Overview

A list of the materials reviewed is found in Appendix 1. It includes research studies, review articles, reports, presentations, and websites.

Technical terms used in this report are defined in a Glossary (Page 11).

The main research data available to date on wind turbines and health include:

- Four cross-sectional studies, published in scientific journals, which investigated the relationships between exposure to wind turbine noise and annoyance in large samples of people (351 to 1,948) living in Europe near wind turbines (see section 2.2).
- Published case studies of ten families with a total of 38 affected people living near wind turbines in several countries (Canada, UK, Ireland, Italy and USA) (Pierpont 2009). However, these cases are not found in scientific journals. A range of symptoms including dizziness, headaches, and sleep disturbance, were reported by these people. The researcher (Pierpont) suggested that the symptoms were related to wind turbine noise, particularly low frequency sounds and infrasound, but did not investigate the relationships between noise and symptoms. It should be noted that no conclusions on the health impact of wind turbines can be drawn from Pierpont's work due to methodological limitations including small sample size, lack of exposure data, lack of controls and selection bias.
- Research on the potential health and safety hazards of wind turbine shadow flicker, electromagnetic fields (EMFs), ice throw and ice shed, and structural hazards (see section 2.3).

A synthesis of the research available on the potential health impacts of exposure to noise and physical hazards from wind turbines on nearby residents is found in sections 2.2 and 2.3, including research on low frequency sound and infrasound. This is followed by information on wind turbine regulation in Ontario (section 3.0), and our conclusions (section 4.0).

2.2. Sound and Noise

Sound is characterized by its sound pressure level (loudness) and frequency (pitch), which are measured in standard units known as decibel (dB) and Hertz (Hz), respectively. The normal human ear perceives sounds at frequencies ranging from 20Hz to 20,000 Hz. Frequencies below 200 Hz are commonly referred to as "low frequency sound" and those below 20Hz as "infrasound," but the boundary between them is not rigid. There is variation between people in their ability to perceive sound. Although generally considered inaudible, infrasound at high-enough sound pressure levels can be audible to some people. Noise is defined as an unwanted sound (Rogers et al. 2006, Leventhall 2003).

Wind turbines generate sound through mechanical and aerodynamic routes. The sound level depends on various factors including design and wind speed. Current generation upwind model turbines are quieter than older downwind models. The dominant sound source from modern wind turbines is aerodynamic, produced by the rotation of the turbine blades through air. The aerodynamic noise is present at all frequencies, from infrasound to low frequency to the normal audible range, producing the characteristic "swishing" sound (Leventhall 2006, Colby et al. 2009).

Environmental sound pressure levels are most commonly measured using an A-weighted scale. This scale gives less weight to very low and very high frequency components that is similar to the way the human ear perceives sound. Sound levels around wind turbines are usually predicted by modelling, rather than assessed by actual measurements.

The impact of sound on health is directly related to its pressure level. High sound pressure levels (>75dB) could result in hearing impairment depending on the duration of exposure and sensitivity of the individual. Current requirements for wind turbine setbacks in Ontario are intended to limit noise at the nearest residence to 40 dB (see section 3). This is a sound level comparable to indoor background sound. This noise limit is consistent with the night-time noise guideline of 40 dB that the World Health Organization (WHO) Europe recommends for the protection of public health from community noise. According to the WHO, this guideline is below the level at which effects on sleep and health occurs. However, it is above the level at which complaints may occur (WHO 2009).

Available scientific data indicate that sound levels associated with wind turbines at common residential setbacks are not sufficient to damage hearing or to cause other direct adverse health effects, but some people may still find the sound annoying.

Studies in Sweden and the Netherlands (Pedersen et al. 2009, Pedersen and Waye 2008, Pedersen and Waye 2007, Pedersen and Waye 2004) have found direct relationships between modelled sound pressure level and self-reported perception of sound and annoyance. The association between sound pressure level and sound perception was stronger than that with annoyance. The sound was annoying only to a small percentage of the exposed people; approximately 4 to 10 per cent were very annoyed at sound levels between 35 and 45dBA. Annoyance was strongly correlated with individual perceptions of wind turbines. Negative attitudes, such as an aversion to the visual impact of wind turbines on the landscape, were associated with increased annoyance, while positive attitudes, such as direct economic benefit from wind turbines, were associated with decreased annoyance. Wind turbine noise was perceived as more annoying than transportation or industrial noise at comparable levels, possibly due to its swishing quality, changes throughout a 24 hour period, and lack of night-time abatement.

2.2.1 Low Frequency Sound, Infrasound and Vibration

Concerns have been raised about human exposure to “low frequency sound” and “infrasound” (see section 2.2 for definitions) from wind turbines. There is no scientific evidence, however, to indicate that low frequency sound generated from wind turbines causes adverse health effects.

Low frequency sound and infrasound are everywhere in the environment. They are emitted from natural sources (e.g., wind, rivers) and from artificial sources including road traffic, aircraft, and ventilation systems. The most common source of infrasound is vehicles. Under many conditions, low frequency sound below 40Hz from wind turbines cannot be distinguished from environmental background noise from the wind itself (Leventhall 2006, Colby et al 2009).

Low frequency sound from environmental sources can produce annoyance in sensitive people, and infrasound at high sound pressure levels, above the threshold for human hearing, can cause severe ear pain. There is no evidence of adverse health effects from infrasound below the sound pressure level of 90dB (Leventhall 2003 and 2006).

Studies conducted to assess wind turbine noise indicate that infrasound and low frequency sounds from modern wind turbines are well below the level where known health effects occur, typically at 50 to 70dB.

A small increase in sound level at low frequency can result in a large increase in perceived loudness. This may be difficult to ignore, even at relatively low sound pressures, increasing the potential for annoyance (Jakobsen 2005, Leventhall 2006).

A Portuguese research group (Alves-Pereira and Castelo Branco 2007) has proposed that excessive long-term exposure to vibration from high levels of low frequency sound and infrasound can cause whole body system pathology (vibro-acoustic disease). This finding has not been recognized by the international medical and scientific community. This research group also hypothesized that a family living near wind turbines will develop vibro-acoustic disease from exposure to low frequency sound, but has not provided evidence to support this (Alves-Pereira and Castelo Branco 2007).

2.2.2 Sound Exposure Assessment

Little information is available on actual measurements of sound levels generated from wind turbines and other environmental sources. Since there is no widely accepted protocol for the measurement of noise from wind turbines, current regulatory requirements are based on modelling (see section 3.0).

2.3 Other Potential Health Hazards of Wind Turbines

The potential health impacts of electromagnetic fields (EMFs), shadow flicker, ice throw and ice shed, and structural hazards of wind turbines have been reviewed in two reports (Chatham-Kent Public Health Unit 2008; Rideout et al 2010). The following summarizes the findings from these reviews.

- **EMFs**
  Wind turbines are not considered a significant source of EMF exposure since emissions levels around wind farms are low.

