

# **BULLINGTON CROSS WIND FARM**

**AN OBJECTION BY**

**KEEP HAMPSHIRE GREEN**

**Winchester City Council Reference: 13/00800/FUL  
Basingstoke and Deane Borough Council: 13/00046/FUL  
Test Valley Borough Council: 13/00753/FULLN**

**June 2013**

**[pdf 4: Sections 5, 6 & 7]**

---

[Text starts on lower half of page]

## **5 Visual**

### **Photomontages**

5.1 It is very difficult for people to visualise just how high a wind turbine will be before it is built. Whilst a limited number of photomontages are provided in this ES it is generally accepted that photomontages underestimate the actual visual impact.

5.2 The University of Newcastle study (2002) - Visual Assessment of Windfarms Best Practice - included 11 case studies comparing photomontages prepared at the planning stage to the actuality of the completed wind farms. In the majority of cases the study found the photomontages understated the size and visual impact of the turbines. It highlighted that photomontages:

*“can imply a degree of realism that may not be robust, and can seduce even a critical viewer into investing more faith in that realism than may be warranted.”*

It goes on to state in its conclusions:

*“The limitations of photomontage should be recognised and acknowledged, especially a tendency for photomontages to consistently underestimate the actual appearance of a windfarm in the landscape.”*

5.3 Given that the true visual impact of a wind farm will not be completely established until after it is built, then the visualisation of the proposed scheme, either through wireframes or photomontages, becomes the only method of assessing the visual impacts. It is, therefore, vital that these are produced to provide the best possible representation, notwithstanding that even then they will underestimate the actual impact.

5.4 This problem is identified in the Scottish Natural Heritage - Visual representation of Windfarms Good Practice Guidance 2006, paras 134, 202 and 206.

*‘One of the most significant difficulties of photographing windfarms, in contrast to other types of development, is that they often appear on the skyline where there is little contrast between the light-coloured turbines and a light-coloured sky. In these circumstances, while the human eye can distinguish, in bright outdoor light, a contrast range of around 1000:1 or more (the brightness ratio of the lightest to darkest elements in the scene), a picture of the same view taken with a camera and shown on a computer screen will have a ratio of only about 100:1. This range of contrast is reduced to as low as 10:1 when printed on paper.’*

5.5 Whilst it is true that in certain atmospheric conditions (such as on very misty or hazy days) it will not be possible to see the turbine, given all the known factors that tend towards an underestimation of the visual impact in photomontages, it is best practice that the turbine, when it is visible, should be shown clearly. This is most helpful to the decision makers and to members of the public trying to use the photomontages to understand the impact of the proposals.

5.6 The conclusion reached in JB’s report is<sup>1</sup>:

*Our view having viewed a number of comparable focal length images in the field, is that an image based on a 50mm lens under represents the scale of wind turbines. However, images based on a 70-75mm (SLR equivalent) single frame image is more representative of what the human eye sees. This is the approach advocated in the Highland Council’s Visualisation Standards for Wind Energy Developments (January 2010). We consider that the images in the ES therefore do not show the perceived scale of the development. Photomontages based on a 70-75mm lens and produced as single frame images at 200mm height minimum should be requested from the applicant for a number of key locations.*

---

<sup>1</sup> Review of Landscape and Cultural Heritage Chapters of ES - Para 2.1.14

## Residential Amenity

- 5.7 A further impact of the visual intrusion of these turbines will be on the residential amenity of people living in close proximity to the site. In planning law there is no right to a private view. However, at a Public Inquiry at North Dover<sup>2</sup> the Inspector, David Lavender said:

*However, when turbines are present in such number, size and proximity that they represent an unpleasantly overwhelming and unavoidable presence in main views from a house or garden, there is every likelihood that the property concerned would come to be regarded as an unattractive and thus unsatisfactory (but not necessarily uninhabitable) place in which to live. It is not in the public interest to create such living conditions where they did not exist before.*

- 5.8 In other words the issue is not whether the properties become “unliveable” but whether they become significantly less attractive places to live.

- 5.9 This was reinforced in an Inquiry for the Wadlow<sup>3</sup> wind farm where the Inspector said:

*“12.34 Nonetheless, when turbines are present in such number, size and proximity that they represent an unpleasantly overwhelming and unavoidable presence in main views from a house or garden, or are likely to cause overshadowing (and particularly flicker effects), there is every likelihood that the property concerned would come to be widely regarded as an unattractive (rather than simply less attractive, but not necessarily uninhabitable) place in which to live. It is not in the public interest to create such living conditions where they did not exist before, and it is against that threshold that I have assessed the effects on outlook.”*

This ‘Lavender Test’ has become accepted as the criteria against which to judge whether the loss of residential amenity can become determinative in a planning application for a wind farm.

