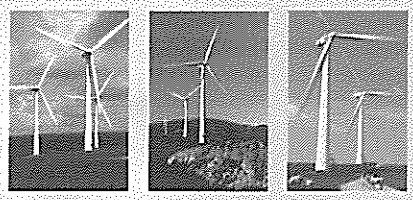
NATIONAL WIND POWER



# Baydon Meadow

## Environmental Noise Impact Assessment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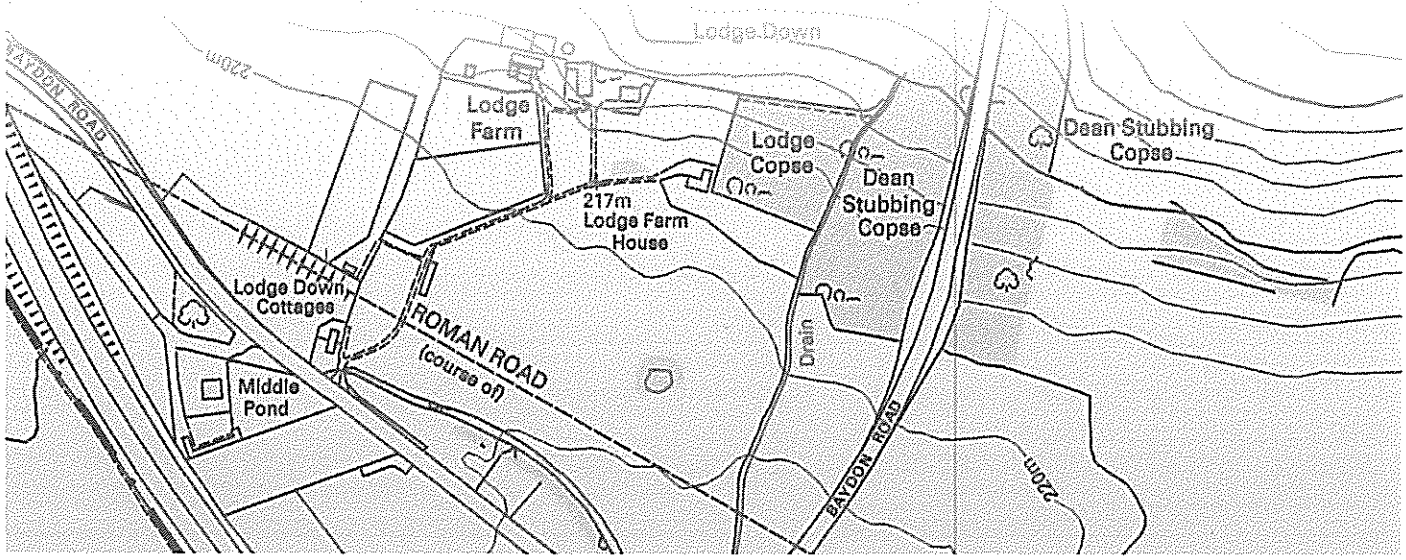

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## INTRODUCTION

The proposed Wind Turbine has a 50m hub-height and a rotor diameter of 62m, giving a maximum tip-height of 81m. The wind turbine is located at SU 29583, 76911 and at an elevation of approximately 220m.

## ASSESSING NOISE EFFECTS

Potential noise effects require careful consideration when assessing proposed wind farm sites. Guidance on the particular characteristics of the issue is available in Planning Policy Guidance Note on Renewable Energy (PPG22), issued by the Department of the Environment in February 1993. In the Annex on Wind Energy, the topic of noise is covered:

"Well designed wind turbines are generally quiet in operation" (para 39); and

"Experience from mainland Europe has shown that there is unlikely to be a significant noise problem for any residential property situated further than 350-400 metres from the nearest turbine." (para 47).

PPG22 does not, however, give any guidance as to what overall levels are acceptable for noise from a wind turbine development.

In 1993 the Department of Trade and Industry set up a Noise Working Group comprising independent experts on wind turbine noise, wind farm developers, DTI personnel and local authority Environmental Health Officers. In September 1996 the Working Group on Noise from Wind Turbines published its findings by way of report ETSU-R-97, "The Assessment and Rating of Noise from Wind Farms", for the DTI. This document describes a framework for the measurement of wind farm noise and contains suggested noise limits which were derived with reference to existing standards and guidance relating to noise emissions from various sources. This 153 page document covers the subject in a great deal of detail. However, some important points are provided below in order to offer further guidance to that provided by the aforementioned PPG22.

