

34 Old Mill Road
Duntocher
Clydebank
Dunbartonshire
G81 6BX
Scotland

Tel (013) 8987 8891
Fax (013) 8989 0516

email mail@newacoustics.co.uk
web site www.newacoustics.co.uk

SNOWGOAT GLEN WIND FARM

ENVIRONMENTAL STATEMENT

Comments on Noise Section

Dick Bowdler
26th September 2004

SNOWGOAT GLEN WIND FARM

ENVIRONMENTAL STATEMENT

Comments on Noise Section

SUMMARY

- 1 The purpose of this report is to review the Noise Section of the Environmental Statement for the proposed windfarm at Snowgoat Glen and to provide an opinion as to the impact of the windfarm on local residents.
- 2 The method of assessment used by the applicant, which I will call the ETSU method, is commonly used to assess windfarm noise and is incorporated into Planning Advice Note, PAN45 Renewable Energy Technologies. However, it is not a method of assessing the impact of noise on neighbours but a framework for achieving a balance between a reasonable degree of protection to neighbours and reasonable restrictions on developers. In view of this, in addition to commenting on the applicants ETSU assessment, I have made an assessment of the impact of turbine noise on neighbours.
- 3 I have no significant comments to make on the background noise measurements. They have been made at four locations, which number is almost half the affected properties, and the results show a typical pattern. I have no significant disagreement with the stated method of calculation of turbine noise nor with the stated levels at each of the neighbouring properties.
- 4 The ETSU method has upper and lower day time noise limits. The selection of an appropriate limit between the upper and lower depends on the circumstances of the development. The Environmental Statement defines whether each property meets the upper and lower day time limits and the night time limit and I agree with the conclusions reached. However, the assessment does not state what noise level is appropriate for this location and therefore whether the wind farm passes the ETSU test. My opinion is that, since most of the properties are downwind of the prevailing wind and have noise levels in these circumstance well above the lower limit the wind farm just fails the ETSU test.
- 5 I have assessed the loss of amenity at neighbouring properties. Excluding Knowes Farm there are 7 properties that will suffer a major loss of amenity and Cockersfauld will suffer a significant loss of amenity. If Baadhead is owned and under the control of the landowner it can be excluded. The properties at Corb are badly affected by noise and may need to be taken into account in the assessment.
- 6 I am not aware that this is a major recreational walking area.
- 7 Should the proposal be granted planning permission I recommend that there should be conditions attached that limit noise levels at surrounding properties.
- 8 If planning permission is given for this and other windfarms nearby there may be a cumulative effect on some residents. I will deal with this separately in another paper.

1 INTRODUCTION

This report is prepared on the instructions of Perth and Kinross Council. The purpose is to examine and comment on the Noise Section (Chapter 10 and Appendix D) of the Environmental Statement for the proposed windfarm at Snowgoat Glen and to provide an opinion as to the impact of the windfarm on local residents. References to the Environmental Statement refer only to the noise section.

I have not been asked to comment on construction noise.

2 METHODS OF ASSESSMENT

The method of assessment used by the applicant is set out in *The Assessment and Rating of Noise from Windfarms* (ETSU-R-97). This is commonly used to assess windfarm noise and is incorporated into PAN45 *Renewable Energy Technologies*. However, it is not a method of assessing the impact of noise on neighbours. This is not merely a personal view but is clearly stated in the first paragraph of the Executive Summary of ETSU-R-97 where it explains that the report *describes a framework for the measurement of wind farm noise and gives indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities*. The applicant is aware of this as it is quoted in paragraph 10.2.2.2. Section 3 of this report contains my comments on the Environmental Statement in terms of ETSU-R-97.

The most commonly used method of assessment of the impact of a new noise is by comparing the new noise with the pre-existing background noise by the method set out in British Standard 4142. At low noise levels there is some controversy about using this method but, for all its faults, BS4142 has been around for nearly 30 years and is widely used in rural Scotland even for low background levels. The Appendix sets out the issues in more detail.