- 5.10 JB’s report concludes:

*- The applicant includes a separate Statement of Residential Amenity that includes the nine closest residential properties. Each location includes wireframes from a viewpoint at these properties. However, they only include the landform and the turbines. The wireframes are therefore of very limited benefit in assessing the visual effects where there are any intervening built or natural features in addition to landform.*

**It is recommended that a photomontage is produced (or at least a superimposed wireframe) over a baseline photograph from selected residential properties where there is likely to be a significant visual**

---

<sup>2</sup> APP/X2220/A/08/2071880

<sup>3</sup> APP/W0530/A/07/2059471

**impact to assess if there will be any greater impacts that would result in an unpleasantly overwhelming and unavoidable presence on the residence.**

- For each location the applicant concludes that the wind farm development is 'unlikely' to produce an unpleasantly overwhelming and unavoidable impact. The use of the word 'unlikely' does not convey surety and needs to be verified with further information particularly in respect of the visual material for some properties.

- **Tufton Warren Farm** - The ES viewed the property from a public right of way running south of the site and from there is difficult to fully understand the character of the views from the house at ground level, 1st and 2nd floor and also the garden areas. Whilst there is screening the extent of the screening was not identified in the ES. With the turbines standing on ground up to 25m higher than the house **the effect from T1 and T3 will be significant on the property in combination with T6, T7 and T8.**

The problems with not gaining access is shown by the fact that the ES thought that the access was from the A34 whilst the main access is from the north straight towards the turbines.

- **Tufton Warren Cottages** - It is anticipated that there will be a view of T1-4 from the rear aspect of these cottages. **It is recommended that a photomontage is produced by the applicant from the rear of Cottages 1-3 to assess the effect on the property before the application is determined.**

- **New Barn House** - This property is relatively well enclosed by summer vegetation. However, the effectiveness of screening in the winter has not been assessed. **It is recommended that that a photomontage is produced from the south elevation**

- **Poachers Lodge** - The view will be largely to turbines T6 and T7 with stacking of blades as T6 sits behind T7 which will aggravate the visual effect. The effect is considered to be at least large magnitude if not very large. **Again a photomontage is required.**

- **Upper Norton Farmhouse** - Whilst there is a landowner interest in this property the correct approach is to treat all properties the same. **The approach to the property and views from the gardens and windows facing north would be dominated by the turbines at this distance. Again a photomontage required.**

5.11 The conclusion that must be drawn is that with properties so close there will be significant visual impacts on residential amenity. There is also a good chance that Tufton Warren Farm and Poachers Cottage could be dominated to such an extent that they would become unattractive places to live. Unfortunately the ES does not provide the required visualisations to arrive at a completely informed decision. Photomontages are required for a number of

the key properties and without such evidence the Councils will have to adopt a worst case scenario and assume that the impact on the two properties is sufficient to refuse this application.

### Recreational Amenity

- 5.12 The enjoyment of the unspoilt countryside is one of the key amenities available to both local residents and visitors. The removal of this enjoyment through the visual intrusion of a massive industrial development in the countryside is an adverse impact on people's quality of life.
- 5.13 It is sometimes claimed by developers that people will have different views on how wind turbines will affect their ability to enjoy the countryside. This was considered by an Inspector in his decision<sup>4</sup> for a wind farm near Oundle:

*“Some would choose to view the turbines at close quarters and for them the public rights of way would have a considerable attraction. But that would not be so for local people who would be only too familiar with the turbines and would have lost the benefit of a rural tranquil network. Overall, the proposed wind farm would have an adverse impact on the users of nearby rights of way.”*

There can be no doubt that the ability of people to enjoy the attractive countryside and use the public rights of way (PRoW) would be significantly debased by the introduction of these wind turbines.

View south across windfarm site from public footpath near Brickkiln Hassock



---

<sup>4</sup> APP/G2815/A/06/2019989

- 5.14 There is very little consideration given in the ES to the effect on the extensive and well used PRoW in the immediate vicinity and wider area. Jonathan Billingsley comments:

*There is no mention of the network of minor lanes and roads that provide a connection for local communities through the landscape. These provide a much more intimate association with the landscape than the main roads and a different perspective of the landscape character and views e.g. Micheldever Road between Whitchurch and Micheldever Station<sup>5</sup>.*

*However, the criteria (for viewpoint selection) seems to omit an important category of local routes in the areas where people would see the proposals from rights of way and local roads. There is a relative shortage of views in the ES from within 2.5km with only two to the north from local rights of way and none along the route that passes to the south of the site<sup>6</sup>.*

Additional photographs are provided in JB's report that show the impact on local PRoWs

- 5.15 In his review of visual impacts JB's report says:

*TLP consider that there would be significant effects on eighteen of the 32 viewpoint locations some eight more than in the ES.<sup>7</sup>*

*In addition of the 20 viewpoints A-T included in the TLP review some sixteen are considered to experience significant effects. A higher proportion (than in the ES) of these views are at a closer distance to the proposed turbines.<sup>8</sup>*

