Dear Douglas

In addition to the enclosed noise report, your specific queries have been addressed below:

1.Loanhead,Myreton
As discussed, further written confirmation from the owner of the property is required to confirm that the building is to remain derelict upon the attaining of consent for the proposed additional turbines.(This is on my understanding that predicted levels at this location would make the property exposed to unacceptable noise nuisance.)It is also appreciated that should the planning consent for the additional turbines be unsuccessful then Loanhead may be rebuilt. For the sake of completeness I would recommend that the noise levels at this location be stated in the application.

1) Regarding development of Loanhead, please find in Appendix A, a letter from the owner of Loadhead (which you will have already received dated 30th January 2009) confirming that the building will remain derelict upon the attaining of consent for the proposed additional wind turbines. Noise levels from the turbine at this location are covered in the noise report.

2. Danish Model application
Can further supporting evidence be provided of the successful application of this model in existing consented projects. I am more familiar with applications using ISO 9613 Part 2 which assume line of sight downwind conditions etc. The ISO model had a process of validation in the Joule Report entiltled " Development of a wind farm noise propagation prediction model" whereby the relative accuracy of the model was underpinned. Are you aware of a similar process of validation for the Danish model?

2) Further supporting evidence of the Danish model is included in Appendix B. The Appendix outlines how the Danish model is well established and is widely used in the wind turbine industry, and gives an overview of the assumptions it makes compared to other models. We are not aware of a formal validation process but the information provided in Appendix B should mitigate any concerns about the soundness of the model.

3. Tonal Analysis
Can the tonal analysis be further elaborated. The ETSU-R-97 document illustrates various methods, including 1/3 octave band and narrow band. The reference to "delta L" on the Enercon "Extract 11 of test report" infers tone analysis using the Joint Nordic Method. I am grateful if this can be clarified.

3) Enercon have informed us in response to our specific query that “our turbines have no tonality”. The tonality in the document “Extract 11 of test report” was determined using method IEC 61400-11/2. When the 1/3 octave band method is used this also demonstrates the lack of tonality. The full test report is available on request. Please note that Enercons guaranteed noise levels were used in the noise prediction rather than the quieter noise levels detailed in the test report.

4. Enercon "Guaranteed Values" attachment
Point 3 - the note refers to Operational Mode 1 of 16-30 rpm. Does the turbine therefore cut out above 30 rpm or else does it change to another mode ?
Point 5 - can you confirm that a safety factor of 1dB is being incorporated into the predictions

4) Enercon has confirmed that the wind turbine will operate in "Operational Mode 1" all of the time.

Yes, a safety factor of 1dB(A) has been incorporated into all noise predictions.

5. Background Noise Survey
The ETSU-R-97 document is relevant in relation to assessing the 3 turbine configuration at the site. Page 85 refers to at least one week of measurement. I would therefore confirm that you consider two monitoring locations over at least 7 days,ie Nethertown as a sheltered location and either Croylet or Windyhills as a second location. To ensure you have 7 days of uncorrupted data from say heavy rain you may need to factor in acquiring the data logger for a few additional days, in order to get a good enough data spread. This should then enable enough data for the polynomial to be developed for a best fit curve.

5) A background noise survey has been undertaken at Nethertown and Croylet over a time period of around 14 days. The report is enclosed. The results find that the proposed wind turbines meet the criterion outlined in ETSU-R-97.

Appendix A – Text Extract: Letter from Clive Streeter re Loanhead

Clive Streeter
Myreton
Crossroads
Keith
Banffshire
AB55 6NJ

Tel: 01542 870661

Douglas Caldwell
Environmental Health
Council Office
High Street
Elgin
Moray
IV30 1BX

Friday, 30 January 2009

Dear Mr Caldwell

I am writing to confirm to you that, in the event that we gain planning permission for a wind turbine situated at Myreton, grid reference NJ 50169 56775, the building at Loanhead of Myreton will remain derelict and will not be developed.

Yours Sincerely

Clive Streeter

Appendix B – Danish Noise Model

The discussion below provides information and examples verifying that the 'Danish' model is a frequently used and well established noise propagation model in the wind industry.

1 ReSoft Windfarm Software

The Software used for predicting the noise levels was Windfarm© developed by ReSoft Ltd [1]. ReSoft software has been widely used in the wind turbine industry for a number of years, and was one of only three Software packages identified in the 2002 DTI document "Wind Energy Products and Service in Britain" [2]

The model used by the software is the "Description Of Noise Propagation Model Specified By Danish Statutory Order On Noise From Windmills (Nr. 304, Dated 14 May 1991)" as produced by The Danish Ministry Of The Environment National Agency For Environmental Protection." This model is also the method adopted by the International Energy Agency recommended practices on noise emission

2 Noise Models and British Standards

BERR advice on renewable energy outlines how there is no relevant British Standard for modelling noise levels from wind turbines. It says that the Danish model used to be frequently used, but that these days the ISO 9613 model is more often chosen by developers. [3] It also describes how when noise models assume a flat hard ground with no buildings or other structures, as is the case with the ReSoft/Danish model, the assumption produces 'worst case' noise assessments.

3 Danish Noise Model Overview

The 'Danish model' is the same as the one used by the national physical laboratory [4]. The text below is their description of the model and its assumptions.