"The Noise Working Group is agreed that the $L_{A90,\ 10min}$ noise descriptor should be used for both the background noise and wind farm noise, and that when setting limits it should be borne in mind that the $L_{A90,\ 10min}$ of the wind farm is likely to be about 1.5 and 2.5dB(A) less than the $L_{Aeq}$ measured over the same period." (para 14)

"The Noise Working Group recommends that the fixed limit for night-time is 43dB(A). This limit is derived from the 35dB(A) sleep disturbance criteria referred to in Planning Policy Guidance Note 24 (PPG24). An allowance of 10dB(A) has been made for attenuation through an open window (free-field to internal) and 2dB(A) subtracted to account for the use of $L_{A90,\ 10min}$ rather than $L_{Aeq,\ 10min}$. (para 24)"

"For single turbines or wind farms with very large separation distances between the turbines and the nearest properties...We are of the opinion that, if the noise is limited to an $L_{A90,\ 10min}$ of 35dB(A) up to wind speeds of 10m/s at 10m height, then this condition

alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary." (para 25).

## PREDICTED RECEIVER NOISE LEVELS

The potential noise levels emitted from the wind turbine were investigated using the propagation model specified in ISO 9613-2: 1996, Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. The following were used to calculate the noise levels at selected properties close to the proposal:

- The octave band sound power level with a total source sound power level of 101dB(A) at 10m/s at 10m height
- Octave band atmospheric attenuation coefficient values as specified in ISO 9613-2: 1996 for conditions of 15 ºC and 80% relative humidity
- No barriers
- No absorption by the ground
- Subtraction of 2dB from receiver levels to correct from $L_{Aeq}$ to $L_{A90}$
- All properties assumed to be downwind

Note that the assumptions above give results indicative of the likely worst case noise levels; in practise it is anticipated receiver noise levels will be lower than those predicted.

Seven dwellings are located in the vicinity of the propose wind turbine and are identified in Table 1, and shown in Figure 1, along with predicted noise levels ($L_{A90,10min}$ & $L_{Aeq,10min}$).

| Property | Distance to wind turbine (metres) | *Predicted noise level ($L_{Aeq,10min}$).* | Predicted noise level ($L_{A90,10min}$). |
|---|---|---|---|
| **Middle Pond** | **330** | *41.3* | **39.3** |
| **Lodge Down Cottages (E)** | **311** | *41.8* | **39.8** |
| **Lodge Down Cottages (W)** | **320** | *41.6* | **39.6** |
| **Lodge Farm** | **510** | *37.0* | **35.0** |
| **Lodge Farm House** | **466** | *37.9* | **35.9** |
| **Woodlands Lodge** | **582** | *35.7* | **33.7** |
| **Saunders Cottage** | **551** | *36.3* | **34.3** |

**Table 1 - Predicted levels of wind turbine noise**

It is apparent that some of the $L_{A90}$ noise levels exceed the 35dB(A) $L_{A90,10min}$ threshold that under the guidance given by the Noise Working Group report would require background noise level assessment. However it is also clear that the predicted noise levels, notwithstanding their "likely worst case" nature, fall well below the level where night-time disturbance might be expected.

A detailed noise assessment would add significantly to the cost of the Environmental Report supporting the planning application. Furthermore, there is likely to be a significant contribution to background noise levels at these receiver locations from road traffic on the M4 motorway. It is appropriate therefore to compare the likely impact of the wind turbine with the current noise from the motorway to assess any *additional* disturbance that might be associated with the operation of the proposed wind turbine.

## EXISTING TRAFFIC NOISE IMPACT

All of the properties located near to the wind turbine will experience noise from the M4 to a greater or lesser extent. The amount of received noise will depend principally on the number of vehicles using the road and the attenuation of the noise as it travels from source to receiver. The procedure detailed in Calculation of Road Traffic Noise 1988, HMSO (CRTN) can be used to assess the level of road traffic noise at receiver locations. In order to assess the likely level of the existing noise impact from the M4 the Highways Agency were contacted, and were able to provide separate East and West flow data for the section of carriageway between junctions 14 and 15 for the first six months of 2001. This flow information has been used as the basis for predicting the current noise exposure using CRTN, assuming the following:-

- No road segmentation - it is assumed that the layout is a simple one
- The flows and therefore source level applies for all properties considered
- East and West flows were added together.
- 12% HGV's (taken from communication with John Charman at the Highways Agency, used when assessing long term average source levels)
- A 1.5 m receiver height
- An average propagation height of 1m
- A mixed ground absorption factor of 0.5
- A barrier loss of 15dB(A) - line of sight may be blocked
- No increase in received noise levels due to façade reflections
- A conversion from $L_{A10}$ to $L_{Aeq}$ specified by TRL (P G Abbott and P M Nelson. Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping. Project report PR/SE/451/02, TRL Limited, 2002. Property of DEFRA.)