- **Shadow Flicker**
  Shadow flicker occurs when the blades of a turbine rotate in sunny conditions, casting moving shadows on the ground that result in alternating changes in light intensity appearing to flick on and off. About 3 per cent of people with epilepsy are photosensitive, generally to flicker frequencies between 5-30Hz. Most industrial turbines rotate at a speed below these flicker frequencies.

- **Ice Throw and Ice Shed**
  Depending on weather conditions, ice may form on wind turbines and may be thrown or break loose and fall to the ground. Ice throw launched far from the turbine may pose a significant hazard. Ice that sheds from stationary components presents a potential risk to service personnel near the wind farm. Sizable ice fragments have been reported to be found within 100 metres of the wind turbine. Turbines can be stopped during icy conditions to minimize the risk.

- **Structural hazards**
  The maximum reported throw distance in documented turbine blade failure is 150 metres for an entire blade, and 500 metres for a blade fragment. Risks of turbine blade failure reported in a Dutch handbook range from one in 2,400 to one in 20,000 turbines per year (Braam et al 2005). Injuries and fatalities associated with wind turbines have been reported, mostly during construction and maintenance related activities.

3 Wind Turbine Regulation in Ontario

The Ministry of the Environment regulates wind turbines in Ontario. A new regulation for renewable energy projects came into effect on September 24, 2009. The requirements include minimum setbacks and community consultations.

3.1 Setbacks

Provincial setbacks were established to protect Ontarians from potential health and safety hazards of wind turbines including noise and structural hazards.

The minimum setback for a wind turbine is 550 metres from a receptor. The setbacks rise with the number of turbines and the sound level rating of the selected turbines. For example, a wind project with five turbines, each with a sound power level of 107dB, must have its turbines setback at a minimum 950 metres from the nearest receptor.

These setbacks are based on modelling of sound produced by wind turbines and are intended to limit sound at the nearest residence to no more than 40 dB. This limit is consistent with limits used to control noise from other environmental sources. It is also consistent with the night-time noise guideline of 40 dB that the World Health Organization (WHO) Europe recommends for the protection of public health from community noise. According to the WHO, this guideline is below the level at which effects on sleep and health occurs. However, it is above the level at which complaints may occur (WHO 2009).

Ontario used the most conservative sound modelling available nationally and internationally, which is supported by experiences in the province and in other jurisdictions (MOE 2009). As yet, a measurement protocol to verify compliance with the modelled limits in the field has not been developed. The Ministry of the Environment has recently hired independent consultants to develop a procedure for measuring audible sound from wind turbines and also to review low frequency sound impacts from wind turbines, and to develop recommendations regarding low frequency sound.

Ontario setback distances for wind turbine noise control also take into account potential risk of injury from ice throw and structural failure of wind turbines. The risk of injury is minimized with setbacks of 200 to 500 metres.

3.2 Community Consultation

The Ministry of the Environment requires applicants for wind turbine projects to provide written notice to all assessed land owners within 120 metres of the project location at a preliminary stage of the project planning. Applicants must also post a notice on at least two separate days in a local newspaper. As well, applicants are required to notify local municipalities and any Aboriginal community that may have a constitutionally protected right or interest that could be impacted by the project.

Before submitting an application to the Ministry of the Environment, the applicant is also required to hold a minimum of two community consultation meetings to discuss the project and its potential local impact. To ensure informed consultation, any required studies must be made available for public review 60 days prior to the date of the final community meeting. Following these meetings the applicant is required to submit as part of their application a Consultation Report that describes the comments received and how these comments were considered in the proposal.

The applicant must also consult directly with local municipalities prior to applying for a Renewable Energy Approval on specific matters related to municipal lands, infrastructure, and services. The Ministry of the Environment has developed a template, which the applicant is required to use to document project-specific matters raised by the municipality. This must be submitted to the ministry as part of the application. The focus of this consultation is to ensure important local service and infrastructure concerns are considered in the project.

For small wind projects (under 50 kW) the public meeting requirements above are not applicable due to their limited potential impacts.

4

Conclusions

The following are the main conclusions of the review and consultation on the health impacts of wind turbines:

- While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects.
- The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct adverse health effects. However, some people might find it annoying. It has been suggested that annoyance may be a reaction to the characteristic "swishing" or fluctuating nature of wind turbine sound rather than to the intensity of sound.
- Low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects.
- Community engagement at the outset of planning for wind turbines is important and may alleviate health concerns about wind farms.
- Concerns about fairness and equity may also influence attitudes towards wind farms and allegations about effects on health. These factors deserve greater attention in future developments.

The review also identified that sound measurements at residential areas around wind turbines and comparisons with sound levels around other rural and urban areas, to assess actual ambient noise levels prevalent in Ontario, is a key data gap that could be addressed. An assessment of noise levels around wind power developments and other residential environments, including monitoring for sound level compliance, is an important prerequisite to making an informed decision on whether epidemiological studies looking at health outcomes will be useful.

Glossary

A-weighted decibels (dBA)
The sound pressure level in decibels as measured on a sound level meter using an A-weighted filter. The A-weighted filter de-emphasizes the very low and very high frequencies of the sound in a manner similar to the frequency response of the human ear.

Decibel (dB)
Unit of measurement of the loudness (intensity) of sound. Loudness of normal adult human voice is about 60-70 dB at three feet. The decibel scale is a logarithmic scale and it increases/decreases by a factor of 10 from one scale increment to the next adjacent one.

Downwind model turbines
Downwind model turbines have the blades of the rotor located behind the supporting tower structure, facing away from the wind. The supporting tower structure blocks some of the wind that blows towards the blades.

Electromagnetic fields (EMFs)
Electromagnetic fields are a combination of invisible electric and magnetic fields. They occur both naturally (light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF.

Grey literature
Information produced by all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishing, i.e., where publishing is not the primary activity of the producing body.

Hertz (Hz)
A unit of measurement of frequency; the number of cycles per second of a periodic waveform.

Infrasound
Commonly refers to sound at frequencies below 20Hz. Although generally considered inaudible, infrasound at high-enough sound pressure levels can be audible to some people.

Low frequency sound
Commonly refers to sound at frequencies between 20 and 200 Hz.

Noise
Noise is an unwanted sound.

Shadow Flicker
Shadow flicker is a result of the sun casting intermittent shadows from the rotating blades of a wind turbine onto a sensitive receptor such as a window in a building. The flicker is due to alternating light intensity between the direct beam of sunlight and the shadow from the turbine blades.

Sound
Sound is wave-like variations in air pressure that occur at frequencies that can be audible. It is characterized by its loudness (sound pressure level) and pitch (frequency), which are measured in standard units known as decibel (dB) and Hertz (Hz), respectively. The normal human ear perceives sounds at frequencies ranging from 20Hz to 20,000 Hz.

Upwind model turbines
Upwind model turbines have the blades of the rotor located in front of the supporting tower structure, similar to how a propeller is at the front of an airplane. Upwind turbines are a modern design and are quieter than the older downwind models.

Wind turbine
Wind turbines are large towers with rotating blades that use wind to generate electricity.

