



Mr Keith Jones
Stone Gables
17, Station Road
Helmdon
Brackley
Northamptonshire
NN13 5QT

5 December 2010

Dear Mr Jones

Proposed Spring Farm Ridge Wind Farm – Noise Issues

You have asked (via Fiona Davies) for my preliminary comments on the noise assessment submitted by Broadview Energy to support their planning application. These are as follows:

Overall, the noise assessment (by TNEI) appears to be thorough and competent, and the supporting measurements and calculations appear to have been carried out in accordance with the methodologies the consultants have adopted. Baseline noise surveys were carried out in March-May 2010 at 11 locations, which appear to be representative of properties surrounding the site. Most wind farm noise assessments rely on many fewer baseline survey locations: 11 must be considered to be more-than-adequate. The results indicate that wind farm noise can be restricted to levels that would be judged 'acceptable', in that they are within the limits set out in ETSU-R-97. The use of ETSU-R-97 for the rating and assessment of noise from wind farms is endorsed in government planning guidance (PPS22).

However, I have some qualifications and concerns:

1 Compliance with ETSU-R-7 noise limits

- 1.1 Compliance with the ETSU-R-97 noise limits does not imply that there will be no adverse noise impact, merely that noise would be restricted to levels that the UK government consider are 'acceptable' in terms of achieving a balance between residential amenity and the requirement for alternative sources of energy. Therefore the effect of noise on residential amenity should not be discounted: I would expect wind farm noise to be audible at a number of dwellings, including the village of Helmdon, in some wind conditions. In some cases, wind farm noise would exceed existing background noise levels by up to 10 dB(A), the greatest exceedance occurring at Bungalow Farm (which I believe is the closest property where the occupant has no financial involvement on the project).
- 1.2 The view that noise can significantly affect residential amenity even where the ETSU-R-97 limits can be complied with has been accepted by Inspectors at a number of recent planning appeals, including the appeal at Gorsedd Bran (APP/R6830/A/08/2074921). The Inspector's decision to dismiss the Appeal in that case was challenged successfully by the Appellant, but this judgement was then subject to further appeal. The Court of Appeal found that:

“.....whilst the ETSU-R-97 limits were a matter to which the Inspector was required to have regard, he was not bound by them. In particular, the ETSU-R-97 limits

represented only one view as to the appropriate balance to be struck between the adverse effects of noise disturbance and the wider beneficial effects of windfarms, and it was for the Inspector to form his own planning judgment as to whether the noise generated by a particular proposal would be unacceptable, taking into account the evidence of local residents and his own experiences on site visits.”

2 Lower ‘fixed’ daytime noise limits

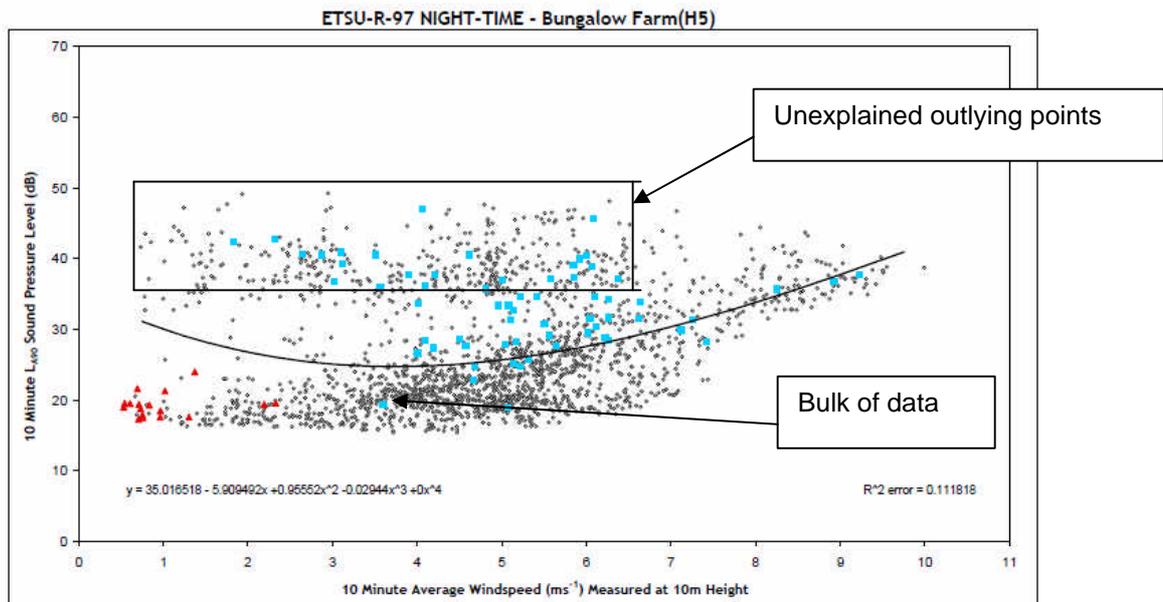
The ETSU noise limits are set at a level 5dB above the existing mean background noise levels (which vary with wind speed), subject to a fixed lower limit of 35-40 dB during the day and 43 dB at night. The value assigned to the daytime lower limit is dependent (according to ETSU-R-97) on three factors: the number of properties affected by noise, the duration and level of noise exposure, and the effect of the noise limits on the power generated by the wind farm. In this case a lower limit of 40 dB (the highest permissible) has been adopted without clear justification. From the data presented, this would not appear to be a critical factor in this case: Table 6.4 in the ES shows that the predicted noise levels would comply with the ETSU daytime limits even if the lower fixed limit were set at 35dB. However, this outcome relies on the background noise levels being representative, since the ETSU limits are based on them. I make further comments on the background noise data below in (4).