*The assessment of shorter range views (up to 5km) records there would be notable effects to the more elevated sections of Whitchurch as illustrated by ES 18, TLP viewpoint S (also in the AONB) and at TLP viewpoint H on Lynch Hill Road where the turbines will breach the skyline looking south.. there would be harmful effects on the views from rights of way around Abra Barrow (ES viewpoint 29) where there are attractive uninterrupted views towards the site.<sup>9</sup>*

*It is noted that there is no description in the ES of the views from the rights of way that runs through the southern part of the site from Upper Norton Farm north east (TLP views N, O and P). this is a significant omission in the ES. There would be a substantial effect on this route which would become completely dominated by the turbines.<sup>10</sup>*

*The effect on views to the south at South Wonston and local rights of way to the north of the village (TLP views C,D and E) would be locally significant*

<sup>5</sup> Review of Landscape and Cultural Heritage Chapters of ES - J. Billingsley - Para 3.43

<sup>6</sup> Ibid - Para 3.4.9

<sup>7</sup> Ibid - Para 4.2.5

<sup>8</sup> Ibid - Para 4.2.6

<sup>9</sup> Ibid - Para 4.2.8

<sup>10</sup> Ibid - Para 4.2.10

*and the turbines would also dominate the ridge occupied by Freefolk Wood.<sup>11</sup>*

View to windfarm site from public footpath at Kitson's Clump, Wonston. Note the blimp flying at 126m, tethered 200m from the nearest turbine at Norton Wood.



5.16 So there can be no doubt that there will be significant harm caused to the users of the local PRoWs. This is reinforced by the objection from the Countryside Access Team at Hampshire County Council who have a number of concerns relating to:

- the use of the Wonston Restricted Byway No 33 and Wonston bridleway for access to the site.
- the resurfacing the proposed access track where they have serious concerns over the effect such major work would have on a rural recreational route. They also comment on the lack of any communication from the applicants
- shadow flicker effect on horses where they state that the proposed 200m separation distance is inadequate and needs to be increased to at least 925m. this would impact up to 12 of the turbines

### **Horse Riders**

5.17 KHG support the stance of Hampshire County Council. Horses can be irrational creatures with an innate ability to be spooked by moving or unfamiliar objects. They have a panoramic field of vision and a highly adapted 'flight response' to fear, which means a horse has the potential to cause serious injury or death to itself, its rider, driver or handler, by swerving, bucking, rearing or bolting when in a panic. Since the more widespread threat of wind turbines on the rural landscape, sections of the

---

<sup>11</sup> Ibid - Para 4.2.15

horse industry have becoming increasingly alarmed about the detrimental effects they will have on the health and safety of staff and animals, and consequently the economic impact on equestrian businesses when turbines are placed close to areas of horse activity. This is aside from the worries of ordinary pleasure riders, and parents of horse riding children, fearful that their animals will act unpredictably when approaching the turbine due to the sheer size and motion of the blades, unexpected start-up, and the low frequency noise created or the shadows crossing their path

- 5.18 The impact of large commercial wind turbines on horses has been increasingly concerning the British Horse Society as turbines become bigger and the number of wind farm applications increase. It has revised its guidelines to state that the guidelines distance from a normal bridleway should be three times the blade tip height (378m in this case) with a minimum distance of 200m. In the socio-economic section we discuss the impact on the livery stable at Lower Norton Farm and the importance of this area of land to the north of the A303 to horse riders as it provides circular rides on bridleways and quiet local roads. The geographical spread of the wind farm will render the whole area out of bounds to any horse rider concerned about the safety implications of riding near turbines.
- 5.19 **There is no doubt that there will be significant harm caused to the amenity value of an attractive well used area of countryside. This harm needs to be taken into account when determining the planning balance.**

View to west across windfarm site from bridleway at Upper Norton Farm



## 6 Cultural Heritage

6.1 JB's report considers the impact on cultural heritage assets. The ES identifies a number of effects that although less than 'substantial harm' in NPPF terms need to be balanced against the benefits of the scheme. However, JB's report identifies a number of heritage assets where the harm could be of greater significance. These are:

- Laverstoke House and Registered Park and Garden
- Hurstbourne Priors Park and Bee House
- Hurstbourne Priors Conservation Area
- Laverstoke Conservation Area
- Stoke Charity Conservation Area and Parish Church
- Bullington House
- Tidbury Hillfort
- Winchester Cathedral

6.2 There is a flaw in the ES that in a number of these cases access has not been gained to the property nor a wireframe produced. This lack of assessment in the field undermines the credibility of the exercise and to fully evaluate the potential impact additional photomontages and a more direct field visit are needed. As an example the report says about Laverstoke House:

### ***Laverstoke House and Registered Park and Garden***

*Appendix 11.2 cites at para 4.16 that the view to the south to the elevated wooded down land comprises the principal views from the house (Grade II\*). The comparison is made with viewpoint 18 which we have identified as significantly harmful in visual terms. It is understood that access has not been gained to the property to assess the impact or produce a wire frame overlay. The listed house is a high sensitivity asset. It is quite possible that the proposal could result in more than moderate magnitude effect on the House and Park and a Major effect occur. **The lack of assessment in the field on this aspect is complacent and should be rectified by an assessment in the field before any decision is made on the application.***

6.3 We would ask that further information is requested from the applicant before any determination is made as the current level of analysis of the effect on cultural heritage assets is inadequate for EIA purposes.