Appendix 1: List of Documents on Wind Turbines

Journal Articles and Books

Braam HGJ, et al. Handboek risicozonering windturbines. Netherlands: SenterNovem; 2005.

Jakobsen J. Infrasound emission from wind turbines. *J Low Freq Noise Vib Active Contr*. 2005;24(3):145-155.

Keith SE, Michaud DS, Bly SHP. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. *J Low Freq Noise Vib Active Control*. 2008;27(4):253-265.

Leventhall G. Infrasound from wind turbines: fact, fiction or deception. *Can Acoust*. 2006;34(2):29-36.

Pedersen E, Hallberg LR-M, Waye KP. Living in the vicinity of wind turbines: a grounded theory study. *Qual Res Psychol*. 2007;4(1-2):49-63.

Pedersen E, Larsman P. The impact of visual factors on noise annoyance among people living in the vicinity of wind turbines. *J Environ Psychol*. 2008;28(4):379-389.

Pedersen E, Persson Waye K. Wind turbines: low level noise sources interfering with restoration? *Environ Res Lett*. 2008;3:015002. Available from: http://www.iop.org/EJ/article/1748-9326/3/1/015002/erl8_1_015002.pdf.

Pedersen E, Persson Waye K. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. *Occup Environ Med*. 2007;64(7):480-6.

Pedersen E, van den Berg F, Bakker R, Bouma J. Response to noise from modern wind farms in The Netherlands. *J Acoust Soc Am*. 2009;126(2):634-43.

Pedersen E, Waye KP. Perception and annoyance due to wind turbine noise – a dose-response relationship. *J Acoust Soc Am*. 2004;116(6):3460-70.

van den Berg GP. Effects of the wind profile at night on wind turbine sound. *J Sound Vib*. 2004;277(4-5):955-970. Available from: http://www.nowap.co.uk/docs/windnoise.pdf.

Grey Literature

Chatham-Kent Public Health Unit. The health impact of wind turbines: a review of the current white, grey, and published literature. Chatham, ON: Chatham-Kent Municipal Council; 2008 [cited 2010 Mar 5]. Available from: http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf.

Colby WD, Dobie R, Leventhall G, Lipscomb DM, McCunney RJ, Seilo MT, et al. Wind turbine sound and health effects. An expert panel review: American Wind Energy Association & Canadian Wind Energy Association; 2009 [cited 2009 Dec 21]. Available from: http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf.

Rideout K, Copes R, Bos C. Wind turbines and health. Vancouver: National Collaborating Centre for Environmental Health; 2010 Jan [cited 2010 Mar 5]. Available from: http://www.ncceh.ca/files/Wind_Turbines_January_2010.pdf.

Wind turbines and Health: a review of evidence. Toronto: Ontario Agency for Health Protection and Promotion; 2009 [cited 2010 Mar 5]. Available from: http://www.oahpp.ca/resources/documents/presentations/2009sept10/Wind%20Turbines%20-%20Sept%2010%202009.pdf.

Environmental Protection Agency, Office of Water. Auxiliary and supplemental power fact sheet: wind turbines. Washington, DC: Environmental Protection Agency; 2007 [cited 2010 Jan 7]. Available from http://www.epa.gov/owm/mtb/wind_final.pdf.

Leventhall G, Pelmear P, Benton S. A review of published research on low frequency noise and its effects. London, England: Department for Environment, Food and Rural Affairs; 2003 [cited 2010 Mar 5]. Contract No.: EPG 1/2/50. Available from: http://www.defra.gov.uk/environment/quality/noise/research/lowfrequency/documents/lowfreqnoise.pdf.

Minnesota Department of Health, Environmental Health Division. Public health impacts of wind turbines.

Saint Paul, MN: Minnesota Department of Commerce, Office of Energy Security; 2009 [cited 2010 Mar 5]. Available from: http://energyfacilities.puc.state.mn.us/documents/Public%20Health%20Impacts%20of%20Wind%20Turbines,%205.22.09%20Revised.pdf.

National Research Council, Committee on Environmental Impacts of Wind-Energy Projects. Environmental impacts of wind-energy projects. Washington, DC: National Academies Press; 2007.

Ontario. Ministry of the Environment. Frequently asked questions: renewable energy approval. Toronto: Queen's Printer for Ontario; 2009. Available from: http://www.ene.gov.on.ca/en/business/green-energy/docs/FAQs%20-final.pdf.

Ontario. Ministry of the Environment. Noise guidelines for wind farms: interpretation for applying MOE NPC publications to wind power generation facilities. Toronto: Queen's Printer for Ontario; 2008 [cited 2010 Mar 5]. Available from: http://www.ene.gov.on.ca/publications/4709e.pdf.

Ontario. Ministry of the Environment. Development of noise setbacks for wind farms: requirements for compliance with MOE noise limits. Toronto, ON: Queen's Printer for Ontario; 2009. Available from http://www.ene.gov.on.ca/en/business/green-energy/docs/WindNoiseSetbacks.pdf.

Pedersen E. Human response to wind turbine noise: perception, annoyance and moderating factors. Göteborg, Sweden: Göteborgs Universitet, Sahlgrenska Acedemy, Department of Public Health and Community Medicine; 2007 [cited 2010 Mar 5]. Available from: http://gupea.ub.gu.se/dspace/bitstream/2077/4431/1/gupea_2077_4431_1.pdf.

Pierpont N. Wind turbine syndrome: a report on a natural experiment [pre-publication draft]. Santa Fe, NM: K-Selected Books; 2009 [cited 2010 Mar 5]. Available from: http://www.windturbinesyndrome.com/wp-content/uploads/2009/03/ms-ready-for-posting-on-wtscom-3-7-09.pdf.

Ramakrishnan R (Aiolos Engineering Corporation). Wind turbine facilities noise issues. Toronto: Queen's Printer for Ontario; 2007 [cited 2010 Mar 5]. Report No.: 4071/2180/AR155Rev3. Available from: https://ozone.scholarsportal.info/bitstream/1873/13073/1/283287.pdf.

Rogers AL, Manwell JF, Wright S. Wind turbine acoustic noise: a white paper. Amherst, MA: University of Massachusetts at Amherst, Department of Mechanical and Industrial Engineering, Renewable Energy Research Laboratory; 2006 [cited 2010 Mar 5]. Available from: http://www.ceere.org/rerl/publications/whitepapers/Wind_Turbine_Acoustic_Noise_Rev2006.pdf.

van den Berg F, Pedersen E, Bouma J, Bakker R. Project WINDFARMperception: visual and acoustic impact of wind turbine farms on residents: final report. Groningen, Netherlands: University of Groningen; 2008 [cited 2010 Mar 5]. Published jointly by the University of Groningen and the University of Gothenburg. Available from: http://www.wind-watch.org/documents/wp-content/uploads/wfp-final-1.pdf.

Whitford J. Model wind turbine by-laws and best practices for Nova Scotia municipalities: final report. Halifax, NS: Union of Nova Scotia Municipalities; 2008 [cited 2009 Apr 21]. Contract No.: 1031581. Available from: http://www.sustainability-unsm.ca/our-work.html.