"This Wind Turbine Noise Model is derived from the method documented by the International Energy Agency: Expert Group Study on Recommended Practices for Wind Turbine Testing and Evaluation, 4. Acoustics Measurements of Noise Emission from Wind Turbines, 3. Edition 1994. It is a simple model which

assumes spherical spreading from a point source either in free space (spherical) or over a reflective plane (hemi-spherical). It can also take into account atmospheric attenuation, using an attenuation rate entered by the user. The source sound power and the absorption coefficient are both assumed to be broad band. Source to receiver distances are calculated by simple geometric means and the total received noise from each turbine logarithmically added.

Users should note that the model does not take account of:

- Uneven topography
- Large obstructions in the propagation path, e.g. barriers etc
- Refraction of noise, e.g. due to atmospheric effects such as temperature inversion
- Wind speed or direction effects
- Any change in the propagation with changing frequency"

The calculation used by ReSoft is the hemispherical model, which gives higher predicted noise levels than the spherical model. The model assumes a reflective hemisphere, i.e. it assumes that there is no reduction in noise due to absorption from the ground.

4 Comparison of Different Noise Models

The noise model in ISO 9613 is more complex than the Danish model, and includes some of the factors listed above.

A study by noise experts [5] undertaken shortly after ISO 9613 was approved compared various noise assessment methods, and found that the simple Danish Model gave louder predicted noise levels than more complex models, which take into account a number of factors. Developers therefore tend to chose more complex models, as taking more factors into account usually gives lower predicted noise levels.

The study found that the Danish Model predicted higher noise levels than those predicted by the ISO 9613 – 2 method. The Danish Model is described in the report HFF/IEA: the Hemispherical Free Field model as recommended by the International Energy Agency. A report undertaken by the Danish Ministry of the Environment also states how the Danish model overestimates the level of noise propagation. [6]

5 Other Projects using the ReSoft Model

A number of developers use ReSoft and/or the Danish noise model for their noise calculations. Some examples are given in table B1. The scheme of most interest to the officer is likely to be Red Bog in Aberdeenshire. This installed scheme consists of two Enercon E48 800kW wind turbines. [7]

Name	Size	LPA	Ref Number
Red Bog	1.6MW	Aberdeenshire Council	APP/2007/2794 & APP/2006/1077
Lafarge Roofing	750kW	Blaenau Gwent CBC	C/2006/0559
Dryscoed Farm	20kW	Rhondda Cynon Taff CBC	06/2353/10
Lewis Wind	650MW	Western Isles	
Tesco Plc (TNEI)	Various	Various	Various
Tedder Hill	6.9MW	East Ridings Council	
Beech Tree Farm	3.9MW	South Hams Council	19/0110/07/F
Greystone	800kW	Aberdeenshire Council	APP/2007/5112

Table B1: Examples of Planning Applications using The Danish noise model

Windfarm is also used by Carmarthenshire County Council, and possibly other local authorities, for assessing wind farm applications.

As listed in table B1, the Danish model was the noise model used by AMEC Wind Energy for the for the Lewis Wind 650MW wind farm. Although recently refused, this again verifies the extent to which the Danish Model is used, and its durability. An extract from the Environmental Statement, section 19.1.2.2, is below

"The method used to predict the noise form a wind farm is described in the Statutory Order from the Ministry of the Environment No 304 of May 14, 1991 on Noise from Windmills, Translation by LK 1991, Denmark. This method is used as there is no relevant British standard. This report will be referred to as the 'Noise from Windmills report'. This method uses straightforward hemispherical noise propagation over a hard surface. MEC Wind Energy has used this method for many years. The results have agreed with measured results from wind farms, when they have been built, giving confidence in the method" [8]

6 Summary

The Danish model is well established and widely used in the wind turbine industry. It is simpler than the ISO 9613 model, and as a result tends to over estimate noise levels compared to other models.

7 References

1 www.resoft.co.uk , March 2009

2 http://www.berr.gov.uk/files/file15157.pdf, March 2009

3 http://www.berr.gov.uk/energy/sources/renewables/planning/onshore-wind/noise/page18728.html, March 2009

4 http://resource.npl.co.uk/acoustics/techguides/wtnm/ , March 2009

5 'The variability of simple noise propagation models' (Brown, Cooper, Snow, 1996) http://www.rtatechnology.com/pdfs/15.pdf, March 2009
http://cat.inist.fr/?aModele=afficheN&cpsidt=2725038, March 2009

6 Danish Environmental Protection Agency, Environmental Project no 1016, 2005, Noise from offshore wind turbines
http://www2.mst.dk/udgiv/publications/2005/87-7614-687-1/pdf/87-7614-689-8.pdf, March 2009

7 http://www.amconline.co.uk/documents/pdf/17890AMCD2EScot9.pdf, March 2009
http://www.aberdeenshire.gov.uk/planning/apps/detail.asp?ref_no=APP/2007/2794, March 2009
http://www.aberdeenshire.gov.uk/planning/apps/detail.asp?ref_no=APP/2006/1077, March 2009

8 www.lewiswind.com/attachment.php?file=envstmt/volume3/ES_Chapter_19_Noise_and_Shadow_Flicker.pdf&type=1 March 2009