## 7 Noise

### Planning Policy

7.1 The National Planning Policy Framework addresses<sup>12</sup> noise as follows:

*Planning policies and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

### ETSU-R-97

- 7.2 The assessment of noise from wind farms is a complicated technical subject. The Government realised early in the development of onshore wind that if the noise output was assessed under the existing methodology for industrial development (BS4142) which limits industrial noise output to 5dB above background then, because most wind turbine sites were in rural locations with low background noise, it would mean that most wind farms would be refused. Therefore they introduced a specific methodology - ETSU-R-97 - for the assessment of noise from wind farms.
- 7.3 The compromise ETSU has adopted between not constraining onshore wind farm development and protecting the amenity of local residents means that it has adopted significantly less stringent noise requirements than are in place for other industrial developments.
- 7.4 The assumptions and experience from which ETSU was drawn up, being based on turbines of much smaller height and blade diameter (generally up to 30/40m to blade tip), have reduced relevance to the size of the turbine being proposed for this scheme. Yet there has been no attempt to update ETSU in the seventeen years since its introduction.
- 7.5 There are a number of issues, such as excessive aerodynamic modulation and wind shear that are now recognised to be significant factors in wind turbine noise, that are not taken into account by ETSU. Indeed an alternative methodology for dealing with wind shear (the Acoustics Bulletin method) has been proposed and used, even though it is in conflict with ETSU. This shows that although ETSU is the required methodology it is acceptable to modify its interpretation in the light of more recent information, provided

---

<sup>12</sup> NPPF - Para 123

there is adequate justification. The key issue is not whether the scheme will conform to ETSU but whether it will create unacceptable noise impacts on local residents, particularly with regard to sleep disturbance and resulting health problems.

- 7.6 The failings of the ETSU methodology has led the Government to ask the Institute of Acoustics to review the way that ETSU is applied in wind farm applications. This has resulted in the IOA issuing A Good Practice Guide to the Application of ETSU-R-97 For the Assessment and Rating of Wind Turbine Noise in May this year. It must be recognised that the terms of reference for this piece of work specifically excluded any consideration of the suitability of ETSU as a means of assessing wind turbine noise and the impact on residential amenity. It was solely focused on the consistent implementation of the ETSU methodology not whether it was fit for purpose.
- 7.7 The fact that even if a proposed wind farm scheme does comply with ETSU-R-97 there is no guarantee that a noise nuisance will not occur is amply illustrated in the case of Jane Davis. She lived with her family on a smallholding 930m away from the nearest turbine of the Deeping St Nicholas wind farm. From the moment of the commissioning of the 100m turbines she and her family suffered serious adverse noise effects, eventually leading to them abandoning their home and moving into rented accommodation some miles away. Yet the noise output was within the ETSU limits and thus the developer claimed there was no problem and refused to enter into any mitigation. Finally the family took the developer to the High Court where, prior to the hearing of any of the noise evidence, there was an out of court settlement which, it is understood, involved the purchase of the Davis's house and smallholding by the developer, although the details of the settlement are the subject of a 'gagging order'.
- 7.8 If noise issues can arise even when ETSU limits appear to be met, when modelling the expected output, then it is imperative that a thorough and rigorous noise assessment is carried out.

### **Background Noise Assessment**

- 7.9 The methodology in ETSU works on the principle of measuring the typical background noise level at the nearest noise sensitive properties across a range of wind speeds at the key times of day and then setting limits at those properties based on limits of 5dB above background or a fixed limit, whichever is higher.

#### **Wind Direction**

- 7.10 ETSU is predicated on the assumption that as the noise from the turbines increases with wind speed this will be largely masked by the increasing background noise from the wind itself and vegetation in the immediate vicinity. This basic principle may well apply in a simple noise environment where there is no external dominant noise source. This is not the case here

where the presence of the A303 and A34 trunk roads are the predominant noise sources for the noise sensitive properties surrounding the proposed site. As is admitted in the ES the wind direction then becomes as, if not more, important than the wind speed in determining the level of background noise at the different properties.

7.11 This is recognised in the IOA Good Practice Guide which says<sup>13</sup> :

*Directional analysis of prevailing background noise levels may be necessary in specific circumstances, where a wind farm is located upwind of a receptor but a significant contributor to the background noise environment is downwind of the receptor in the same wind conditions.*

Whilst such a directional sub-analysis was carried out for the dwellings at Tufton Warren using an easterly wind no such analysis was performed for the properties at Upper Norton Farm. This may well have been because all the properties were considered to have a financial interest in the wind farm and hence had higher limits applied to the properties. We show later in this section that this is incorrect and the tenanted properties do not qualify as financially involved and given their proximity to the A303 they should have been subjected to a directional sub-analysis, even though the background noise level is high enough at this location to make the background noise the determinant for the noise limits. The point is that with a wind blowing the noise of the roads away from the properties then it could be that a lower noise limit will come into play.