World Health Organization

World Health Organization, Regional Office for Europe. Night noise guidelines for Europe. Geneva, Switzerland: World Health Organization; 2009 [cited 2010 Mar 5]. Available from: http://www.euro.who.int/document/e92845.pdf.

World Health Organization. Occupational and community noise. Fact sheet no. 258. Geneva, Switzerland: World Health Organization; 2001 [cited 2010 Mar 5]. Available from: http://www.who.int/mediacentre/factsheets/fs258/en/.

Community Concerns about Health Effects of Wind Turbines

Archives and Collections Society. Some health aspects of wind driven industrial turbines. Picton, ON: Archives and Collections Society; c2003-2004 [cited 2010 Mar 5]. Available from: http://www.aandc.org/research/wind_community_health.html.

Gillis L, Krogh C, Kouwen N. A self-reporting survey: adverse health effects with industrial wind turbines and the need for vigilance. London, ON: WindVOiCe: Wind Vigilance for Ontario Communities; 2009. Available from: http://windconcernsontario.files.wordpress.com/2009/04/windvoice__sept__24__20091.pdf.

McMurtry R. Deputation to the Ontario Standing Committee on General Government regarding Bill C-150. Scarborough, ON: Wind Concerns; 2009 Apr 22 [cited 2010 Mar 5]. Available from: http://windconcernsontario.files.wordpress.com/2009/04/deputation-to-standing-committee-mcmurtry.pdf

National Wind Watch: presenting the facts about industrial wind power. Rowe, MA: National Wind Watch; [cited 2010 Mar 5]. Available from: http://www.wind-watch.org/.

Wind Concerns Ontario: bringing sanity to wind development in Ontario. Scarborough, ON: Wind Concerns; [cited 2010 Mar 5]. Available from: http://windconcernsontario.wordpress.com/.

Conference Papers

Alves-Pereira M, Castelo Branco NAA. Infrasound and low frequency noise dose responses: contributions. In: Proceedings of the Inter-Noise Congress; 2007 Aug 28-31; Istanbul, Turkey.

Alves-Pereira M, Castelo Branco NAA. In-home wind turbine noise is conductive to vibroacoustic disease. In: Proceedings of the 2nd International Meeting on Wind Turbine Noise. 2007 Sep 20-21; Lyon, France.

Alves-Pereira M, Castelo Branco NAA. Public health and noise exposure: the importance of low frequency noise. In: Proceedings of the Inter-Noise Congress; 2007 Aug 28-31; Istanbul, Turkey.

Alves-Pereira M, Castelo Branco NAA. The scientific arguments against vibroacoustic disease. In: Proceedings of the Inter-Noise Congress. Istanbul; 2007 Aug 28-31; Istanbul, Turkey.

van den Berg GP. Do wind turbines produce significant low frequency sound levels? In: Proceedings of the 11th International Meeting on Low Frequency Noise and Vibration and its Control. 2004 Aug 30-Sep 1; Maastricht, Netherlands.

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Stray *Voltage*

What is Stray Voltage?

Varying amounts of low-level voltage often exist between the earth and electrically-grounded farm equipment such as metal stabling, feeders, or milk pipelines. Usually, these voltage levels present no harm to animals. However, if an animal touches a grounded metal object where these low voltages are found, a small electric current may pass through the animal. The voltage that causes this small current is known as "animal contact voltage," "stray voltage" or "tingle voltage."

Reported symptoms for dairy cows include:

- Reluctance to enter milking parlour
- Reduced water or feed intake
- Nervous or aggressive behaviour
- Uneven and incomplete milkout
- Increased somatic count
- Lowered milk production

These symptoms can also be the result of other non-electrical farm factors such as disease, poor nutrition, unsanitary conditions or milking equipment problems. Farmers should consider and investigate all possibilities, including stray voltage, when attempting to resolve these symptoms.

What causes Stray Voltage?

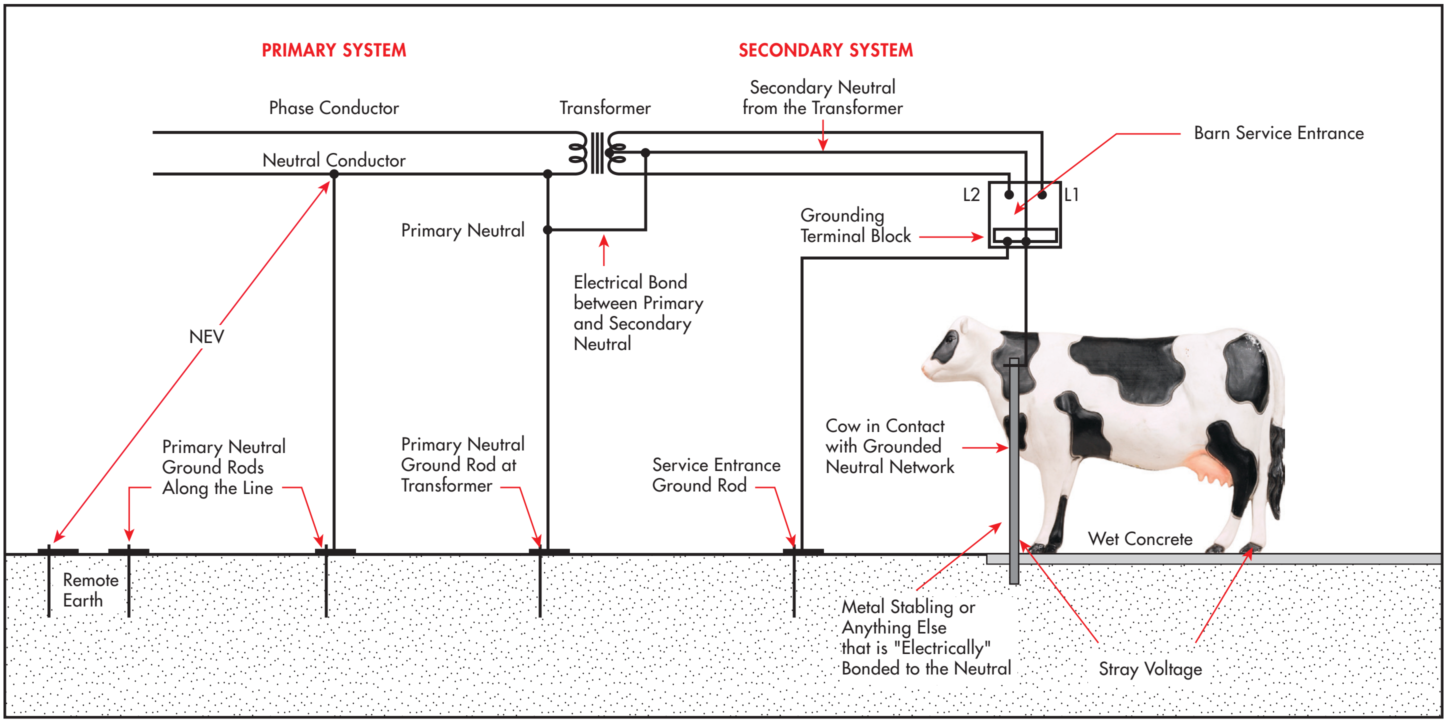
Stray voltage can be produced by a wide variety of off-farm and on-farm sources.