3 Margin below limits

The daytime levels at H4, H5 and H6 (Spring Farm, Bungalow Farm and Greatworth Hall) are fairly close to the limits (1-2dB) and could therefore be considered marginal in the light of the prediction uncertainty. I understand that Spring Farm and Greatworth Hall are ‘financially involved’ properties: if this is the case then less-restrictive noise limits (a fixed lower noise limits 45 dB for day and night) would be applied and the levels at these properties would no longer be considered ‘marginal’, leaving Bungalow Farm as the property most-affected. It could be argued that these houses are only ‘at risk’ in northerly winds, and only in a narrow range of wind speeds, but these conditions will occur from time to time.

4 Reliability of Background noise levels (and noise limits)

- 4.1 For these ‘marginal’ houses the reliability of the background noise data becomes important – if the background noise levels are set too high, so will be the ETSU noise limits. Looking at the **night-time** noise data for H5 (The Bungalow – Figure 5.11 – copy below) it is seen that the noise levels fall into two groups at low wind speeds – between 20-25 dB and 35–45 dB, with few intermediate data points. This is an unusual distribution of noise levels and the reason should be investigated.



4.2 It is clear that the 'best fit' line, representing the mean background noise level at each wind speed, is strongly influenced by the higher outlying points at wind speeds up to about 6m/s. If these outlying points are non-typical, the noise limits (derived from the background noise levels) are likely to be over-stated and therefore the noise impact under-stated.

The most likely explanations are:

- The higher levels are the result of the dawn chorus: noise levels are often significantly raised by birdsong during the period 0300 – 0500, which 'artificially' raises the average (2300 – 0700) night time noise level. It is obvious from the above figure that discounting the 'outlying' data points would significantly change the shape and level of the 'best fit' curve which represents the mean level. Since dawn chorus noise is generally seasonal it is usual practice to exclude data which is obviously influenced by birdsong.
- The background noise levels are dependent on wind direction. Although this may not be immediately apparent, I think it is likely that noise from the M40 (and possibly the A43) is contributing to the background levels when the wind is generally from the west or the south. This distant traffic noise is likely to have most effect at night, when noise from other local sources is likely to be greatly reduced compared with the daytime levels.

4.3 The wind direction effect can be important: for example, the wind farm noise levels would be highest at Bungalow Farm (H5) when the winds are northerly, whereas noise from the M40 and A43 will be reduced. In such cases it is common practice to 'filter' the background noise data on wind direction, so that the noise limits for a particular property are defined for the situation when the wind farm noise would be highest (the 'downwind' situation). Then the comparisons between wind farm noise and background noise are made on a 'like for like' basis. In this case it is clear that even if the night time background noise levels at Bungalow Farm were reduced at low wind speeds this would not change the noise assessment (in terms of wind farm noise meeting the ETSU limits), since the 43 dB lower limit would apply in either case. However, if the 'quiet daytime' background noise levels are shown to be lower in northerly winds this could make the daytime noise assessment even more marginal at Bungalow Farm.

- 4.4 It might therefore be useful to analyse the raw data in more detail to see if wind direction or 'dawn chorus' noise are factors.

5 Exclusion of rain-affected data

Another point I notice is that TNEI did not use a rain gauge to detect rainfall on site. ETSU-R-97 requires that rain-affected noise data is excluded. It is standard practice to install a recording rain gauge on the site, or at one or more of the monitoring locations. TNEI appear to rely on Met. Office data, although the measurement location is not stated. There is no certainty that the Met. Office data accurately represents the rainfall in the vicinity of the site itself. This is perhaps a minor point, in that for most surveys the overall results are little-changed whether rain-affected data is included or excluded, but it does introduce some uncertainty into the analysis, which can be critical in marginal cases.

