

4d. Noise Conditions (Planning)

This chapter gives details of the noise planning conditions which will be required if TDC, despite the compelling evidence recommending refusal given in the preceding three chapters 4a, 4b and 4c, is still minded to grant permission for this application.

This chapter has 2 sub-sections:

- 4d.1 Planning Conditions and Statutory Nuisance
- 4d.2 Noise Level, Tonality and Amplitude Modulation Conditions

4d.1 Planning Conditions and Statutory Nuisance

From the DEFRA Report '*Wind Farm Noise Statutory Nuisance Complaint Methodology*' (April 2011):

'Compliance with any imposed planning conditions does not on its own provide a defence against alleged Statutory Nuisance or justify an effect that is judged to be a Statutory Nuisance due to noise from wind farms and turbines. However, the granting of planning permission affects decisions on Statutory Nuisance where it alters the nature and character of the location so that such noise is to be expected or tolerated. Furthermore, compliance with planning conditions does not provide blanket protection against Statutory Nuisance.'

(Executive Summary page 2)

4d.2 Noise Level, Tonality and Amplitude Modulation Conditions

These conditions incorporate the Den Brook AM Noise Condition, upheld in the High Court by their Lordships Lord Justice Mummery, Lord Justice Elias and Lord Justice Patten as robust and enforceable.

1. The rating level (as defined in the Glossary of PPG24: Planning and Noise) of noise immissions from the combined effects of the wind turbines (including the application of any tonal penalty), when assessed in accordance with the attached Guidance Notes, shall not exceed the values set out in the attached Tables 1 and 2 below. Noise limits for dwellings which lawfully existed at the date of this permission but not listed in the Tables attached shall be those at the nearest location listed in the Tables.

2. The wind farm operator shall, at its own expense, employ a consultant approved by the local planning authority to monitor noise levels at up to five selected residential locations (or at representative locations close to those properties, to be agreed with the Local Planning Authority) during the six months following connection to the electricity grid and full operation of all the turbines on the site. The duration of such monitoring shall be sufficient to provide comprehensive information on noise levels at a representative range of wind speeds and wind directions with all wind turbines operating. Monitoring shall be carried out in accordance with the procedures described in the attached Guidance Notes. A report of the assessment shall be provided in writing to the local planning authority within 56 days of a request under this condition unless this period is extended by the local planning authority in writing.

3. Subsequent to the initial six-month period in condition 2, at the request of the local planning authority following a complaint the wind farm operator shall, at its expense, employ a consultant approved by the local planning authority to assess the level of noise emissions from the wind farm at the complainant's property following the procedures described in the attached Guidance Notes. A report of the assessment shall be provided in writing to the local planning authority within 56 days of a request under this condition unless this period is extended by the local planning authority in writing.

4. Wind speed, wind direction and power generation data for each wind turbine shall be continuously logged and provided to the local planning authority at its request and in accordance with the attached Guidance Notes within 56 days of such a request.

5. No wind turbine shall generate electricity to the grid until the local planning authority, as advised by a consultant approved by the local planning authority at the expense of the operator, has approved in writing a scheme submitted by the wind farm operator providing for the measurement of noise immissions from the wind turbines. The objective of the scheme (which shall be implemented as approved) shall be to evaluate compliance with condition 1 in a range of wind speeds and directions and it shall terminate when compliance with condition 1 has been demonstrated to the satisfaction of and agreed in writing by the local planning authority.

6. At the request of the local planning authority following the receipt of a complaint the wind farm operator shall, at its expense, employ a consultant approved by the local planning authority, to assess whether noise immissions at the complainant's dwelling are characterised by greater than expected amplitude modulation. Amplitude modulation is the modulation of the level of broadband noise emitted by a turbine at blade passing frequency. These will be deemed greater than expected if the following characteristics apply:

a) A change in the measured $L_{Aeq, 125 \text{ milliseconds}}$ turbine noise level of more than 3 dB (represented as a rise and fall in sound energy levels each of more than 3 dB) occurring within a 2 second period.

b) The change identified in (a) above shall not occur less than 5 times in any one minute period provided the $L_{Aeq, 1 \text{ minute}}$ turbine sound energy level for that minute is not below 28 dB.

c) The changes identified in (a) and (b) above shall not occur for fewer than 6 minutes in any hour.

Noise immissions at the complainant's dwelling shall be measured not further than 35m from the relevant building, and not closer than within 3.5m of any reflective building or surface, or within 1.2m of the ground.