Off-farm sources:

In a properly functioning electrical distribution system, some voltage will always exist between the neutral system (ground conductors) and the earth. The level of this neutral-to-earth voltage (NEV) can change on a daily or seasonal basis, depending on changes in electrical loading, environmental conditions and other factors. For safety reasons, Hydro One's neutral system is connected to a farm's grounding system. While this bond protects people and animals from shocks caused by faulty electrical equipment and lightning strikes, it can also result in a stray voltage equal to a fraction of the NEV appearing on grounded farm equipment, such as feeders, waterers, metal stabling, metal grates and milk pipelines.

On-the-farm sources:

Poor or faulty farm wiring, improper grounding, unbalanced farm system loading, defective equipment or voltages from telephone lines or gas pipelines are all possible sources of stray voltage.



If you think you have a Stray Voltage problem

Call our Customer Communications Centre at 1-888-664-9376 (Monday to Friday, 7:30 a.m. to 8 p.m.). Your local field business centre will call you within five business days to arrange an appointment.

1. **First Site Visit:** We'll meet with you at your property to perform pre-test inspections, conduct a site layout and carry out an animal contact test.

2. **Second Site Visit:** Five to ten business days after the first site visit, we will return to your property and install a farm stray voltage recording device.

3. **Third Site Visit:** Two to three business days after the second site visit, we'll remove the recording device and analyze the recorded data. We'll discuss the results of the testing with you at this time.

4. **The Ontario Energy Board (OEB) has specified that voltage levels of less than 1.0 volt to be of no concern.** If the measured threshold falls below this level, the investigation will conclude. Nevertheless, if you choose to purchase a stray voltage filter from us, we'll install it at no cost.

5. **If the stray voltage measured is above 1.0 volt,** we'll do further OEB-defined testing during a fourth site visit to determine whether corrective measures need to be taken by us.

6. **Final Site Visit:** If corrective measures were implemented by us, we'll return to your property to conduct final testing to see whether any additional corrective measures need to be taken by us.

For more information, go to www.HydroOneNetworks.com/strayvoltage

For additional information on the effects of stray voltage on livestock, see the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) website, www.omafra.gov.on.ca/english/livestock/dairy/facts/strayvol.htm

hydro one
Partners in Powerful Communities

ADELAIDE WIND ENERGY CENTRE

Stage 1 and 2 Archaeological Assessment Reports Summary

APRIL 2012

Kerwood Wind, Inc. is proposing to develop the Adelaide Wind Energy Centre (the "Project"). Kerwood Wind, Inc. is a wholly-owned subsidiary of NextEra Energy Canada, ULC (NextEra). The parent company of NextEra Energy Canada, ULC is NextEra Energy Resources, LLC, with a current portfolio of nearly 8,500 operating wind turbines across North America. The Project is located in the Township of Adelaide-Metcalfe and North Middlesex and is proposed to consist of 37, 1.62 MW turbines with a total nameplate capacity of up to 59.9 MW, though 38 turbine positions will be permitted.

The purpose of a Stage 1 Archaeological Assessment is to find out whether there are any known archaeological sites on or near the Project area. If the Stage 1 Assessment determines there is archaeological potential, a Stage 2 Assessment is completed to identify any archaeological resources and confirm if further archaeological studies are required.

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STAGE 1 ARCHAEOLOGICAL ASSESSMENT

The Stage 1 Archaeological Assessment is a desktop background study and was completed in 2010 and involved reviewing background research, such as land use history and historic maps of the area, a property inspection and a review of the Ontario Archaeological Sites Database.

CONCLUSIONS

The potential for Aboriginal and Euro-Canadian Archaeological resources within the study area was determined to be moderate to high. For pre-contact Aboriginal Sites, this is based on the account of nearby water sources, level topography, soils that can be used for agriculture, and known archaeological sites. The historic Euro-Canadian potential was an account of documentation indicating early 19th century occupation, abandoned villages, plus the continued existence of historic transportation routes such as Egremont Road.

Only one pre-contact Aboriginal site had been discovered in the study area historically, this is in the southeast corner of the study area. The Armbro site was a 10 x 15 m lithic scatter but no diagnostic artifacts had been found and therefore can only be interpreted as an undateable pre-contact Aboriginal Site.

Stage 2 Archaeological Assessment

FIELD METHODS

The Stage 2 Assessment was completed in February 2012. The study involved "pedestrian surveys" (i.e. archaeologists walking ploughed fields). Pedestrian surveys were completed for all areas within ploughed agricultural fields while the remainder fall within municipal right-of-ways deemed to be disturbed by previous construction activity. A total of five First Nations monitors participated in the Stage 2 Archaeological Assessment between 2008 and 2012.

CONCLUSIONS

A total of 29 archaeological sites were identified through pedestrian surveys; these included:

- 17 pre-contact Aboriginal sites and,
- 12 historic Euro-Canadian sites.

Thirteen of the 29 sites have been recommended for a Stage 3 Assessment. To date, 6 of the 13 have been completed, of which, 1 has been recommended for a Stage 4 Archaeological Assessment.

