

## Technical Appendix 9.4: Suggested Planning Conditions: Noise

If the wind farm was successful in its application for planning permission any resulting decision notice would likely contain appropriately worded noise conditions, written so as to be in accordance with Circular 4/1998 The Use of Conditions in Planning Permissions<sup>1</sup>.

Such conditions would provide a degree of protection to nearby residents in the event that noise from the wind farm causes disturbance. To that end, presented below are a set of relevant, precise and enforceable conditions that RES suggest may be considered as appropriate. The form of condition wording suggested has been adopted at sites such as Freasdail<sup>2</sup>, Minnygap<sup>3</sup>, Roos<sup>4</sup>, Solwaybank<sup>5</sup> and Wryde Croft<sup>6</sup>. Any final conditions attached to the proposal would be according to the discretion of the decision maker.

Noise limits for the proposed development are derived by subtracting the predicted noise levels due to the consented Stronelaig scheme, including an additional 3 dB buffer, from the total ETSU R-97 limit. This produces noise limits for the proposed development alone such that the total ETSU R-97 limit is met in combination with Stronelaig.

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<sup>1</sup> Circular 4/1998, "The Use of Conditions in Planning Permissions", Scottish Government, February 1998

<sup>2</sup> Directorate for Planning and Environmental Appeals, Appeal Decision Notice, Appeal Reference PPA-130-2036, Decision Date: 15 April 2014

<sup>3</sup> Directorate for Planning and Environmental Appeals, Appeal Decision Notice, Appeal Reference PPA-170-2055, Decision Date: 19 June 2014

<sup>4</sup> The Planning Inspectorate, Appeal Decision, Appeal Reference: APP/E2001/A/09/2113076, Decision Date: 21 June 2010

<sup>5</sup> Directorate for Planning and Environmental Appeals, Appeal Decision Notice, Appeal Reference PPA-170-2091, Decision Date: 23 September 2014

<sup>6</sup> The Planning Inspectorate, Appeal Decisions for Appeal References: APP/J0540/A/08/2083801 and APP/J0540/A/08/2090541, Decision Date: 1 April 2010

1. The level of noise immissions from the combined effects of the wind turbines (including the application of any tonal penalty) when calculated in accordance with the attached Guidance Notes, shall not exceed the values set out in the attached Table A. Noise limits for dwellings which lawfully exist or have planning permission for construction at the date of this consent but are not listed in the attached Table shall be those of the physically closest location listed in the Table unless otherwise agreed with the Local Planning Authority. The coordinate locations to be used in determining the location of each of the dwellings listed in Table A shall be those listed in Table B.
2. Within 21 days from the receipt of a written request from the Local Planning Authority and following a complaint to the Local Planning Authority from the occupant of a dwelling which lawfully exists or has planning permission at the date of this consent, the wind farm operator shall, at the wind farm operators expense, employ an independent consultant approved by the Local Planning Authority to assess the level of noise immissions from the wind farm at the complainant's property following the procedures described in the attached Guidance Notes.
3. The wind farm operator shall provide to the Local Planning Authority the independent consultant's assessment and conclusions regarding the said noise complaint, including all calculations, audio recordings and the raw data upon which those assessments and conclusions are based. Such information shall be provided within 2 months of the date of the written request of the Local Planning Authority, with an additional 3 weeks allowed should further investigation pursuant to Guidance Note 4 be required, unless otherwise extended in writing by the Local Planning Authority.
4. Wind speed, wind direction and power generation data shall be continuously logged and provided to the Local Planning Authority at its request and in accordance with the attached Guidance Notes within 14 days of such request. Such data shall be retained for a period of not less than 24 months.
5. No development shall commence until there has been submitted to the Local Planning Authority details of a nominated representative for the development to act as a point of contact for local residents (in connection with conditions 1 - 4) together with the arrangements for notifying and approving any subsequent change in the nominated representative. The nominated representative shall have responsibility for liaison with the Local Planning Authority in connection with any noise complaints made during the construction, operation and decommissioning of the wind farm.

## SCHEDULE OF NOISE GUIDANCE NOTES

These notes form part of conditions 1-5. They further explain these conditions and specify the methods to be deployed in the assessment of complaints about noise immissions from the wind farm.

Reference to ETSU-R-97 refers to the publication entitled "The Assessment and Rating of Noise from Wind Farm" (1997) published by the Energy Technology Support unit (ETSU) for the Department of Trade and Industry (DTI).