Even the Tufton Warren analysis fails because of a lack of data, with relevant data only available between 3 and 5m/s wind speeds.

7.12 There is a more fundamental point to be made about the issue of wind direction. The specific noise environment at each measurement location is crucial. Given that the individual background noise characteristics of each dwelling will be unique and will vary differently by time of day, wind speed and wind direction it is vital that the survey period is sufficiently long to provide a complete spectrum of values for each variable.

7.13 This is defined in ETSU<sup>14</sup> which states:

*“The background survey should be taken over a sufficient period of time to enable a reliable assessment of the prevailing background noise levels at each property to be made. As a guideline, an appropriate survey period might be 1 week, although the actual duration will depend on the weather conditions, in particular the wind speed and direction during the survey. It **must** (our bold) be ensured that, during the survey period, wind speeds over the range zero to at least 12m/s and **a range of wind directions that are typical of the site** (our bold), are experienced.”*

---

<sup>13</sup> Policy SB19

<sup>14</sup> ETSU-R-97 - Pg.99 1.2 The Background Noise Survey

- 7.14 There is no wind rose provided in the ES of the wind direction that occurred during the background noise measurement period or indeed of the prevailing wind directions over long periods that could have been obtained from a meteorological mast that most developers would erect as a matter of course for at least twelve months prior to any application being submitted. Thus there is no way of knowing if the wind direction conditions during the measurement period were representative of the normal conditions that this site experiences. This is crucial because if the wind direction was proportionately more from a direction which maximised the background noise than would normally be expected then the measured background noise would be higher and this would feed through into the limits that would be applied in any noise condition, to protect residential amenity. The applicant would have been aware of the directional noise sensitivity of this site from the start, given the obvious presence of the roads, and to not include this wind direction data means that there can be no confidence in the representativeness of the background noise data that leads directly to the only protection of residents from noise and resulting health problems, namely any planning condition.

#### Wind Turbine Noise Annoyance

- 7.15 The background noise levels at all properties are relatively high, for a rural location, because of the proximity to trunk roads. This high background level feeds through into high noise limits allowed under the ETSU methodology. Residents become acclimatised to road traffic noise which tends to be a steady low frequency rumble. However, wind turbine noise is different and even with a high background noise level the likelihood of potential disturbance is heightened because wind turbine noise is uniquely annoying due to the impulsive rhythmical ‘thumping’ content of the sound. It can ‘cut through’ other background noise. This is important because it is a vital factor that ETSU has not taken into consideration, namely that the character of wind turbine noise makes it especially intrusive. There has been research<sup>15,16,17,18</sup> into this area over many years and it is now accepted that wind turbines are at least three times more annoying at a given sound level than the same level of noise from road traffic. A paper summarising the issues of wind turbine noise<sup>19</sup> concludes:

*Wind turbines are noisy and cause annoyance in about 20% of residents living within a distance considered acceptable by regulatory authorities. For many of this 20%, the annoyance and sleep disturbance leads on to adverse health effects. This is a far larger proportion than for those living with traffic and industrial noise at the same level. The annoyance and adverse*

---

<sup>15</sup> Noise Annoyance from Wind Turbines - Pedersen/Halmstadt - Swedish Environmental Protection Agency - 2003

<sup>16</sup> Pedersen/ Waye Wind Turbine Noise, Annoyance and Self-Reported Health and Well-being in Different Living Environments - Occupational and Environmental Medicine, 64, 480-486, 2007

<sup>17</sup> Pedersen/Waye, Perception & Annoyance due to Wind Turbine Noise, Journal of the Acoustical Society of America, 116, 3460-3470

<sup>18</sup> Pedersen, Van den Berg, Bakker, Bouma, Response to Noise from Modern Wind Farms in the Netherlands, Journal of the Acoustical Society of America, 126, 634-643

<sup>19</sup> Wind Turbine Noise - John P. Harrison, Bulletin of Science, Technology & Society, 31(4), 256-261

*health effects are attributable to the character of turbine noise and to deficiencies in noise regulations. Specifically, given the amplitude modulation, the allowed intrusion above ambient is far too high; there is no account taken of the uncertainty in the prediction of noise at a home; there is no account taken for the excess noise caused by turbulent inflow, both natural and up-wind turbine wake; and the lack of compliance testing leaves the adverse health effects to compound from one completed wind farm to the next being designed.*

- 7.16 The wind turbine noise will cut through the background traffic noise because of its unique nature and with residents already experiencing high levels of background noise, when the wind is blowing in a certain direction, to load a more penetrating noise on top of already high levels is counter to natural justice.