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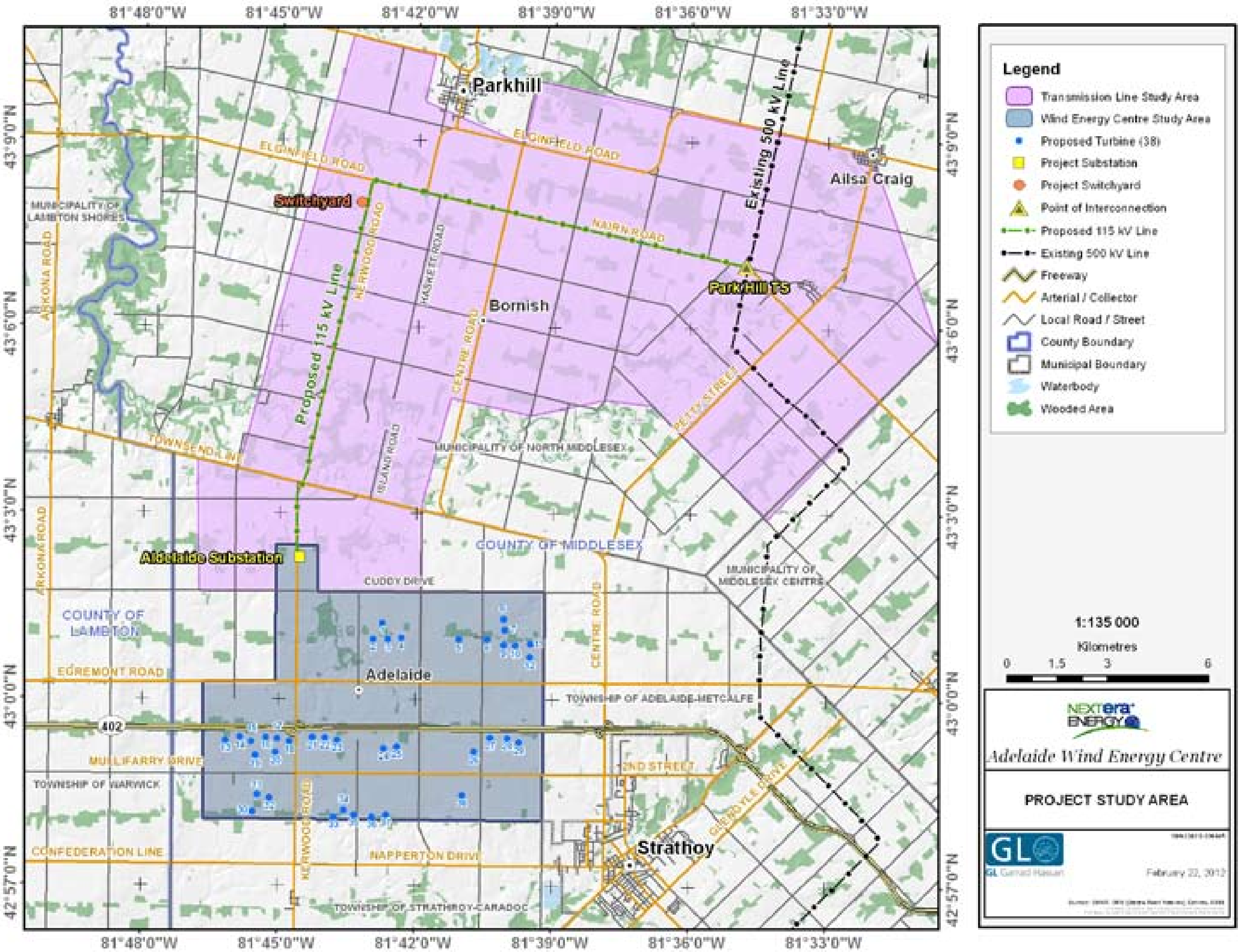
ADELAIDE WIND ENERGY CENTRE

Stage 1 and 2 Archaeological Assessment Reports Summary



Have A Question?

We hope you find this Plain Language Summary helpful. In case you would like additional information or have any questions, please contact us directly:

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ADELAIDE WIND ENERGY CENTRE

Decommissioning Plan Report Summary

APRIL 2012

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The purpose of the Decommissioning Plan Report is to describe all activities involved in dismantling or decommissioning the Project at the end of the operations phase. The report also explains the Project owner will restore the land and manage excess water or waste.

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DECOMMISSIONING PLAN OVERVIEW

The anticipated life of the Project is approximately 30 years. Decommissioning typically occurs following the operations phase.

At the end of the Project life, the wind turbines may be 're-powered', meaning turbine components could be replaced to extend the life of the Project and delay any decommissioning activities. Alternatively, the wind turbines may be decommissioned. Project decommissioning will follow the Ontario Health and Safety Act along with any applicable municipal, provincial and federal regulations and standards.

The following components will be removed during dismantling:

1. Turbines;
2. Overhead lines and poles; and,
3. Transformer substation.

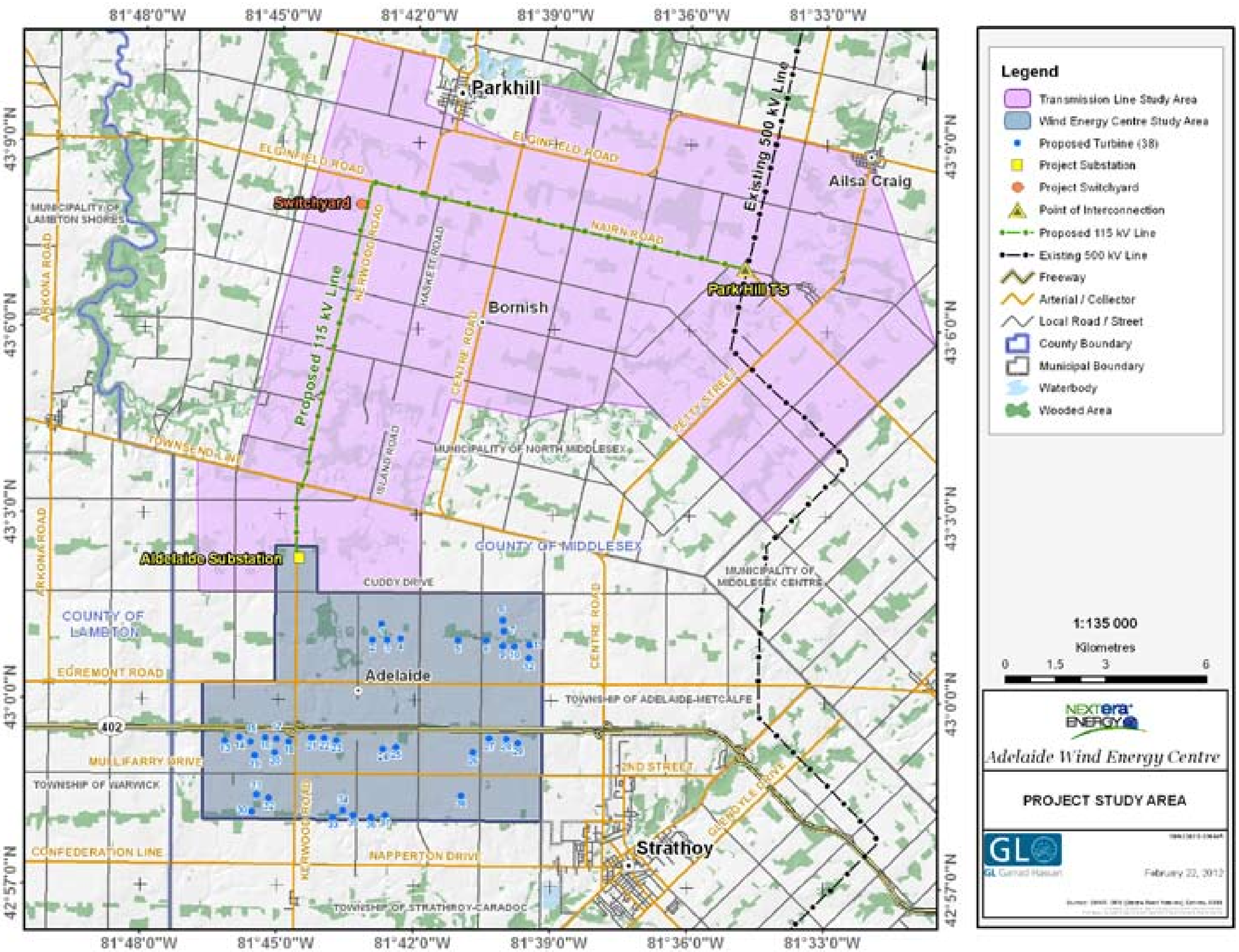
RESTORATION OF LAND AND WATER

All areas, including the access roads, transformer pads and crane pads will be restored as much as practical to their original condition with native soils and seeding.

