REPORT

File: D08 Official Plan Comprehensive Review

TO: Diane Pearce, C.A.O.

FROM: Murray J. Beckel, MCIP, RPP
Planner/Chief Building Official

DATE: September 25, 2008

SUBJECT: Proposed Resolution Regarding Wind Turbines

Refer to: [X] Township Council [ ] Administration Committee [ ] Closed Session
[ ] Administrative [ ] Budget

Background

The Planner/C.B.O.'s report of July 2, 2008, entitled Next Steps – Official Plan Comprehensive Review, contained a recommendation that stated the following:

> "That staff be directed to prepare a resolution for Council's consideration, which is to be directed to the Ministry of Environment and the Ministry of Health, to request that the province immediately provide funding to and implement monitoring of existing wind energy projects to ascertain actual noise levels in order to determine if current noise guidelines are acceptable or need to be adjusted."

This recommendation was adopted by Council at their August 12th, 2008 Administration Committee meeting.

Report

The context in which the staff recommendation was made was that there have been assertions that wind turbine arrays have had negative health effects on residents due to noise. The argument is that typical government guidelines/requirements do not take into account all factors necessary to make an informed assessment, resulting in noise impacts for residents who live near one or more turbine(s).

For instance, there has been a doctoral dissertation completed in the Netherlands by G. P. Van den Berg, which indicates that in certain conditions (referred to as atmospheric stability), actual wind speed at ground level is much lower than modeled, meaning that the sound of the wind turbine is not "masked", resulting in higher sound conditions and complaints from affected residents. This atmospheric stability tends to occur with highest frequency at night.

Recently the Ministry of Environment had a literature review completed and the Van den Berg dissertation peer reviewed by an acoustical engineering firm and the findings of the Van den Berg study were criticized. However, the executive summary of the report (full summary attached – the critical paragraph is highlighted by an asterisk) states:

> "Although, the data of Van den Berg's research did not provide conclusive scientific evidence to support the above hypotheses, further review of the literature showed that the basic conjectures may well be true. Hence, the research of Van den Berg must be considered as the catalyst that started serious discussion on many noise aspects of wind farms. Future research must therefore provide strong scientific data to validate these different noise concerns."

The last paragraph of the summary goes on to say:

> "The Ministry of the Environment's procedures to assess wind farm noise levels follow a simple procedure that is sound for most situations. However, additional concerns still need to be addressed in the next round of revisions to their assessment process. These revisions may need to be addressed after the results from future research provide scientifically consistent data for effects such as meteorology, human response and turbine noise source character."

Therefore, the report submitted to the Ministry of Environment recognizes that the full extent of turbine noise may not be understood and should be studied.

In speaking with professionals at the Ministry of Environment and Health Canada, there is acknowledgement that post turbine installation noise monitoring is essential to validate current sound modeling for accuracy, or to determine if there are deviations such as Van den Berg has postulated, and then make some adjustments to the modeling.

Monitoring should occur at varying sites in Ontario and other locations in Canada to take into consideration a variety of factors like atmospheric stability, terrain, vegetation, sound character of different types of turbines, etc.

It is imperative that a monitoring program is established in a way that is scientifically defensible, using accepted practices, and that it is implemented as quickly as possible before further wind arrays are approved by the province.

Recommendation

1. The following resolution is presented for Council's consideration.

"WHEREAS the Council for The Corporation of Loyalist Township recognizes the need for energy conservation and the development of renewable energy in the province in order to promote a sustainable future;

AND WHEREAS Council has recognized this reality and has recently adopted progressive energy conservation and renewable energy policies in its Official Plan in a manner which is consistent with the Provincial Policy Statement;

AND WHEREAS a recently completed study commissioned by the Ministry of Environment entitled Wind Turbine Facilities Noise Issues, December 2007, as prepared by Aiolos Engineering, stated that there is a need to conduct further research on wind turbine noise in a manner to provide scientifically consistent data for effects such as meteorology (in particular atmospheric stability), human response and turbine noise character;

AND WHEREAS wind turbine noise data should be collected in a scientifically defensible manner from locations in the vicinity of currently installed wind turbine arrays in Ontario and other Canadian locations to verify if actual noise conditions are similar to those that were expected through study and modeling; or to determine if there are deviations and then a need to adjust modeling requirements;

AND WHEREAS there have been concerns expressed that noise from wind turbine arrays might impact human health negatively and, meanwhile, the Ministry of Energy has requested that the Ontario Power Authority secure another 2,000 MW of renewable energy, with the first 500 MW round to close October 28, 2008;