Since the Environmental Statement does not clearly set out the noise impacts on neighbouring properties I have used BS4142 to do this in Section 4.

3 ETSU-R-97 ASSESSMENT

This is the method used in the Environmental Statement. The ETSU method compares the predicted noise from turbines with the background noise or, where background noise is low, with a fixed noise level. This requires that measurements of background noise are made, turbine noise levels are calculated, and a comparison is made of the two.

All noise levels in this section are shown as L_{A90} unless otherwise stated, in accordance with ETSU-R-97.

3.1 General Comments

I have no significant comments to make on sections 10.1, 10.2 and 10.3 of the ES.

3.2 Background Noise

Background noise measurements have been made at four positions near to neighbouring residential properties, two of which are derelict. I consider the number and location of monitoring positions to be sufficient.

As required by ETSU-R-97, a curve has been drawn through the noise measurements to give, effectively, an average background noise level at each wind speed. The results show a typical pattern of background noise with wind.

3.3 Turbine Noise

I have no significant disagreement with the stated method of calculation in 10.5, nor with the results for turbine noise set out in Table 10.5.

3.4 Proposed Turbine Noise Standards

The maximum permitted noise level of turbines is set out in paragraphs 21 and 22 of ETSU R-97. This permits levels of 5dBA above background noise except where background noise is low when there is an absolute limit of 35 to 40dBA during the day and 43dBA at night.

Section 10.7.2 does not propose a day time limit but identifies which limit is exceeded at each location. This is not entirely satisfactory because it means that no conclusions are drawn as to whether properties meet the guidelines or not.

3.5 Assessment

The assessment states that:

All properties meet the night standard except Corb.

Baadhead meets the upper and lower day time standards.

Knowes Cottage, Cockersfauld, Blaeberry Toll, Greenhill Cottage and Greenhill Farm exceed the lower but not the upper day time standard

Corb exceeds the upper day time standard.

Knowes Farm is occupied by the landowner and meets the higher standard for such properties.

I agree with the above conclusions and, as all properties within 2km have been assessed, I consider that all relevant properties have been considered.

ETSU says that the choice of day time standard between 35 and 40dBA should depend on the number of dwellings in the neighbourhood of the wind farm, the effect of noise limits on the

number of kWh generated and the duration and level of exposure. It gives no guidance as to how these are to be quantified. If Corb and Baadhead, which are unoccupied, and Knowes, which is occupied by the owner, are excluded there are 5 properties affected. They are subject to noise in the upper part of the range and they are to the east of the turbines, which means that they will be regularly downwind and the duration of exposure to the highest noise levels will be considerable.

The situation in terms of ETSU is marginal but on balance I consider that the proposed wind farm fails the applicant's own noise test set out in ETSU-R-97.

4 NOISE IMPACT ASSESSMENT

I have set out in this section my assessment of the likely loss of amenity to residents using the spirit of British Standard 4142.

Unless otherwise stated in this section, turbine noise is in L_{Aeq} and background in L_{A90} as provided for in BS4142. I have no evidence that there are any tonal components in windfarm noise and so the L_{Aeq} value is the same as the rating level described in BS4142. Wind speeds are those at 10m height.

As a rule of thumb I think that all properties within 2km of a turbine should be assessed. This is less than the minimum distance for these turbines in the Wind Energy Policy Guidelines produced by Perth and Kinross Council.

4.1 Background Noise

Local Authorities generally require that background noise is measured at the quietest part of the period in question. For example, where the background is dominated by road traffic this may fall to a minimum about 3am. The 3am level is generally considered to be representative of the background noise throughout the night: the average over the whole night period is not considered to be appropriate. In the case of windfarms the "period" required at each wind speed is the aggregate of all the periods at that wind speed and the background noise level at any wind speed should be the quietest at that wind speed.

The methodology used by ETSU is effectively to average 10 minute values of L_{A90} at each wind speed and this gives a higher figure than would normally be considered appropriate for an amenity assessment.

