

These methods would include covering open trenches each night or providing a mammal 'ladder' within trenches to minimise risk of animals becoming trapped in trenches. An update survey to check the current status of setts will be undertaken prior to works commencing as badger can open or re-occupy previously disused setts at any time.

Limited evidence of badger foraging and territorial marking was recorded during the survey and it is considered that the proposed development would only result in the loss of negligible areas of badger foraging habitat. Therefore, once the above recommendations are undertaken, no further mitigation is considered necessary.

Birds

Overview

The site is comprised predominantly of arable fields with areas of plantation woodland, hedgerows and a few rough grassland patches and field margins. These habitats are typical of farmland habitats across much of rural Cambridgeshire and support a suite of wintering bird species which would appear to be typical for the county.

Results of the viewpoint and walkover surveys undertaken show the site not to be of major significance for avifauna. A total of 70 bird species were recorded from all survey visits, including species recorded in summer and winter, and during viewpoint and winter walk-over and summer walk-over surveys. There was no evidence to indicate the site was being used as a major migration route and even local movements (i.e. of gulls) were found to be of a very modest scale for all species.

The viewpoint target species recorded were also fairly limited in range. Only three wader species were recorded, and not in any notable abundance. Raptors accounted for five species with two of these sighted on only one occasion. Wildfowl accounted for four species and, with the exception of mallard, were recorded rarely. However, several passerine species of conservation concern were recorded: corn bunting, yellowhammer, skylark, meadow pipit, song thrush, tree sparrow, bullfinch, reed bunting, marsh tit, linnets, and lesser redpoll were all recorded, and some of these quite frequently during some survey visits.

A detailed assessment of these findings has been undertaken and will be set out within the ES Chapter. However, based upon the results of the surveys, it is considered that the potential operational stage impacts on both summer and wintering birds, through disturbance / displacement and the risk of birds colliding with

wind turbines, is unlikely to significantly affect their local conservation status, although minor disturbance and collision risk effects may be apparent.

Bats

Overview

Eight species of bat have been confirmed to be using the site with the majority of registrations recorded along hedgerows and woodland habitat. Of the species recorded the majority of registrations originated from *Pipistrellus* species, dominated by common pipistrelle with lesser numbers of soprano pipistrelle (both which are considered as species whose populations are at a low level of threat from turbine developments). Other species were recorded at much lower frequencies or within limited areas of the site.

A detailed assessment of the findings of the bat survey work, in line with best practice guidance, has been undertaken and will be set out within the ES Chapter. Where necessary the findings of the bat survey work have also informed the provisional layout of the site.

Great crested newt

The survey results confirmed that a small population of great crested newt is present adjacent to the site but over 500 m distant from the nearest development works. A risk assessment of the likelihood of an offence being committed with regard to great crested newt through the construction of turbines and associated infrastructure has been undertaken based on the 11 turbine layout to help inform the need, or otherwise, for mitigation and/or licensing.

It is unlikely, given the distance of the nearest great crested newt pond and the habitats found both within and adjacent to the development site, that great crested newt is a material consideration for the proposed development. Although turbines 4 and 5 fall within approximately 100-250 m of a number of ponds these were not found to support great crested newt.

Furthermore the extent of habitat loss or disturbance associated with Turbines 4 and 5 and any associated infrastructure is < 0.5 ha and therefore it is unlikely that an offence would be committed with regard to great crested newt and no license would be required. However, some form of 'avoidance' mitigation would be prudent, for example, avoiding hedgerows near Turbines 4 and 5 that may be used by over-wintering great crested newt.

References

- Anon (1995). *The UK Biodiversity Action Plan (as amended)*. HMSO, London.
- Anon (2005), *Planning Policy Statement 9: Biodiversity and Geological Conservation*. Office of the Deputy Prime Minister.
- IEA (1995). *Guidelines for Baseline Ecological Assessment*. E & F Spon.
- IEEM (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom*. Winchester.