#### Measurement Location Selection

- 7.17 ETSU is very clear that its methodology is based on measuring the specific noise environment of the nearest noise sensitive properties so that the noise output of the turbines can be related directly to that particular noise environment. The selection of the actual measurement locations is crucial to reflect the external noise environment where the residents spend the majority of their time when enjoying the amenity of their garden as ETSU is predicated on external limits. The locations chosen here throw up a number of problems.
- 7.18 The ES reflects the fact that permission was refused for the noise measuring equipment in all the selected locations except that of the landowner. This has led to the current situation where the proxy locations are up to 750m away from the location they are supposed to be representing. This adds a considerable degree of uncertainty into the validity of these background measurements. Whilst photographs are shown of the measuring equipment there is only one per location which is insufficient to fully understand whether the location is representative. The IOA guidance says<sup>20</sup>:

*Photographs of the equipment showing its position relative to the dwelling or other conspicuous features should also be provided, to inform the assessment and to enable the survey to be repeated at the same location if necessary.*

The photographs provided do not show the position relative to the dwelling and in the case of Tufton Warren it appears that there may be a hedge to the right of the microphone which would have an impact on the noise levels from vegetation. Also the location at Upper Norton Farm is right next to a gravel driveway.

#### Removal of Atypical Noise Sources

---

<sup>20</sup> IOA Good Practice Guide - Para 2.5.10

- 7.19 The ES states<sup>21</sup> that both rainfall and the period immediately after rainfall have been removed from the data but there is no indication of the length of the period post rainfall. This should have been clearly identified so that its validity could be assessed.
- 7.20 There is also removal of the ‘dawn chorus’ by merely removing the first hours data after dawn. It can be seen from the time history charts<sup>22</sup> that in many instances this removes low noise levels and the time periods concerned do not show any abnormal data. To validate the decision to remove the dawn chorus an analysis should have been carried out on the difference between taking this data out and leaving it in. The time history charts are at a reduced scale to that normally provided which makes any analysis virtually impossible.

One other factor that is clear from the study of the noise history charts is the wide spread of the data points, particularly in the night-time period. At any given wind speed there can be up to 30dB difference between the upper and lower values. The deviation from the best fit line, used to set the ‘acceptable’ limits, will thus be up to 15dB. Consequently there will be periods when the background noise levels will be up to 15dB lower than that assumed in the ES dramatically increasing the perceived noise impact of the turbines whose power output will not vary. This is a key failing of the ETSU methodology in complicated noise environments.

- 7.21 With a complicated noise environment it is crucial that the background noise assessment is carried out rigorously. The lack of an adequate assessment of the impact of wind direction on the noise environments at a number of the noise sensitive properties means that this crucial first step in providing adequate protection to the residential amenity of people living locally has failed to meet the requirements of ETSU-R-97.

### **Turbine Noise Predictions**

#### **Tonal Penalty**

- 7.22 The fact that wind turbine noise can contain a tonal element is recognised by ETSU-R-97<sup>23</sup> which says:

*It has been our experience, confirmed by the survey reported in Chapter 5, that where complaints have been made over noise from existing wind farms the tonal character of the noise has been the feature that has caused the greatest annoyance. This finding corresponds with the results of a survey of EHOs and noise consultants undertaken by NPL on complaints about industrial noise sources which indicated that a significant number of noise complaints are caused by the tonal character of the noise.*

To overcome this problem ETSU-R-97 includes a penalty system whereby a

<sup>21</sup> ES - Appendix 10.1 - Para 7.1

<sup>22</sup> Es Appendix 10.1 - Appendix G of noise report

<sup>23</sup> ETSU-R-97 - Para 69

penalty of up to 5dB is added to the noise output.

The ES<sup>24</sup> hardly mentions the tonality of the proposed Repower MM92 turbine and merely states that a guarantee would be sought from the manufacturers regarding tonality.

- 7.23 This is unacceptable and the applicant should provide proof that the noise output from this turbine is not subject to a tonal element which would require a penalty to be added to the actual sound power level. A potential 5dB variance will make a significant difference in the conclusions that have been drawn from the noise impact assessment.
- 7.24 With such a large scheme as this, properties will receive noise from a number of turbines simultaneously. There is no indication within the ES of how this situation has been accommodated within the modelling. It appears from the noise contour plot that the nearest turbine has been taken as the noise source and other turbines have been ignored. The Councils need to reassure themselves that the noise from all relevant turbines has been taken into account in the modelling process.