To overcome this problem it is my practice to take the 25th percentile or the mean less one standard deviation of a group of 10 minute measurements at a particular wind speed to define the L_{A90} at that wind speed.

I see no reason to differentiate between day and night since the turbine noise levels will be no different. In any case, in most rural areas there is only a small difference between background noise levels in the day and the night.

At locations where the applicant has measured the background noise I have used those figures. Specifically I have taken the average of the

day and night noise levels at each wind speed and deducted 3dB, which typically gives the 25th percentile.

Where I do not have data for background noise, I have taken typical background noise levels based on my own experience of similar locations to those here. The basic level chosen is 31dBA at 8m/s rising at 2dBA for each 1m/s increase of wind speed and falling by 2dBA for each 1m/s decrease of wind speed to a minimum value of 24dBA. These figures represent the 25 percentile of the ten minute noise levels. These background noise levels are incorporated into Perth and Kinross Wind Energy Policy Guidelines June 2004. It may be noted that my assumed noise levels are more than the measured noise levels in all cases.

Background Noise	Wind Speed									
	4	5	6	7	8	9	10	11	12	
Baadhead	21	23	25	26	28	30	31	33	34	
Knowes Cottage	20	22	23	25	27	28	30	32	33	
Cockersfauld	24	25	27	29	31	33	35	37	39	
Blaeberry Toll	24	25	27	29	31	33	35	37	39	
Greenhill Cottage	19	21	23	24	26	28	29	31	33	
Greenhill Farm	24	25	27	29	31	33	35	37	39	
Corb 1	18	20	22	24	26	27	29	31	33	
Corb 2	18	20	22	24	26	27	29	31	33	

4.2 Turbine Noise at Neighbours

I have used the noise levels at the neighbouring properties as calculated by the CONCAWE method, which takes account of different meteorological conditions. The conditions taken are Category 6, which is favourable to downwind propagation. In practice the results from this method are usually within about 1dBA of those obtained using ISO 9613-2, which is the applicants model. In accordance with BS4142 the values are L_{Aeq} so the noise levels are typically 2dBA higher than the ETSU figures.

The table below shows the turbine noise levels at neighbouring properties.

Turbine Noise	Wind Speed									
	4	5	6	7	8	9	10	11	12	
Baadhead	25	30	35	38	40	40	40	39	39	
Knowes Cottage	26	30	35	38	40	41	40	40	40	
Cockersfauld	24	29	33	37	38	39	39	38	38	
Blaeberry Toll	26	31	35	39	40	41	41	40	40	
Greenhill Cottage	28	32	37	40	42	43	42	41	42	
Greenhill Farm	26	31	36	39	41	41	41	40	40	
Corb 1	31	36	40	44	45	46	46	45	45	
Corb 2	31	35	40	43	45	46	45	44	45	

4.3 Assessment of Impact

BS4142 says that *A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance.*

An increase in noise level of up to 3dB is not readily detectable.

Based on the principles above, I suggest an assessment of loss of amenity as shown below. This is included in Perth and Kinross Wind Energy Guidelines June 2004.

- A difference of 3dB or less – insignificant
- A difference of 4 to 6dB – marginal loss of amenity
- A difference of 7 to 9dB – significant loss of amenity
- A difference of 10dB or more – major loss of amenity

The old planning guidance (Circular 24/73) provided some justification for this in the case of industrial noise generally. It says (in common with the Welsh guidance quoted on page 21 of ETSU-R-97) that *where, by the standards established in BS4142, “the noise from the development is likely to give rise to complaints” it will hardly ever be right to give [planning] permission.* PAN 56 is less specific but says in relation to windfarms that *Good acoustical design and siting of turbines is essential to ensure there is no significant increase in ambient noise levels as they affect the environment and any nearby noise-sensitive property.*

Taking the two tables above I have deducted the background noise level from the turbine noise level to obtain the values in the table below.