12. Noise

12.1 Overview

A noise assessment will be undertaken for the proposals. A survey of ambient noise in the vicinity of the proposed wind energy scheme will be carried out. The levels of noise likely to occur at local residential property as a result of the operation of the turbines will then be calculated, and the environmental implications considered.

The results will be assessed against the available guidelines for wind energy developments, including PPG24 and PPS22. Particular attention will be paid to the ETSU-R-97 report *The Assessment and Rating of Noise from Wind Farms* and the latest *Onshore wind energy planning conditions* guidance note (Renewables Advisory Board and BERR).

Assessment Criteria

PPG24

Planning Policy Guidance Note 24 relates to noise in general. It replaced previous guidance (Circular 10/73, now cancelled) and provided advice on how the planning system could be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. The most recent version of PPG24 was under review in 2006 but its replacement, PPS24, had not at the time of writing been issued, because of the government's reforms of the planning system.

General guidance is provided on how noise may be assessed and controlled, and mitigation measures are suggested. These are of particular relevance to conventional industrial noise sources, since they include the provision of noise barriers or enclosures, the protection of noise-sensitive buildings, measures such as allowing adequate source-to-receiver distances, and limitations to the permitted operating times of noise sources.

PPS22

This Planning Policy Statement specifies the issues that should be taken into account by local planning authorities in England when assessing the development of renewable energy projects. Regarding wind energy in particular, it states that the nature of noise emissions from turbines is one of the distinctive features of this type

of development, and must be taken into account in planning and development control.

PPS22 has a 'Companion Guide' called *Planning for Renewable Energy* which first appeared in 2004. The guide includes a Technical Annex on wind energy (number 8) which deals with noise issues at paragraphs 41 to 44 inclusive.

BS.4142:1997

Throughout the UK, the usual basis for assessing noise of industrial origin is BS.4142:1997, which calls for a comparison of the 'new' noise with the pre-existing L_{A90} . The current version is due to be reviewed and updated during 2006, but to date this review still had not been completed. The basic premise of the standard has not changed over the years: to summarise, complaints from local residents are only considered likely where a development gives rise to noise levels that exceed the previous ambient noise by 10dB or more. Where the 'new' noise is 10dB quieter than the present ambient noise levels, this is to be taken as a positive indication that justifiable complaints will not occur. Differences of 5dB are regarded as being of marginal significance. In practical terms this means that there is a band of uncertainty at least 10dB wide, and probably nearer 20dB wide, within which neither developers nor the enforcement authorities have clear guidance on which they may rely.

There are several problems with the direct application of BS.4142:1997 to wind energy developments, and the conditions stipulated by the standard are often difficult to satisfy.

The standard recommends that noise measurements should not be taken in wind speeds greater than 5ms^{-1} . Since the wind speeds of particular interest are from about 4ms^{-1} to 12ms^{-1} , this being the range over which the turbines operate in periods of relatively low wind noise, great care is necessary in measuring noise levels in order to eliminate wind noise across the microphone diaphragm.

A wind turbine cannot operate below a certain wind speed. This 'cut-in' speed varies according to turbine type, but it is usually between 3 and 4ms^{-1} . It follows that any noise limits on wind turbine developments could only be applicable above this critical wind speed, when the level of ambient noise would be affected to a greater or lesser degree by the action of the wind on vegetation. These circumstances were not

foreseen by the authors of BS.4142, who assumed that for practical purposes (where industrial noise is not wind-dependant) the conditions under which complaints from local communities are most likely are those when background noise is at a minimum. This would be during a calm night, but under those conditions it would be impossible for a wind turbine to generate any noise at all, since it would be stationary.

ETSU-R-97

A wind energy development should be assessed using the DTI ETSU report. The guidance may not be perfect in every respect, but it is by far the best available, and certainly has the most relevance to this particular project.