### NOTE 1

- a) Values of the  $L_{A90,10min}$  noise statistic shall be measured at the complainant's property using a sound level meter of EN 60651/BS EN 60804 Type 1, or EN 61672 Class 1 quality (or the replacement thereof) set to measure using a fast time weighted response as specified in BS EN 60651/BS EN 60804 or BS EN 61672-1 (or the equivalent UK adopted standard in force at the time of the measurements). This shall be calibrated in accordance with the procedure specified in BS 4142: 1997 (or the replacement thereof). These measurements shall be made in such a way that the requirements of Note 3 shall also be satisfied.
- b) The microphone should be mounted at 1.2 - 1.5 m above ground level, fitted with a two-layer windshield (or suitable alternative approved in writing from the Local Planning Authority), and placed outside the complainant's dwelling. Measurements should be made in "free-field" conditions. To achieve this, the microphone should be placed at least 3.5m away from the building facade or any reflecting surface except the ground at a location agreed with the Local Planning Authority.
- c) The  $L_{A90,10min}$  measurements shall be synchronised with measurements of the 10-minute arithmetic mean wind speed and with operational data, including power generation information for each wind turbine, from the turbine control systems of the wind farm.
- d) The wind farm operator shall continuously log arithmetic mean wind speed and arithmetic mean wind direction data in 10-minute periods on the wind farm site to enable compliance with the conditions to be evaluated. The mean wind speed at hub height shall be 'standardised' to a reference height of 10 metres as described in ETSU-R-97 at page 120 using a reference roughness length of 0.05 metres. It is this standardised 10m height wind speed data which is correlated with the noise measurements of Note 2(a) in the manner described in Note 2(c).

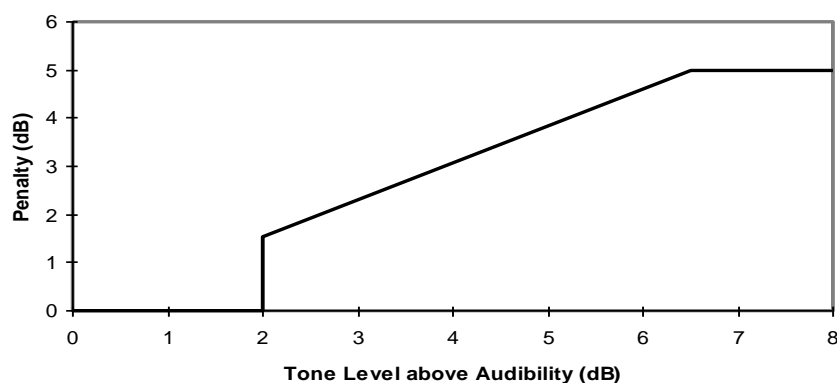
### NOTE 2

- a) The noise measurements shall be made so as to provide not less than 20 valid data points as defined in Note 2 paragraph (b). Such measurements shall provide valid data points for the range of wind speeds, wind directions, times of day and power generation requested by the Local Planning Authority. In specifying such conditions, the Local Planning Authority shall have regard to those conditions which were most likely to have prevailed during times when the complainant alleges there was disturbance due to noise.
- b) Valid data points are those that remain after all periods during rainfall have been excluded. Rainfall shall be assessed by use of a rain gauge that shall log the occurrence of rainfall in each 10minute period concurrent with the measurement periods set out in Note 1(c) and is situated in the vicinity of the sound level meter.
- c) A least squares "best fit" curve of a maximum 2nd order polynomial or otherwise as may be agreed with the local planning authority shall be fitted between the standardised mean wind speed (as defined in Note 1 paragraph (d)) plotted against the measured  $L_{A90,10min}$  noise levels. The noise level at each integer speed shall be derived from this best-fit curve.

### NOTE 3

Where, in the opinion of the Local Planning Authority, noise immissions at the location or locations where assessment measurements are being undertaken contain a tonal component, the following rating procedure shall be used.

- a) For each 10-minute interval for which  $L_{A90,10min}$  data have been obtained as provided for in Notes 1 and 2, a tonal assessment shall be performed on noise immissions during 2-minutes of each 10-minute period. The 2-minute periods shall be regularly spaced at 10-minute intervals provided that uninterrupted clean data are available. Where clean data are not available, the first available uninterrupted clean 2-minute period out of the affected overall 10 minute period shall be selected. Any such deviations from standard procedure, as described in Section 2.1 on pages 104-109 of ETSU-R-97, shall be reported.
- b) For each of the 2-minute samples the margin above or below the audibility criterion of the tone level difference,  $\Delta L_{tm}$  (Delta  $L_{tm}$ ), shall be calculated by comparison with the audibility criterion, given in Section 2.1 on pages 104-109 of ETSU-R-97.
- c) The arithmetic average margin above audibility shall be calculated for each wind speed bin where data is available, each bin being 1 metre per second wide and centred on integer wind speeds. For samples for which the tones were below the audibility criterion or no tone was identified, a value of zero audibility shall be substituted.
- d) The tonal penalty shall be derived from the margin above audibility of the tone according to the figure below. The rating level at each wind speed shall be calculated as the arithmetic sum of the wind farm noise level, as determined from the best-fit curve described in Note 2, and the penalty for tonal noise.



#### NOTE 4

If the wind farm noise level (including the application of any tonal penalty as per Note 3) is above the limit set out in the conditions, measurements of the influence of background noise shall be made to determine whether or not there is a breach of condition. This may be achieved by repeating the steps in Notes 1 & 2 with the wind farm switched off in order to determine the background noise,  $L_3$ , at the assessed wind speed. The wind farm noise at this wind speed,  $L_1$ , is then calculated as follows, where  $L_2$  is the measured wind farm noise level at the assessed wind speed with turbines running but without the addition of any tonal penalty:

$$L_1 = 10 \log \left[ 10^{L_2/10} - 10^{L_3/10} \right]$$

The wind farm noise level is re-calculated by adding the tonal penalty (if any) to the wind farm noise.

