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**GRIFFIN WINDFARM**  
**ENVIRONMENTAL STATEMENT**  
**Comments on Noise Section**

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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 Griffin Forest 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 applicant's ETSU assessment I have made an assessment of the impact of turbine noise on neighbours.
- 3 I cannot comment on whether the period of measurement of background noise is sufficient as wind distribution data has not been supplied but I have some concerns about the locations. In particular it is noted that there is water noise at some locations, which may not be so at other locations where the figures are used.
- 4 I have no significant disagreement with the methodology or the calculated figures for turbine noise.
- 5 The standard adopted for turbine noise is the highest permitted by ETSU but no justification is put forward for this. Nevertheless Scotston and the derelict property at Upper Pitleoch exceed this level. If the lower level were adopted as a standard then Meikle Tombain (where there are two properties) and the other derelict properties at Pitleoch would also exceed the level. Mitigation measures are proposed that rely on the selected turbines being adjustable in speed, which may not necessary be the case. Whether the higher or lower standard or something intermediate ought to be adopted depends partly on the number of properties affected. This in turn hinges on the ownership of the various derelict properties.
- 6 I have made an assessment of the impact of noise on neighbouring properties. Tomnagairn, the derelict property north of Ballinlick and the two properties at Meikle Tombain will suffer a marginal loss of amenity. Scotston and some of the Pitleochs will suffer a major loss of amenity. Scotston is particularly badly affected because of the low background noise level.
- 7 Whilst I find the proposed standards of noise in recreational areas unacceptable, it does not appear that there is a major impact on recreational activity.
- 8 Should the proposed development be granted planning permission then I recommend that there should be conditions attached to limit noise levels at surrounding properties.

## 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 (Section 12 and Appendices 25 and 26) of the Environmental Statement for the proposed windfarm at Griffin Forest 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 12.3.2. In Section 3 below I will assess the Environmental Statement in terms of this document.

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. My Appendix sets out the issues in more detail. In Section 4 I will assess the impact of the windfarm on neighbouring properties.

## 3 ETSU-R-97 ASSESSMENT

This is the method used in the Environmental Statement and my comments on it are contained in this section. 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.

### **3.2 Background Noise**

Background noise measurements have been made at three positions near to neighbouring residential properties for a period of about weeks. I cannot comment on whether the period of measurement is sufficient, as no data has been supplied to show the range of wind directions and speeds. I have some concerns about the locations of the measurements, which I will return to later, but this does not influence the ETSU assessment. (I presume, in 12.4.3, that the dates of the measurements should read 2003).

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.

### **3.3 Turbine Noise**

I have no significant disagreement with the methodology or the calculated figures for turbine noise in Table 5 at the three chosen locations.

### **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. Although not specifically stated, it is apparent from Table 6 (because of the stated mitigation required) that the applicant considers that the upper day time limit of 40dBA is appropriate.

### **3.5 Assessment**

Whether the selection of the day time limit is correct depends, amongst other things, on the number of properties affected. In particular it depends on whether the Pitleoch properties are under the ownership or tenancy of someone with a financial interest in the windfarm. This is not made clear. It should also be noted that there are two properties at Meikle Tombain – a point not mentioned in the report.

Where properties are unoccupied and in the ownership or tenancy of someone other than a person with a financial interest in the windfarm I consider that 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.

35dBA is exceeded at all the Pitleoch properties, at the two properties at Meikle Tombain and at Scotston. I am satisfied that no other properties are affected by more than 35dBA. The applicants selected

level of 40dBA is exceeded at two of the Pitleoch properties and at Scotston. Section 12.7 of the Environmental Statement sets out mitigation measures that can be taken if necessary. The mitigation measures are based on the selected turbines being variable speed and noise controllable which may not necessarily be the case if other turbines are selected.

## 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 proposed minimum distance for these turbines in the Wind Energy Policy Guidelines adopted by Perth and Kinross Council. There are 8 properties in this distance as follows:

- Scotston
- Tomnagairn
- 2 properties at Meikle Tombain
- 3 properties in the Pitleoch area, all derelict
- 1 derelict property north of Ballinlick

### 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.

In 12.4.4 it states that water noise has a significant effect at Meikle Tombain and Upper Pitleoch. There are two properties at Meikle Tombain and several around Upper Pitleoch. I do not think it is valid to assume that background noise levels influenced by water noise will apply at all these locations.

Except at Scotston, I have therefore 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 are the figures incorporated into the Wind Energy Policy Guidelines adopted by Perth and Kinross Council.

It may be noted that the background noise levels measured at Scotston are significantly lower than the figures I have assumed for the other sites.

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. This can clearly be seen at Scotston even though the property is close to the road.

The background noise levels computed in this way are shown in the following table.

	Wind Speed (m/s)												
	2.9	3.6	4.3	5.0	5.7	6.5	7.2	7.9	8.6	9.3	10.1	10.8	11.5
Scotston	22	22	22	23	23	24	25	26	27	27	29	30	32
Meikle Tombain	24	24	24	25	27	28	29	31	32	34	35	37	38
Tomnagairn	24	24	24	25	27	28	29	31	32	34	35	37	38
Upper Pitleoch	24	24	24	25	27	28	29	31	32	34	35	37	38
North of Ballintick	24	24	24	25	27	28	29	31	32	34	35	37	38

## 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. 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 the selected properties.

Location	Wind Speed (m/s)												
	2.9	3.6	4.3	5.0	5.7	6.5	7.2	7.9	8.6	9.3	10.1	10.8	11.5
Scotston	23	28	33	36	39	42	43	43	43	43	43	43	43
Meikle Tombain	15	20	25	28	31	34	35	35	35	35	35	35	35
Tomnagairn	13	18	23	26	29	32	33	33	33	33	33	33	33
Upper Pitleoch	22	27	32	35	38	41	42	42	42	42	42	42	42
North of Ballintick	13	18	23	26	29	32	33	33	33	33	33	33	33

### 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:

- 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 specifically 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.

Location	Wind Speed (m/s)												
	2.9	3.6	4.3	5.0	5.7	6.5	7.2	7.9	8.6	9.3	10.1	10.8	11.5
Scotston	1	6	11	14	16	18	18	18	17	16	15	14	11
Meikle Tombain	-9	-4	1	3	5	6	6	4	3	1	0	-2	-3
Tomnagairn	-11	-6	-1	1	3	4	4	2	1	-1	-2	-4	-5
Upper Pitleoch	-2	3	8	10	12	13	13	11	10	8	7	5	4
North of Ballintick	-11	-6	-1	1	3	4	4	2	1	-1	-2	-4	-5

Tomnagairn and the derelict property north of Ballinlick will suffer a marginal loss of amenity in a narrow band of windspeed. The two properties at Meikle Tombain will suffer a marginal loss of amenity in a wider band of windspeed. Scotston and some of the Pitleochs will suffer a major loss of amenity. Scotston is particularly badly affected because of the low background noise level.

Section 12.1.2 suggests that there is a small amount of walking and some fishing. From my limited knowledge of this specific area I would expect that to be likely. Section 12.6.5 suggests that 55dBA or 65dBA would be appropriate levels for recreational areas. I find these levels quite unacceptable for such areas but it does not seem likely that much recreational activity extends close enough to the turbines to experience anything like that level.

Should the proposed development be granted planning permission then I recommend that there should be conditions attached to limit

noise levels at surrounding properties. In particular these should cover the situation that might arise if different turbines with higher noise levels were used.



## 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.