The report describes a framework for the measurement of wind turbine noise and indicates desirable noise levels, so that without placing unreasonable restrictions on wind energy developments, neighbouring residential properties can be protected from excessive noise. A primary objective of the report is to suggest noise limits in a form suitable for adoption as planning conditions. The Noise Working Group that produced the report considered that absolute noise limits regardless of wind speeds were not suited to wind energy schemes in the UK, and that it was more appropriate in the majority of cases to set noise limits relative to background noise. The background noise levels are to be measured over a range of wind speeds so that the impact of turbine noise, which is also wind-speed dependant, can be evaluated.

The parameters to be measured include the equivalent continuous noise level and the 90% exceedance level. The equivalent continuous noise level L_{Aeq} is the noise level in dB(A) which if present for the entire measurement period would produce the same sound energy to be received as was actually received as a result of a signal which varied with time. The abbreviation often includes a specification of the time period (such as one hour, or five minutes) indicating the period of time to which the measured value has been normalised; for example, ' $L_{Aeq,1hr}$ '. The statistical indicator of the form L_n resulting from an environmental noise measurement is the level which was exceeded for n percent of the measurement period. Thus, an L_{A90} of 35dB represents the A-weighted sound pressure level which was exceeded at the microphone for 90% of the measurement period. Any value of n between 0 and 100 is meaningful, but the indices in general use in the UK are L_{A90} , L_{A50} and L_{A10} . The L_{A90} index is generally taken to be representative of the steady background noise level. The L_{A50} is the arithmetic average of all the instantaneous values during the measurement period. The principal use of L_{A10} is in the assessment of road traffic

noise. Again, the time period over which the measurement took place can be specified, so the $L_{A90,10\text{min}}$ is the level which was exceeded for 90% of a ten-minute measurement period: in other words, the level was exceeded for nine of the ten minutes.

One of the most important recommendations in the ETSU-R-97 report is that the statistical index $L_{A90,10\text{min}}$ should be used for both the background noise and the wind farm noise. This allows reliable measurements to be made without them being corrupted by louder, transitory noise events from other sources. The report notes that for the typical wind turbine, the $L_{A90,10\text{min}}$ is between 1.5 and 2.5 dB lower than the L_{Aeq} over the same measurement period. This is worthy of note because for conventional noise measurements in the environment, the L_{Aeq} index is generally regarded as the most appropriate descriptor, and it is normal practice to use it when noise limits are being set. In the present assessment, a constant difference of 2dB between the $L_{A90,10\text{min}}$ and the L_{Aeq} is assumed.

A methodology is provided for the measurement of background noise levels under various wind conditions. The report recommends that data which may be corrupted by extraneous noise sources, including periods when rain falls or when watercourses have abnormally high flows, should be discarded. At all times, the noise levels measured in the environment are to be correlated with wind speed measurements at the site, at a reference height of 10m above ground. Because the noise levels can vary by several decibels at any given wind speed, a curve is to be fitted to the raw data (having discarded doubtful measurements) in order to determine the typical variation in background noise level with wind speed. The exercise is carried out for 'quiet' daytime periods and night-time periods, defined as follows.

Quiet daytime is from 18.00h to 23.00h on weekdays, 13.00h to 23.00h on Saturdays, and all day Sunday. Night-time is between 23.00h and 07.00h daily. All other periods (weekdays and Saturday mornings) are defined as normal daytime, when it would be expected that the ambient noise levels may be somewhat elevated because of human activity, distant road traffic, and natural noise sources.

No specific method is prescribed for the calculation of wind turbine noise, although there is a basic requirement for the sound power level of the machine to be determined by a standard test method (such as the IEA Recommended Practice). It should be noted that both background noise levels and turbine noise are to be

determined by best-fit curves through the survey data once extraneous data points have been removed.

Noise limits

The practice of controlling wind turbine noise by means of noise limits at the nearest noise-sensitive properties is considered appropriate. Noise limits should be applied to external locations and should apply only to those areas frequently used for relaxation or activities for which a quiet environment is highly desirable. Noise limits should be set relative to the background noise at the nearest noise-sensitive properties. Thus, the limits reflect the variation in both turbine source noise and background noise with wind speed.