#### Financially Involved Properties

- 7.25 ETSU allows a higher noise limit for financially involved properties on the assumption that these residents will be willing to accept a higher level of noise intrusion given that they will be benefiting from the turbines. There are a number of cottages at Upper Norton Farm that are occupied on a tenancy basis by farm workers. These have been treated as financially involved when, unless the applicants can show differently, they are merely employees of the farm and will have no financial involvement or benefit from the wind farm.
- 7.26 This issue was considered at the Poddington Inquiry<sup>25</sup> where the Inspector said:

*There is another matter that causes me concern with regard to the issue of noise and this proposal. ETSU-R-97 states that both day- and night-time lower fixed limits can be increased to 45dB(A) to increase the permissible margin above background where the occupier has some financial interest in the wind farm. I consider that a reasonable and proper interpretation of the term 'financial interest' is those occupiers of properties who own the land on which a wind farm is proposed, or who have invested in the project in some way and seek to gain a financial reward from it ...*

*The occupiers of the wooden building, known as Unit 11, and the caravan near the aforementioned dwellings do not have an interest in the appeal site. They simply live nearby. They will, however, receive annual payments under agreements dated November 2009, after the noise assessment was made. It*

---

<sup>24</sup> ES - Appendix 10.1 - Para 7.9

<sup>25</sup> APP/K0235/A/09/2108506

*seems to me that these payments run counter to the spirit and intention of the guidance and have been designed specifically to circumvent the noise limits.*

- 7.27 His decision is very clear and it is assumed that the people renting the cottages at Upper Norton Farm have not invested in the wind farm and even if they receive a reduction in rent or a direct payment this still does not qualify the dwellings for any limit apart from the 35dB day-time and 43dB night-time ETSU limits. This was raised at a meeting with the EHOs but no action has been taken by the applicant.

### **Conditions**

- 7.28 The applicant may argue that because noise conditions will be applied to any planning permission then it does not matter that a representative noise impact assessment has not been carried out but that is to miss the point. Conditions cannot be used to solve a potential problem.

- 7.29 Any protection would be via a planning condition that would be based on the ETSU methodology. The implications of this were shown in the Shipham Inquiry<sup>26</sup> where the Inspector concluded:

*”I consider that the suggested conditions could not control noise effectively. They fail the Circular 11/95 tests of precision and enforceability, and they are too cumbersome for frequent use.”*

- 7.30 In other words if the turbine were approved it is extremely difficult for residents to get any protection if a noise nuisance occurs. Any complaint post-determination against the operator is likely to lead to lengthy arguments as to the factual validity of the complaint, opportunities for remediation and, possibly, as to the validity of the condition itself. In this process, much of the burden of proof will be on the complainant, who may be hampered by a number of practical limitations as to how he can substantiate his claim – one such limitation being the problem of differentiating between wind farm emissions and background noise when the scheme is operating. In practice, council resources available to investigate and pursue a possible breach of noise limits are limited. It is therefore highly desirable that this point is not reached. This is also further complicated by the potential presence of wind shear and excessive amplitude modulation which are not covered by the ETSU methodology.

- 7.31 This point is discussed at length and with great lucidity by the Inspector for the appeal to Long Bennington wind farm:

*“It is therefore important both for the operator and those potentially affected by noise to have confidence that turbines capable of meeting the “permitted” levels at any particular site, and addressing AM should it occur, are installed at the outset...”*

---

<sup>26</sup> Shipdham - APP/F2605/A/08/2089810

*“...Enforceable noise limit conditions form the basis of PPG24 and PPS22 advice and represent an important safeguard, often of last resort, to local residents. I have considered the approach outlined in the Appellant’s noise evidence (document 14, paragraph 6.7) but in the interests of public confidence in the decision-making and enforcement process, it is in my view necessary for the noise limits and choice of turbine to be founded upon data which has, and can be seen to have been, carefully and accurately compiled before full permission has been granted, rather than afterwards. That is, after all, a purpose of statutory Environmental Assessment, and the judgement in Newport County Borough Council-v-The Secretary of State for Wales and Browning Ferris Environmental Services Ltd (1998) Env LR 174 reinforces the point.”*

- 7.32 For this reason, and those expressed above, it is of fundamental importance that the noise impact assessment is rigorous and thorough and meets the ETSU methodology, and that use of conditions should be seen only as a final line of defence not as a means of trying to ensure that significant adverse noise impacts do not occur.
- 7.33 This particularly important in a case such as this where there is a very complicated wind environment with variables other than basic wind speed being the key factors affecting background noise levels. ETSU, through its averaging methodology, does not cope well with such situations where the noise impacts will vary significantly over time. Thus, whilst the average noise levels may meet the derived limits there will be times when background noise levels will be significantly lower and significant noise impacts may arise.

### **Excess Aerodynamic Modulation**

- 7.34 Aerodynamic modulation (AM) is a phenomenon which was the subject of a research paper for the DTI<sup>27</sup> (The Measurement of Low Frequency Noise at Three UK Wind Farms). It concluded that the cause of the noise complaints at these three wind farms was the audible modulation of the aerodynamic noise, especially at night. Although the noise levels were not high enough to result in the awakening of a resident, once awoken the audibility of this noise could result in difficulties in returning to sleep. The authors also concluded that they did not know what caused aerodynamic modulation, that it could not be predicted if a wind farm would suffer from it and that its effects would cause the noise output of the wind farm to be higher than that predicted by the ETSU-R-97.
- 7.35 Indeed one of the sites affected by AM is at Deeping St Nicholas in Lincolnshire. Here the owners of a house 930m away have had to rent a house 5 miles away to assure themselves of a good night’s sleep. Their quality of life has been completely destroyed.