Difference	Wind Speed									
	4	5	6	7	8	9	10	11	12	
Baadhead	4	7	10	12	12	11	9	7	5	
Knowes Cottage	6	9	12	13	13	13	10	8	7	
Cockersfauld	0	4	6	8	7	6	4	1	-1	
Blaeberry Toll	2	6	8	10	9	8	6	3	1	
Greenhill Cottage	8	11	14	16	16	15	13	10	9	
Greenhill Farm	2	6	9	10	10	8	6	3	1	
Corb 1	13	16	19	20	20	19	16	14	12	
Corb 2	12	15	18	20	19	18	16	13	11	

Orange (dark grey if this is printed in black and white) denotes conditions where there is a major loss of amenity, yellow (grey) indicates a significant loss of amenity and cream (pale grey) a marginal loss of amenity.

Excluding Knowes Farm there are 7 properties that will suffer a major loss of amenity and Cockersfauld will suffer a significant loss of amenity.

It is possible that Baadhead is owned and under the control of the landowner in which case it can be excluded (though a planning condition limiting development might be appropriate). In the case of the two derelict properties at Corb the situation may be different. It is possible that these are owned and under the control of the promoter of

Little Law windfarm. If this is the case and Little Law were refused permission and Snowgoat Glen granted permission the redevelopment of Corb would be prejudiced.

5 OTHER MATTERS

I am not aware that this is a major walking area.

Should the proposal be granted planning permission then there should be conditions attached that limit noise levels at surrounding properties at each wind speed. This is because alternative turbines may have higher noise levels than the presently proposed turbines and to protect residents from any turbine noise in excess of the design levels.

I am aware that there are three other applications for windfarms pending in the immediate area. It is possible that there will be a cumulative effect and I propose to deal with this in a separate paper.

APPENDIX

ETSU R-97 is not, and does not claim to be, a method of assessing loss of amenity. It sets out maximum noise levels from windfarms that aim to achieve a balance between the need for windfarms and the protection of residents' amenity. The levels set are effectively the upper limits of acceptability or even higher. For example, for night time, the level proposed by ETSU R-97 is that which the World Health Organisation considered to be the highest level at which people are able to get back to sleep.

The ETSU R-97 method is quite different from general practice in assessing loss of amenity such as the use of BS4142. It is different even from the method normally used to assess other renewable energy developments such as landfill and biomass generators.

In my opinion an Impact Statement should clearly set out the potential loss of amenity to residents. Thereafter the decision as to whether any loss of amenity is outweighed by other factors is a political one.

Normal Practice

Where a new noise is to be introduced into a residential area it is normal to set a noise limit relative to the pre-existing background noise.

What is Background Noise at a Windfarm Site?

ETSU R-97 rejects BS4142 for two reasons related to background noise. The first is that it is not applicable in low background noise levels and the second is that it should not be used when wind speeds are above 5m/s. I see no reason to reject the principle of the method on these grounds.

Low Background Noise

In low background noise levels much is often made of the suggestion that BS4142 precludes its own use where background levels are less than 30dBA. The current standard (which was published after ETSU R-97) actually says that *the method is not suitable . . . when the background and rating noise levels are both very low*. Very low is defined as 30dB for the background level and 35dB for the rating level.

The fact is that some measure of loss of amenity needs to be applied below a background level of 30dB and there is nothing better at present than to use the same method of comparing turbine noise with background.

Wind

BS4142 also requires that measurements be made with wind speeds less than 5m/s. There are two reasons for this. The first is that, for most assessments, windy weather is not representative of quiet times and the second is that noise may be created by wind on the measuring equipment. Clearly the procedure needs some modification for wind turbines because they do not generally operate until wind speeds reach around 4m/s and it would be unreasonable to base the assessment in calm conditions when the turbines would not be working. BS4142 is

looking for the noise level in the quietest normal circumstances. With wind farms it would be reasonable to make background noise measurements when wind speeds at the development site were in the range at which the turbines operate. In fact, ETSU R-97 accepts this point and does make background measurements in this way. Clearly care needs to be taken to ensure that wind noise on the microphone is not a factor.