**TABLE OF NOISE LIMITS RELATING TO CONDITION 1**

Table A: The LA90,10min dB Wind Farm Noise Level at all times												
House ID	Reference Wind Speed, Standardised v <sub>10</sub> (ms <sup>-1</sup> )											
	1	2	3	4	5	6	7	8	9	10	11	12
H1	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H2	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H3	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H4	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H5	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H6	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H7	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H8	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H9	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H10	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H11	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H12	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.7	34.7	34.7	34.7	34.7
H13	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.6	34.6	34.6	34.6	34.6
H14	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.6	34.6	34.6	34.6	34.6
H15	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H16	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H17	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H18	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H19	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H20	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H21	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H22	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H23	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H24	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H25	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H26	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H27	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H28	35.0	35.0	35.0	35.0	34.9	34.8	34.6	34.6	34.6	34.6	34.6	34.6
H29	35.0	35.0	35.0	35.0	34.9	34.7	34.4	34.4	34.4	34.4	34.4	34.4
H30	35.0	35.0	35.0	34.9	34.9	34.7	34.4	34.3	34.3	34.3	34.3	34.3

**Table A: The LA90,10min dB Wind Farm Noise Level at all times**

House ID	Reference Wind Speed, Standardised $v_{10}$ ( $\text{ms}^{-1}$ )											
	1	2	3	4	5	6	7	8	9	10	11	12
H31	35.0	35.0	35.0	34.9	34.8	34.6	34.3	34.3	34.3	34.3	34.3	34.3
H32	35.0	35.0	35.0	34.9	34.8	34.6	34.3	34.3	34.3	34.3	34.3	34.3
H33	35.0	35.0	35.0	35.0	34.9	34.7	34.5	34.5	34.5	34.5	34.5	34.5
H34	35.0	35.0	35.0	34.9	34.8	34.5	34.2	34.1	34.1	34.1	34.1	34.1
H35	35.0	35.0	35.0	34.9	34.8	34.5	34.2	34.1	34.1	34.1	34.1	34.1
H36	35.0	35.0	35.0	35.0	34.9	34.7	34.4	34.4	34.4	34.4	34.4	34.4
H37	35.0	35.0	35.0	34.9	34.8	34.5	34.1	34.0	34.0	34.0	34.0	34.0
H38	35.0	35.0	35.0	34.9	34.8	34.6	34.3	34.2	34.2	34.2	34.2	34.2
H39	35.0	35.0	35.0	35.0	34.9	34.7	34.5	34.4	34.4	34.4	34.4	34.4
H40	35.0	35.0	35.0	35.0	34.9	34.7	34.4	34.4	34.4	34.4	34.4	34.4
H41	35.0	35.0	35.0	34.9	34.8	34.4	34.0	33.9	33.9	33.9	33.9	33.9
H42	35.0	35.0	35.0	34.9	34.8	34.5	34.2	34.1	34.1	34.1	34.1	34.1
H43	35.0	35.0	35.0	35.0	34.9	34.7	34.4	34.4	34.4	34.4	34.4	34.4
H44	35.0	35.0	35.0	35.0	34.9	34.8	34.7	34.6	34.6	34.6	34.6	34.6

**TABLE OF COORDINATE LOCATIONS OF PROPERTIES**

Note to Table B: The geographical co-ordinates references are provided for the purpose of identifying the general location of dwellings to which a given set of noise limits applies.

**Table B: Coordinate locations of the properties listed in Table A**

House ID	Co-ordinates	
	X (m)	Y (m)
H1	255066	789587
H2	255066	789587
H3	255066	789587
H4	255153	789623
H5	255068	789659
H6	253940	789689
H7	254831	789721
H8	254712	789783
H9	255736	790182
H10	256934	790535
H11	256985	790552
H12	257024	790553
H13	258709	791468
H14	258709	791468

<b>Table B: Coordinate locations of the properties listed in Table A</b>		
<b>House ID</b>	<b>Co-ordinates</b>	
	<b>X (m)</b>	<b>Y (m)</b>
H15	259369	792343
H16	259373	792353
H17	259353	792371
H18	259314	792407
H19	259342	792434
H20	259341	792444
H21	259340	792457
H22	259340	792465
H23	259343	792481
H24	259348	792489
H25	259356	792500
H26	259360	792507
H27	259368	792519
H28	259372	792526
H29	256816	792982
H30	256193	793009
H31	254994	793129
H32	254974	793163
H33	259490	793602
H34	255163	793782
H35	255163	793782
H36	258851	794065
H37	252886	794282
H38	258346	794360
H39	260077	794433
H40	246363	795930
H41	252800	794869
H42	247373	795422
H43	246300	796074
H44	243988	795242