It should be noted that the above assumptions are considered to give received traffic levels lower than those likely to occur. The method in CRTN stipulates either ground absorption OR barrier effects, by taking account of both, the resulting predicted noise levels are likely to be lower. The shortest distances from the M4 motorway to properties are given in Table 2 below.

| Property | Distance to Motorway (metres) |
|---|---|
| Middle Pond | 50 |
| Lodge Down Cottages (E) | 270 |
| Lodge Down Cottages (W) | 200 |
| Lodge Farm | 470 |
| Lodge Farm House | 520 |
| Woodlands Lodge | 341 |
| Saunders Cottage | 165 |

**Table 2 - Distances from the M4 to nearby properties**

Charts 1 to 7 in Appendix A1 show how the average hourly predicted road traffic noise varies throughout the 24 hour period at each property. Also shown on each chart are the predicted receiver levels of wind turbine noise *(please note: wind turbine noise should normally be considered using the $L_{A90}$ indices, $L_{Aeq}$ values have been included in these figures for comparison only, $L_{A90}$ values for wind turbines are typically 2dB(A) lower, refer to table 1).* It is clear from the charts that road traffic noise is highly likely to be the dominant source for the majority of the 24 hour period at all of the properties

near to the wind turbine. In general the properties are both downwind of the road and wind turbine, therefore when weather related propagation effects give rise to lower road traffic noise, lower levels of wind turbine noise are also to be expected.

Although no background noise surveys have been performed at this site, at other sites additional information is available that may help to assess the likely impact at the proposed site. The Lambrigg Wind Farm Environmental Statement includes a noise assessment relating to a property very close to the M6 motorway. The property was approximately 80m west of the motorway, whilst noise monitoring took place approximately 15m west of the property. At the microphone location therefore, the house acted as a partial acoustic barrier. The results of this monitoring are included here as Chart 8 in Appendix A1 and show that the noise levels during quiet day-time periods (as defined by ETSU-R-97) were clearly dominated by traffic noise from the M6. Average noise levels for these periods ranged from approximately 52dB(A) at 0 m/s windspeed to approximately 55dB(A) at 15 m/s windspeed demonstrating that background noise levels did not fall and were dominated by high levels of road traffic noise.

## CONCLUSION AND RECOMMENDATION

Objective assessment of the potential noise impact at all properties due to the proposed Baydon Meadow wind turbine indicates that a) recommended night-time noise criteria are met by the proposal; and b) any day-time noise impact is not expected to be significant when compared to the likely levels of existing background road traffic noise.

It is proposed that in the event that planning permission is granted, a programme of background noise monitoring in accordance with the recommendations of ETSU-R-97 should be undertaken, and that this should be enforced with appropriately worded planning conditions. This would ensure that the noise amenity at properties in the vicinity of the wind turbine are adequately protected. Such a program of monitoring could be required by the use of planning conditions such as those shown below.

> *"X Full details of a background noise monitoring scheme shall be submitted to and agreed in writing by the Local Planning Authority prior to commencement of the construction of the wind turbine hereby approved, such scheme to follow the recommendations in report "The Assessment and Rating of Noise from Wind Farms", ETSU-R-97, report for the Department of Trade and Industry, September 1996.*
>
> *Y Property-specific noise limits shall be submitted to and agreed in writing by the Local Planning Authority prior to commencement of the construction of the wind turbine hereby approved, such limits to follow the recommendations in report "The Assessment and Rating of Noise from Wind Farms", ETSU-R-97, report for the Department of Trade and Industry, September 1996, and based on the results of the background noise monitoring scheme implemented subject to planning condition X. The level of noise emissions from the combined effects of the wind turbine generator shall not exceed these agreed limits."*

Given the proposed noise related planning conditions, the design of the proposed wind energy project is assured to offer sufficient protection of noise amenity based on the guidance given in report ETSU-R-97, "The Assessment and Rating of Noise from Wind Farms".