---

<sup>27</sup> The Measurement of Low Frequency Noise at Three UK Wind Farms - URN 06/1412

- 7.36 This scheme will have a number of properties closer than 930m to the nearest turbine, with the closest at around 600m.
- 7.37 A further study by Salford University for BERR<sup>28</sup> showed that 19% of existing wind farms had resulted in noise complaints to the local planning authority. This will be an underestimate of the actual noise problems as many people do not complain as they believe that nothing can be done and their complaints would have to be disclosed if they wanted to sell their house. Also the universe of wind farms in the study included all the smaller original wind farms and the large number in Scotland with no houses within a few kilometres for whom there is no chance of any noise nuisance.

### **Wind Shear**

- 7.38 There is strong evidence that at night in stable atmospheric conditions the wind speed at rotor blade height is not accurately predicted from the 10m height wind speed measurements. Fritz G.P. Van Den Berg (Effects of the Wind Profile at Night on Wind Turbine Sound- Journal of Sound and Vibration - 2003) has shown that wind speed at hub height at night is up to 2.6 times higher than expected and consequentially up to 15dB higher sound levels can be expected, relative to the same reference speed in daytime. Thus when the wind speed is low at ground level, with correspondingly low background noise, at rotor height the speed will be higher and the noise produced by the turbines will be greater than that predicted by a normal logarithmic conversion of wind speed by height.
- 7.39 Because there is no data from an anemometer mast then there is no information on the specific wind environment and what level of wind shear exists throughout the year. If the site exhibits high wind shear characteristics then the chance of noise problems, particularly at night, will increase. It was the applicant's decision to forego the use of an anemometer mast and thus deprive the decision makers of this important information.

### **Conclusions**

- 7.40 It is clear from the spread of data in the time history charts that a complicated noise environment such as this with direction specific dominant noise sources is more difficult to assess using ETSU. It is even more important that the noise impact assessment is carried out with total rigour with due account taken of the directional specificity of this particular location.

Unfortunately this has not been the case and thus the decision makers are left trying to determine an application with incomplete data. Further data and analysis should be obtained from the applicant prior to determination.

---

<sup>28</sup> Research into Aerodynamic Modulation of Wind Turbine Noise - URN 07/1235

## Health

- 7.41 It is not just noise nuisance which is the issue in this case. It is now a matter of public record, validated by substantial research from recognised academic and technical authorities in their respective fields, that a wide range of serious public health complaints arise and directly damage the lives of people living within too close proximity of industrial turbines and exposed to their effects for long periods. These effects can cause stress related health impacts including sleep disturbance, headache, tinnitus, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep, and depression. These consequences are serious, clinically recognised and now frequently reported and represent an extensive body of evidence appearing that shows the significant impacts that wind turbines can have on the health of residents living in close proximity to these turbines.
- 7.42 As well as the direct audible sound from turbines there is also the problem of the low-frequency sound generated. Although Government advice is that the level of this sound is too low for any significant impact there is growing evidence that, even at levels too low for audibility, infrasound could affect the operation of the ear. Professor Alec Salt, of the Department of Otolaryngology, Washington University School of Medicine, in an abstract of an article published in the American Bulletin of Science and Technology in 2012 provides a clear explanation of the effect:
- Wind turbines generate low-frequency sound that affects the ear. The ear is superficially similar to a microphone, converting sound waves into electrical signals, but does this by complex physiologic processes. Serious misconceptions about low-frequency sound and the ear have resulted from a failure to consider in detail how the ear works. Although the cells that provide hearing are insensitive to infrasound, other sensory cells in the ear are much more sensitive, which can be demonstrated by electrical recordings. Responses to infrasound reach the brain through pathways that do not involve conscious hearing but instead may produce sensations of fullness, pressure or tinnitus, or have no sensation. Activation of subconscious pathways by infrasound could disturb sleep. Based on our current knowledge of how the ear works, it is quite possible that low-frequency sounds at the levels generated by wind turbines could affect those living nearby.*
- 7.43 The three councils determining this wind farm application have a clear and over-riding legal responsibility to ensure the protection of public health in respect of any decisions it makes. In situations where the evidence is not yet 100% proven, as here, it has an equal duty to apply the precautionary principle in favour of rejection.
- 7.44 One of the key issues regarding wind turbine noise is the fact that, whilst most natural and man-made noise dies away at night, noise from wind

turbines is totally wind speed dependant and thus can be at a maximum at the dead of night when people are trying to sleep. Sleep deprivation is well recognised as a source of stress related illness and with so many turbines so close to residential properties there is a possibility that, particularly noise sensitive, residents will be significantly affected by this proposed development.

- 7.45 We have already commented on the fact that wind turbines are three times more annoying than road traffic. The fact that the noise from the A303 and A34 will be a major part of the background will not mask the noise from the turbines and will not desensitise residents to the unique rhythmical noise they will create that will 'cut through' this background noise.