Decommissioning Plan Report Summary

ADELAIDE WIND ENERGY CENTRE

Decommissioning Plan Report Summary



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ADELAIDE WIND ENERGY CENTRE

Heritage Assessment Report Summary

APRIL 2012

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The purpose of the Heritage Assessment Report is to identify known and potential heritage resources in the study area in order to identiy potential effects on these areas from the Project.

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ADELAIDE WIND ENERGY CENTRE

Heritage Assessment Report Summary

STUDY PROCESS

The Heritage Assessment was conducted through the use of historic research, mapping, field surveys and consultation with local historians, the municipalities of Middlesex, North Middlesex and the Township of Adelaide-Metcalfe to identify any potential effects to heritage resources from the Project. A heritage resource may be a building, structure or landscape that has cultural heritage value or interest.

EVALUATION

Following the assessment, it was determined that no protected properties or cultural heritage landscapes with heritage value or interest are situated at the Project Location or beside the Project Location (the Heritage Assessment Report defines Project Location as the participating parcels within the Study Area where project components are proposed to be located).

The study indicated that 47 structures were identified to be greater than 40 years old, of which 42 (27 houses and 15 barns) were determined to have general historical significance. In summary, none of the structures that were identified on participating parcels with proposed turbines and infrastructure for this Project have been determined to have cultural value or interest. Although these buildings are considered Heritage Resources, they are not significant enough to warrant designation or further investigation, and finally, no Protected Properties were identified by this report.


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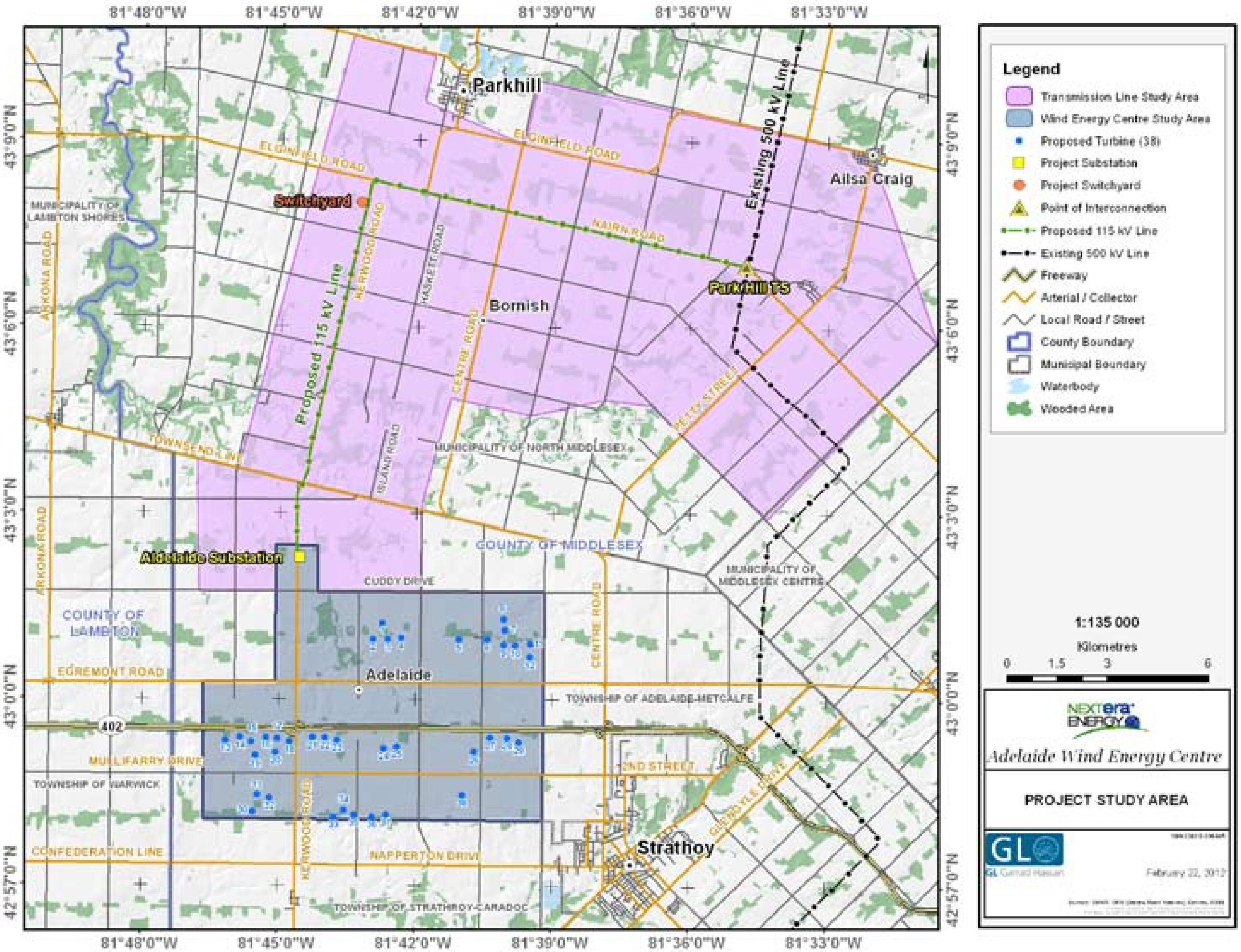
ADELAIDE WIND ENERGY CENTRE

Heritage Assessment Report Summary



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ADELAIDE WIND ENERGY CENTRE

Natural Heritage Assessment Report Summary

APRIL 2012

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The purpose of the Natural Heritage Assessment Report is to first identify ecologically significant natural features (for example, important wildlife habitat) within 120 metres (m) of the proposed Project Location (the Project Location is defined as the outer limit of where disturbance may occur due to construction or operation of the Project), and then to determine potential effects, mitigation measures and residual effects, if any. Residual effects are "left over" effects once mitigation measures have been applied for these natural features.

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ADELAIDE WIND ENERGY CENTRE

Natural Heritage Assessment Report Summary

RECORDS REVIEW

Information gathered during this stage of the process was used to determine if there are any of the following natural features within the Study Area:

- Provincial Parks and Conservation Reserves;
- Wetlands;
- Woodlands;
- Valleylands;
- Rare species and significant wildlife habitats; and,
- Areas of Natural and Scientific Interest (ANSIs).

This involved contacting the Ministry of Natural Resources (MNR), the Ministry of the Environment (MOE), the local Conservation Authority and the Municipalities to obtain any records they keep of these natural features within the Study Area.

SITE INVESTIGATION

After the Records Review, Site Investigations were conducted to confirm that the findings of the Records Review were correct, to identify any additional natural features not documented in the Records Review, and finally to define the boundaries and characteristics of the features (for example, what types of plants and animals live in a particular woodland).