AND WHEREAS it is anticipated the bulk of the 2,000 MW of renewable energy projects to be awarded will be based on wind power and the likelihood is that most, if not all, of these projects will be in proximity to houses and other sensitive land uses;

NOW THEREFORE BE IT RESOLVED THAT the Council for The Corporation of Loyalist Township requests that the Ministry of Environment and the Ministry of Health immediately develop and implement scientifically defensible wind turbine monitoring programs in Ontario to determine actual noise conditions at various wind farm sites and to decide if the actual data collected supports current Ministry of Environment guidelines, or whether the guidelines need to be adjusted in order to protect human health, and that Council strongly encourages that the two Ministries cooperate with the Consumer and Clinical Radiation Protection Bureau – Acoustics Section of Health Canada for collaboration purposes and to broaden the study scope to include installed wind turbine arrays in other locations in Canada."

2. AND FURTHER, that this resolution be forwarded to the Minister of Environment, Minister of Health, local M.P.P.'s, Health Canada and any other parties identified by Council.

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Attachment

ORIGINAL SIGNED BY Diane Pearce, CAO

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APPROVED BY CAO
FOR COUNCIL CONSIDERATION

EXECUTIVE SUMMARY

All proponents of a wind farm development need to apply for a Certificate of Approval from the Ministry of the Environment of Ontario. The noise assessment report required for the approval process uses the guideline Ministry document, "Interpretation for Applying MOE NPC Technical Publications to Wind Turbine Generators" released in 2004. The above guidance document was to assist proponents of wind turbine installations in determining the list of necessary information to be submitted when applying for a Certificate of Approval (Air and Noise) under Section 9 of the *Environmental Protection Act*. The noise guidelines in MOE publications NPC-205/NPC-232 as well as the wind generated noise levels were applied to set the noise limits.

The Ministry has now initiated a review of the interpretation of the above policies, due to expanding body of knowledge of the noise impacts of wind turbines. The main aim of the proposed review is to assess the appropriateness of the Ministry's approach to regulating noise impacts of wind turbines.

The scope and requirements of the review can be summarized as: a) Review of the 2006 doctoral dissertation by van den Berg; b) Review of available noise policies and guidelines; review of relevant scientific literature; and review of MOE's current noise policies as applied to wind turbine noise and c) Provide expert opinion based on the above findings; and d) Prepare a report that provides advice on the state of the science regarding wind turbine noise, and on MOE policies and procedures that relate to wind turbine facilities. The results of the investigations are described below.

Van den Berg's research was initiated as a result of complaints, in Netherlands, against an existing wind farm in Germany very close to the Dutch border. The main hypotheses of the research are: a) atmospheric stability, particularly stable and very stable conditions happen mostly at night time and the hub-height wind speeds can be higher than those predicted from the 10 m high wind speeds using standard methods, such as the logarithmic profiles of the IEC standard. And hence, the wind turbine noise levels can be higher than expected. It was also conjectured that these discrepancies are prevalent during summer months; and b) beat-sounds

can become very pronounced during stable and very stable conditions. Although, the data of van den Berg's research did not provide conclusive scientific evidence to support the above hypotheses, further review of the literature showed that some of the basic conjectures may well be true. Hence, the research of van den Berg must be considered as the catalyst that started serious discussion on many noise aspects of wind farm. Future research must therefore provide strong scientific data to validate these different noise concerns.

The noise policies from different Canadian provinces, USA states and a few other countries were reviewed. General comparison of the noise regulations was presented. The main differences between the different regulations seem to be: i) in the acceptable noise limits; and ii) in the evaluation of receptor noise levels from the cumulative operation of the turbines in the wind farm. Further, some jurisdictions have special legislation concerning wind turbines, while others apply general recommendations. The Ministry of the Environment assessment process in Ontario is similar to other jurisdictions.

A literature review, focussed mainly on a) Metrological effects on wind turbine noise generation; b) Assessment procedures of wind turbine noise levels and their impact; c) Particular characteristics of wind farm noise; and d) Human responses to wind farm noise levels, was conducted. It showed that - local terrain conditions can influence meteorological conditions and can affect the expected noise output of the wind turbines; assessment procedures of sound power levels and propagation models, applied in different jurisdictions are quite similar in their scope; wind farm noise do not have significant low-frequency (infrasound) components; and modulations effects can impact annoyance;

The Ministry of the Environment's procedures to assess wind farm noise levels follow a simple procedure that is sound for most situations. However, additional concerns still need to be addressed in the next round of revisions to their assessment process. These revisions may need to be addressed after the results from future research provide scientifically consistent data for effects such as meteorology, human response and turbine noise source character.