(d) The wind farm operator shall continuously log arithmetic mean wind speed and arithmetic mean wind direction data in 10 minute periods from the hub height anemometer on the site to enable compliance with the conditions to be evaluated. Such data shall be 'standardised' to a reference height of 10m as described in ETSU-R-97 at page 120 using a reference roughness length of 0.05m.

7. No wind turbine shall generate electricity to the grid until the local planning authority, as advised by a consultant approved by the local planning authority at the expense of the operator, has approved in writing a scheme submitted by the wind farm operator providing for the measurement of greater than expected amplitude modulation immissions generated by the wind turbines. The objective of the scheme (which shall be implemented as approved) shall be to evaluate compliance with condition 6 in a range of wind speeds and directions and it shall terminate when compliance with condition 6 has been demonstrated to the satisfaction of and agreed in writing by the local planning authority.

SCHEDULE OF GUIDANCE NOTES RELATING TO CONDITIONS 1 - 4

These notes (or any superseding equivalent UK adopted procedure) are to be read with conditions 1 - 4. They further explain these conditions and specify the methods to be deployed in the assessment of complaints about noise immissions from the wind farm.

NOTE 1

(a) Values of the $L_{A90,10min}$ noise statistic should be measured at the complainant's property, using a sound level meter of IEC 651 Type 1, or BS EN 61672 Class 1, standard (or the equivalent relevant UK adopted standard in force at the time of the measurements) set to measure using a fast time weighted response. This should be calibrated in accordance with the procedure specified in BS 4142: 1997 (or the equivalent relevant UK adopted standard in force at the time of the measurements).

(b) The microphone should be mounted at 1.2 - 1.5m above ground level, fitted with a two layer windshield or suitable equivalent approved by the local authority, and placed outside the complainant's dwelling. Measurements should be made in "free-field" conditions, so that the microphone should be placed at least 3.5m away from the building façade or any reflecting surface except the ground.

(c) The $L_{A90,10min}$ measurements should be synchronised with measurements of the 10-minute arithmetic average wind speed and with operational data 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 from the hub height anemometer on the site to enable compliance with the conditions to be evaluated. Such data shall be 'standardised' to a reference height of 10m as described in ETSU-R-97 at page 120 using a reference roughness length of 0.05m.

NOTE 2

(a) The noise measurements should be made so as to provide not less than 20 valid data points as defined in Note 2 paragraph (b). Such measurements should provide valid data points for the range of wind speeds, wind directions, wind shear levels, frozen ground, cloud cover, 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. At its request the wind farm operator shall provide all of the data collected under condition 2 to the local planning authority.

(b) Valid data points are those that remain after all periods during rainfall have been excluded as informed by a rain gauge sited adjacent to the measurement location. Additional atypical data as agreed by the local planning authority shall also be removed.

(c) A least squares, "best fit" curve of a maximum 2nd order should be fitted to the data points and define the rating level at each integer speed.

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 should be used.

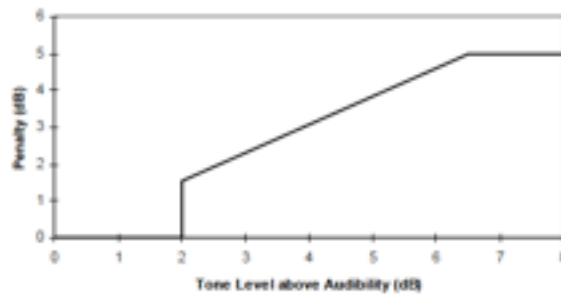
(a) For each 10-minute interval for which $L_{A90,10min}$ data have been obtained as provided for in Note 1 a tonal assessment is performed on noise immissions during 2 minutes of each 10 minute period. The 2 minute periods should be regularly spaced at 10 minute intervals provided that uninterrupted 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 shall be reported.

(b) For each of the 2-minute samples the margin above or below the audibility criterion of the tone level difference, ΔL_{tm} , should be calculated by comparison with the audibility criterion given in paragraph 2.1 on pages 104-9 of ETSU-R-97.

(c) The margin above audibility is plotted against wind speed for each of the 2- minute samples. For samples for which the tones were below the audibility criterion or no tone was identified, substitute a value of zero audibility.

(d) A linear regression should then be performed to establish the margin above audibility at the assessed wind speed for each integer wind speed. If there is no apparent trend with wind speed then a simple arithmetic average shall be used.

