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LITTLE LAW WINDFARM
ENVIRONMENTAL STATEMENT
Comments on Noise Section

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31st August 2004

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SUMMARY

- 1 The purpose of this report is to review the Noise Section of the Environmental Statement for the proposed windfarm at Little Law 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 the 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 The use of background noise measurements made in one place to assess noise in another is a matter of some concern. This does not affect the ETSU assessment but may affect the impact of noise on some properties. I have no disagreement with the method of calculation of turbine noise though the levels shown are rather higher than I calculate.
- 4 The main house at Coulshill is occupied by the landowner and is inside or only just outside the special ETSU standard for those with a financial interest. The shepherd's cottage at Coulshill is very substantially in excess of the ETSU guidelines. With the exception of derelict properties all other properties comply with the more stringent end of the ETSU guidelines as proposed by the applicant. The derelict properties at Corb and at Bankfold are in excess of the ETSU guidelines and this should be taken into account in framing planning conditions.
- 5 I have assessed the impact of turbine noise on surrounding properties and concluded that the two properties at Coulshill will suffer a major loss of amenity. Greenhill Farm, Greenhill Cottage and Upper Cloan will just have a marginal loss of amenity and the three unoccupied properties will suffer a major loss of amenity. No other properties will suffer a loss of amenity.
- 6 Should the proposal be granted planning permission I recommend that there should be conditions attached that limit noise levels at surrounding properties.
- 7 There is a marked footpath from Coulshill to Glendevon. At times the noise of turbines will be a significant intrusion to people walking in the quiet country.
- 8 If planning permission is given for this and other windfarms nearby there may be a cumulative effect on some residents.

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 12 and Appendices 21 to 26) of the Environmental Statement for the proposed windfarm at Little Law and to provide an opinion as to the impact of the windfarm on local residents. Note that 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 8.2.11. 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 12.1, 12.2 and 12.3 of the ES except that, in 12.2.3, it suggests that ETSU-R-97 proposes an assessment method that ensures that neighbouring residential properties can gain protection from unacceptable levels of noise. As I have pointed out in paragraph 2 above that is not what it says.

3.2 Background Noise

Background noise measurements have been made at three positions near to neighbouring residential properties for a period of about two weeks.

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 background noise measurements are a matter of some concern particularly for wind speeds between 4 and 8m/s, which are likely to be the critical speeds as far as neighbour noise, is concerned. I have no doubt that they show the actual noise measured and, assuming the measurement position to be representative of the property, may well be applicable to that property. My concern is particularly that the measurements have been used for other properties.

They show very poor correlation with wind speed. Normally, between 4m/s and 8m/s, a rise in noise level of 10dBA would be expected. The highest value in Appendices 22 and 23 is 3dBA.

The absolute levels are also rather high particularly at Coulshill and, to a lesser extent, at Littlerig and Greenhill Farm. It is unusual, where there is no fixed noise such as water, for there to be no readings in the low 20s and even below 20dB.

It seems likely that might be due to two reasons. The first is that there is some permanent fixed noise at some of the locations, such as a burn. The second is that the distribution of wind speeds and directions may not be adequate. Inspection of Appendix 24 shows that there was almost no time during the measurements when the wind was in the eastern half.

In 12.4.5 it says that *The data profile obtained at Littlerig was of exactly the form expected for a sheltered rural area and was, as far as could be ascertained, free from parasitic noise or other unwelcome influences. It is very unlikely that the wind-dependent background noise levels at Greenhill Farm would ever fall below those measured at Littlerig.* As I have explained I do not agree that the data at Littlerig is of the form to be expected. Furthermore there is a burn running immediately in front of the property at Littlerig that dominates the noise level both at the measuring position on the other side of the road and at the property itself. It therefore seems very likely that the noise levels at Greenhill Farm would be lower than at Littlerig. Indeed inspection of Appendices 21, 22 and 23 shows that noise levels were, in fact, sometimes lower at Greenhill Farm.

3.3 Turbine Noise

I have no disagreement with the stated method of calculation in 12.3.4. The results for turbine noise are set out in Table 12-6. Apart from the level at Coulshill, which I think is a little too low, the turbine noise levels as stated are rather higher than I calculate.

3.4 Proposed Turbine Noise Standards

The maximum permitted noise level of turbines has been derived using 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.