According to ETSU-R-97 (and the RAB/BERR guidance, discussed below) separate noise limits should apply for daytime and for night-time, because during the night the emphasis should be on preventing sleep disturbance rather than protecting external amenity. Absolute noise limits and margins above background should relate to the cumulative effect of all wind turbines in the area contributing to the noise received at the properties in question. Noise from the wind turbine or combination of turbines should be limited to 5dB above background for daytime and night-time, remembering that the background level of each period may be different.

The day-time level of the $L_{A90,10min}$ of the wind farm noise should normally be limited to an absolute level within the range 35 to 40 dB. The actual value chosen within this range should depend upon a number of factors, such as the number of dwellings in the vicinity of the wind farm, the effect of noise limits on the number of kWh generated, and the duration of the level of exposure. The 'flat' lower limit should be set at a value offering a reasonable degree of protection to the neighbours of wind turbines without placing unreasonable restrictions on developments, and a value of 37.5dB is assumed for the present scheme.

A lower fixed limit of 43dB is recommended for night-time. This is based on a sleep disturbance criterion of 35dB(A) with an allowance of 10dB for attenuation through an open window (free field to internal) and 2dB subtracted to account for the use of $L_{A90,10min}$ rather than $L_{Aeq,10min}$. Both the daytime and night-time lower fixed limits can be increased to 45dB to increase the permissible margin above background where the occupier of the property in question has some financial interest in the project.

Renewables Advisory Board and BERR

In October 2007 a report '*Onshore wind energy planning conditions: Guidance note*' was produced for the Renewables Advisory Board and the Department for Business, Enterprise and Regulatory Reform by TNEI Services Ltd. The purpose of the document was to provide advice on the appropriate types of planning condition relevant to wind energy development. It incorporates information already present within existing planning guidance, provides additional advice regarding the use of planning conditions, and outlines generic conditions for use in wind energy developments. It is aimed at Local Planning Authorities, statutory consultees, objector groups, potential wind applicants and other stakeholders.

As far as noise is concerned, the RAB/BERR guidance reproduces the relevant parts of ETSU-R-97, further strengthening the view that the latter is entirely appropriate for this type of development. It recommends that wind farm noise for quiet daytime periods should be limited to 5dB above the prevailing background noise level, or a fixed minimum level within the range $L_{A90,10min}$ 35 to 40 dB, whichever is the higher. The precise choice of a criterion level within the range 35 to 40 dB(A) depends on a number of factors, including the number of dwellings in the neighbourhood of the wind farm, the effect of noise limits on the number of kWh generated, and the duration and level of any exposure to noise.

It is worthy of note that the up-to-date guidance on planning conditions calls for a specific table of values for the wind-speed-dependent noise limits, based on the background noise curve derived according to the ETSU method. This has in the past been included by some planning authorities as a matter of course.

13. Cultural Heritage

13.1 Overview

A Cultural Heritage assessment will be undertaken. This will consider the likely impact of the proposed development on cultural heritage interests, and identifies measures that should be taken to mitigate, where practical, potential adverse impacts.

13.2 Methodology and Guidance

The specific objectives of the cultural heritage study will be to:

- Identify the cultural heritage baseline within and in the vicinity of the proposed development;
- Consider the proposed development area in terms of its archaeological and historic environment potential;
- Assess the potential and predicted effects of the construction and operation of the development on the baseline cultural heritage resource, within the context of relevant legislation and planning policy guidelines;
- Propose measures, where appropriate, to mitigate any predicted significant adverse impacts.

Planning Policy Context

Legislation includes the Ancient Monuments and Archaeological Areas Act 1979, the Planning (Listed Buildings and Conservation Areas) Act 1990, and the Town and Country Planning (General Development Procedure) Order 1995. Planning policy comprises PPG 15 and PPG 16 at national level and Policies at regional and local level.

Cultural heritage resources include:

- Scheduled Monuments and other archaeological features;
- Listed Buildings and other buildings of historic or architectural importance;
- Conservation Areas and other significant historic townscapes;