The results of the Site Investigation revealed:

- 5 wetlands
- 57 woodlands;
- 2 valleylands; and,
- 31 Candidate Significant Wildlife Habitats, including important habitats for bats, snakes, weasels, frogs, birds and terrestrial crayfish.

These natural features were carried forward to the Evaluation of Significance stage.

EVALUATION OF SIGNIFICANCE

At this stage, natural features are evaluated to determine if they are significant according to provincial criteria. If a feature is determined to be significant, an Environmental Impact Study (EIS) must be conducted to identify potential effects, propose mitigation measures and described how the potential effects will be addressed through the environmental effects monitoring plan.

Of the natural features identified through the Site Investigation, the following were determined to be significant and therefore will be addressed in the EIS:

- 5 wetland;
- 42 woodlands;
- 2 valleylands; and,
- 26 Candidate Significant Wildlife Habitats, as well as generalized candidate significant wildlife habitats.

ENVIRONMENTAL IMPACT STUDY

For each natural heritage feature identified as significant, potential effects were assessed and mitigation measures/monitoring commitments were proposed depending on the type of project infrastructure affecting the feature.

Below is a summary of some of the potential effects, mitigation measures and monitoring commitments from the effects assessment. For the full effects assessment, please refer to the Natural Heritage Assessment Report.

POTENTIAL EFFECTS FROM CONSTRUCTION/DECOMMISSIONING:

- Increased erosion, sedimentation and turbidity (i.e. an increase in soil in wetlands, water bodies and other significant features) from clearing vegetation for construction of access roads, temporary crane paths, etc. To avoid or lessen these effects, erosion control fencing will be used and kept in place until the disturbed areas are stabilized, all stockpiled materials will be kept away from the features and periodic monitoring will occur during construction to ensure compliance with these mitigation measures.
- Damage to vegetation while operating construction equipment. To avoid or lessen these effects, protective fencing will be installed around construction areas to ensure that no work occurs outside the identified zones, and periodic monitoring will occur during construction to ensure compliance.
- Soil and water contamination from accidental spills of oils, gasoline or grease. To avoid or lessen these effects, a spill response plan will be developed to outline steps to be taken to contain any chemicals and avoid contamination of features. The Design and Operations Report contains an Emergency Response and Communication Plan which outlines action to be taken should a spill occur; including notifying the MOE's spills Action Centre, if required, and the local municipalities.

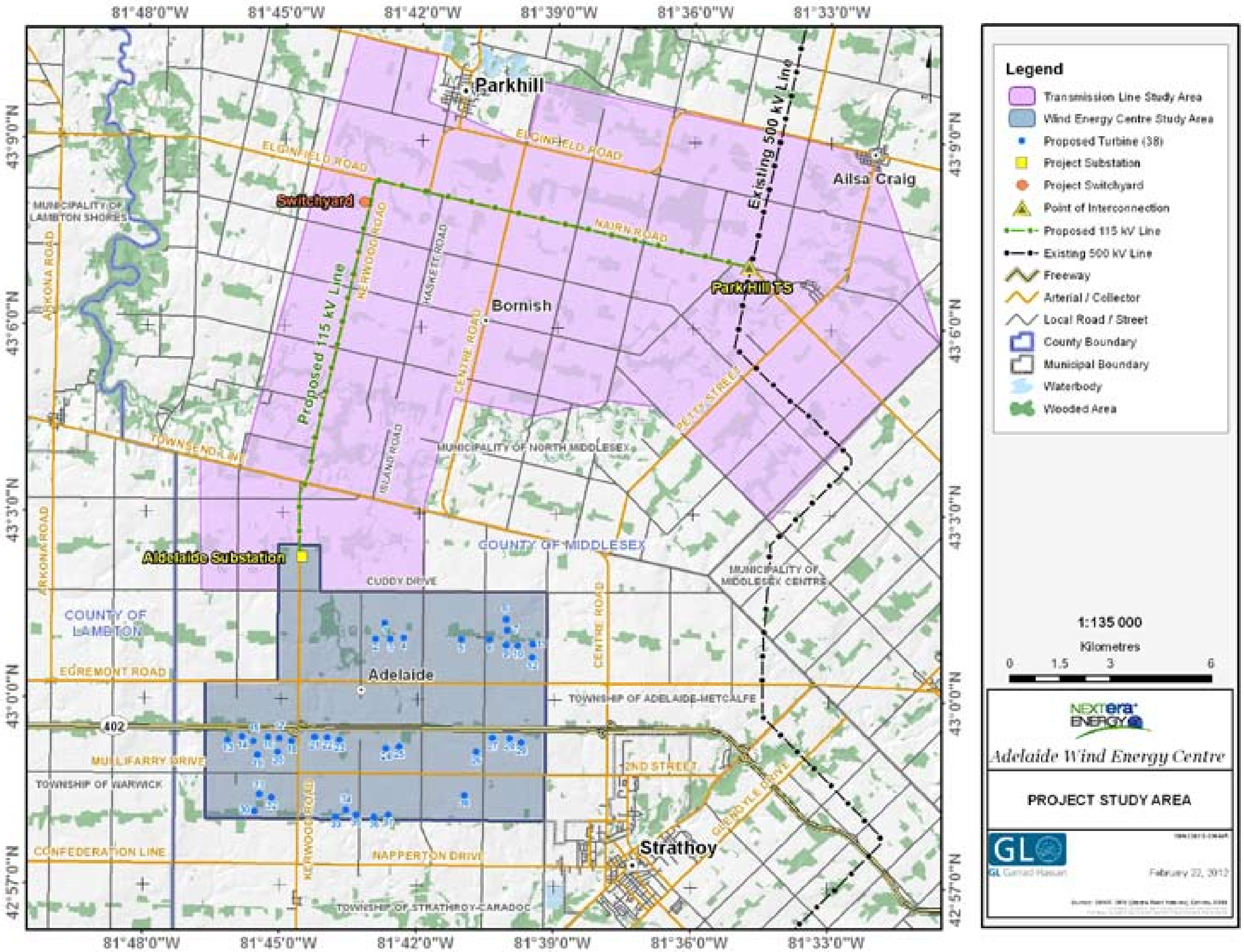
POTENTIAL EFFECTS FROM OPERATION:

- Disturbance or mortality to wildlife (e.g. birds and bats) from collisions with turbines. To avoid or mitigate these effects, operational mitigation techniques will be implemented if impacts are observed to be above provincial thresholds. Monitoring will consist of three year post-construction mortality surveys for birds and bats which will be submitted to the MNR.

The overall conclusion of the Natural Heritage Assessment Report is that this Project can be constructed and operated without any remaining effects that could harm the environment. Post-construction monitoring related to effects on wildlife, including birds and bats, will be undertaken to confirm this conclusion.

ADELAIDE WIND ENERGY CENTRE

Natural Heritage Assessment Report Summary



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ADELAIDE WIND ENERGY CENTRE

Noise Assessment Report Summary

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The purpose of the Noise Assessment Report is to ensure that sound produced from the operating wind turbines and the transformer substations remain within Provincial guidelines at certain Points of Reception (Points of Reception are defined on page 2).

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