The applicant has selected an absolute level of 35dBA, which is the lower end of the scale.

3.5 Assessment

With the exception of Coulshill (where there are two properties) and derelict properties (which I will discuss below) I am satisfied that remaining surrounding properties comply with the more stringent end of the ETSU guidelines as proposed by the applicant. I say this in spite of my reservations regarding the background noise measurements because I think that the turbine noise levels at the remaining properties will be a little less than shown by the applicant.

There are two occupied properties at Coulshill in excess of the ETSU guidelines. The first is the main house which, I understand, is occupied by the landowner and so may be (in accordance with ETSU) up to 45dBA. The Environmental Statement shows the level to be slightly less than 45dBA though my calculation shows a figure of about 47dbA.

The second property is the shepherd's cottage which, I assume, does not come under the exception for occupiers with a financial interest. Noise at this property is very substantially in excess of the ETSU guidelines.

It is my opinion that where properties are unoccupied and in the ownership or tenancy of someone other than a person with a financial interest in the windfarm they should be treated in the same way as occupied properties. Where properties are unoccupied and in the ownership of a person with a financial interest in the windfarm they might be considered as a special case depending on the particular circumstances. The two properties at Corb and the one at Bankfold are in excess of the ETSU guidelines. If these are owned by someone without a financial interest in the windfarm then they should be taken into account in the assessment of overall impact. If they are in the ownership of someone with a financial interest then I recommend that a condition be imposed limiting or preventing their occupation during the currency of the windfarm.

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.

As I do not have the detailed 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.

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 in background noise levels between day and night.

The background noise levels computed in this way are shown in the following table. This is the table incorporated into Perth and Kinross Wind Energy Policy Guidelines June 2004.

	Wind Speed (m/s)							
	3	4	5	6	7	8	9	10
Background dBA	24	24	25	27	29	31	33	35

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 2dBA higher than the ETSU figures.

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

No of Props	Location	Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
2	Coulshill	29.5	36.9	42.3	46.3	48.8	49.1	49.1	49.1
1	Greenhill Farm	14.1	21.5	26.9	30.9	33.4	33.7	33.7	33.7
1	Littlerig	12.2	19.6	25.0	29.0	31.5	31.8	31.8	31.8
2	Upper Cloan	13.5	20.9	26.3	30.3	32.8	33.1	33.1	33.1
1	Greenhill Cottage	14.0	21.4	26.8	30.8	33.3	33.6	33.6	33.6
1	Cockersfauld	6.3	13.7	19.1	23.1	25.6	25.9	25.9	25.9
1	Bellshill	12.0	19.4	24.8	28.8	31.3	31.6	31.6	31.6
1	Bankfold	20.6	28.0	33.4	37.4	39.9	40.2	40.2	40.2
2	Corb	25.4	32.8	38.2	42.2	44.7	45.0	45.0	45.0

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 follows shown below and 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.

No of Props	Location	Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
2	Coulshill	6	13	17	19	20	18	16	14
1	Greenhill Farm	-10	-3	2	4	4	3	1	-1
1	Littlerig	-12	-4	0	2	2	1	-1	-3
2	Upper Cloan	-11	-3	1	3	4	2	0	-2
1	Greenhill Cottage	-10	-3	2	4	4	3	1	-1
1	Cockersfauld	-18	-10	-6	-4	-3	-5	-7	-9
1	Bellshill	-12	-5	0	2	2	1	-1	-3
1	Bankfold	-3	4	8	10	11	9	7	5
2	Corb	1	9	13	15	16	14	12	10

The two properties at Coulshill will suffer a major loss of amenity. In fact they will have noise levels twice as loud (plus 10dBA) as that which would put them into that category.

Greenhill Farm, Greenhill Cottage and Upper Cloan will just enter the category of marginal loss of amenity at some wind speeds.

The three unoccupied properties will suffer a major loss of amenity.

No other properties will suffer any loss of amenity.

There is a marked footpath from Coulshill to Glendevon that passes within about 600m of the nearest turbines. The noise level on this path will be up to 48dBA at times and this will be a significant intrusion to people walking in the quiet country.

4.4 Other Matters

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 other applications for windfarms pending in the immediate area though I have no details. It is possible that there could be a cumulative noise effect at some properties such that, though there is no impact from any individual development there may be a cumulative impact.

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.