(e) The tonal penalty is derived from the margin above audibility of the tone according to the figure below. The rating level at each wind speed is 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 rating level is above the limit set out in the conditions, measurements of the influence of background noise should be made to determine whether or not there is a breach of condition. This may be achieved by repeating the steps in Note 2, with the wind farm switched off, and determining the background noise at the assessed wind speed, L_3 . The wind farm noise at this speed, L_1 , is then calculated as follows where L_2 is the measured level with turbines running but without the addition of any tonal penalty:

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

The rating level is re-calculated by adding the tonal penalty (if any) to the derived wind farm noise L_1 . If the rating level lies at or below the values set out in the conditions then no further action is necessary. If the rating level exceeds the values set out in the conditions then the development fails to comply with the conditions.

Tables of Noise Limits Relating to Condition 1

Table 1: Between 23:00 and 07:00 hours (Noise Level in dB LA90, 10 min)

LOCATION	STANDARDISED WIND SPEED (m/s) at 10m agl								
	4	5	6	7	8	9	10	11	12
Fairlawns	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
Little Copse	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
The Vale	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
Moyles Moor	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
6 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
Lyne Akres	43.0	43.0	43.0	43.0	43.0	46.0	49.1	51.5	53.2
5 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
4 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
3 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
2 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
1 Station Cottages	43.0	43.0	43.0	43.0	43.0	46.0	49.6	52.7	55.0
1 The Granary	43.0	43.0	43.0	43.0	43.0	46.0	49.1	51.5	53.2
2 The Granary	43.0	43.0	43.0	43.0	43.0	46.0	49.1	51.5	53.2
View Farm	43.0	43.0	43.0	43.0	43.0	46.0	49.1	51.5	53.2
Manor Farm	45.0	45.0	45.0	45.0	48.9	53.2	56.0	57.3	57.0
Cranmore	43.0	43.0	43.0	43.6	48.9	53.2	56.0	57.3	57.0
Woodlands	43.0	43.0	43.0	43.5	48.4	52.5	55.5	57.4	58.5
New Buildings	43.0	43.0	43.0	43.5	48.4	52.5	55.5	57.4	58.5
Longfield	43.0	43.0	43.0	43.5	48.4	52.5	55.5	57.4	58.5
Bickford Cottage	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Bickford Arms	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Old Post Office	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
The Nook	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
The Firs	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Bickford Lodge	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Miksam Barn	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
6 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
The Laurels	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
5 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
The Retreat	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Tem bani	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Freshfields	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Eden Park	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
4 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
1 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
2 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
3 The Gardens	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Oakfield	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Old Chapel	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Carley	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2
Moorfield House	43.0	43.0	43.0	43.0	43.0	46.1	49.3	51.6	53.2

Table 2: At all other times (Noise Level in dB LA90, 10 min)

LOCATION	STANDARDISED WIND SPEED (m/s) at 10m agl								
	4	5	6	7	8	9	10	11	12
Fairlawns	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
Little Copse	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
The Vale	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
Moyles Moor	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
6 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
Lyne Akres	35.0	35.3	37.2	39.5	42.2	45.0	47.9	50.9	53.8
5 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
4 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
3 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
2 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
1 Station Cottages	35.0	35.9	37.5	39.5	41.9	44.7	47.7	50.8	54.0
1 The Granary	35.0	35.3	37.2	39.5	42.2	45.0	47.9	50.9	53.8
2 The Granary	35.0	35.3	37.2	39.5	42.2	45.0	47.9	50.9	53.8
View Farm	35.0	35.3	37.2	39.5	42.2	45.0	47.9	50.9	53.8
Manor Farm	45.0	45.0	45.0	45.1	49.8	53.7	55.0	55.0	55.0
Cranmore	36.6	38.0	40.9	45.1	49.8	53.7	55.0	55.0	55.0
Woodlands	39.8	41.5	43.6	46.2	49.0	52.0	54.8	57.4	59.7
New Buildings	39.8	41.5	43.6	46.2	49.0	52.0	54.8	57.4	59.7
Longfield	39.8	41.5	43.6	46.2	49.0	52.0	54.8	57.4	59.7
Bickford Cottage	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Bickford Arms	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Old Post Office	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
The Nook	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
The Firs	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Bickford Lodge	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Miksam Barn	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
6 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
The Laurels	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
5 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
The Retreat	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Tem bani	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Freshfields	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Eden Park	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
4 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
1 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
2 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
3 The Gardens	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Oakfield	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Old Chapel	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Carley	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1
Moorfield House	36.1	37.4	39.1	41.1	43.3	45.7	48.2	50.7	53.1