6 Possibility of enhanced amplitude modulation

- 6.1 There is a possibility that noise from the wind farm would exhibit enhanced amplitude modulation or 'AM' (audible blade 'swish' or 'thump'. If this occurs – it has caused complaints at a small number of UK wind farms – noise would be more intrusive than if the noise is steady and continuous. TNEI suggest that the possibility of AM occurring can be neglected because:

- Government advice, following the Salford University Report of 2007, is that the occurrence of AM is so infrequent that it can be ignored (ES para. 3.3)
- Although the causes of AM are not understood, a number of contributory factors have been identified (ES para.3.4). TNEI suggest that none of the five factors listed are present at Spring Ridge.

- 6.2 The current position is that the causes of AM are not understood, and there is no up-to-date evidence on how prevalent the problem may be, given that turbine design is evolving and turbines are becoming larger. Therefore there is no certainty that enhanced AM will not occur at Spring Ridge. RenewableUK (previously the British Wind Energy Association) have recently awarded a research contract to study the causes of AM and to devise a method of objective measurement, to enable a planning condition to be developed to address AM should it occur (there is currently no robust technical basis on which to found such a condition). This initiative, taken by the organisation representing wind farm developers and operators, confirms that AM is a 'live issue' and remains a matter of concern.

7 Reliability of noise predictions

- 7.1 I also draw attention to the limitations of the noise propagation 'model' used to predict wind farm noise. The model used in ISO 9613-2, which has been shown to generally provide a realistic estimate of wind farm noise levels at local receptors. However, the predictions depend on the model inputs: in this case the inputs include an assumption about ground conditions (Section 4 in the ES) which could result in noise levels being under-predicted by about 2 dB in situations where the surroundings of a receptor location (perhaps a patio or courtyard) are predominantly hard-surfaced.

7.2 The propagation model assumes that the ground is substantially flat, and therefore does not take account of enhanced propagation effects that can occur in some terrain in some weather conditions. In this case, it appears that the village of Helmdon is in a 'bowl' to the ENE of the wind farm site, which is elevated. I understand that in some weather conditions residents report unusual sound propagation effects. These effects, if they occurred when the wind turbines were operating, could increase the level of noise perceived in Helmdon, although it is very unlikely that the ETSU noise limits would be breached, given the distances involved. However, it is a factor worthy of consideration, given the number of dwellings in Helmdon, where background noise levels (particularly at night) are generally conspicuously low, as can be seen from Figure 5.5 in the ES (if the unexplained 'outlying' data points are discarded).

8 Concluding Comments

8.1 Overall, the noise assessment presented in the ES appears to be thorough and competent. As it stands, it demonstrates that the wind farm can be operated within limits derived using the ETSU-R-97 procedure (and if planning permission is given, a condition could be applied which would constrain noise levels to appropriate limits).

8.2 However noise is still, in my view, a factor to be taken into account for the following reasons:

- Compliance with the ETSU limits does not infer that there would be no effect of residential amenity by reason of noise.
- There are unexplained anomalies in the baseline noise data, which should be investigated, since the noise limits are founded on this baseline data.
- Wind turbine noise will be audible in Helmdon for a significant percentage of the time. Noise propagation towards Helmdon may be enhanced by the local topography. The prediction methodology used takes no account of topographical factors. Neither does it incorporate a 'safety margin' to take account of extensive sound-reflective surfaces at receptor locations.
- There is a possibility that wind turbine noise would exhibit enhanced amplitude modulation ('swish' or 'thump') which would make the noise more intrusive. The likelihood of AM occurring cannot be predicted and it is not possible to devise an effective condition to address AM should it occur.

I hope that these comments are helpful and constructive. Please let me know if I can advise you further or if you have any queries.

Yours sincerely



R A Davis

Enc: CV (Wind Energy)



Curriculum Vitae – Robert A Davis

I hold the degree of Bachelor of Science in Engineering from the University of Southampton, and I am a member of the Institute of Acoustics. I have worked in the fields of acoustics and noise control since 1968, and as an acoustics consultant since 1971. I have carried out assessments of environmental noise from existing and proposed industrial sites at numerous locations throughout the UK, and I have presented evidence on these matters in Court and at Public Inquiries.

From 1990-2001 I was Technical Manager of ISVR Consultancy Services (now ISVR Consulting), a consultancy unit within the Institute of Sound and Vibration Research at Southampton University. The Institute is recognised internationally as a centre for teaching, research and consultancy in most aspects of acoustics, noise and vibration. I represented the Institute on British Standards Committees concerned with the measurement and assessment of noise. I left the Institute in 2001 to set up my own practice. I also continue to work with ISVR as an Associate Consultant.

I have experience of the prediction and assessment of noise from wind farms through involvement in research programmes carried out by ISVR and from the assessment of the noise impact of proposed wind farms on specific sites. I have advised local authorities and residents' groups on the prediction and assessment of noise from over 30 proposed UK wind turbine installations and I have presented technical evidence on noise at a number of Public Inquiries relating to wind farm planning applications. I was a member of the Noise Working Group assembled by the DTI in 2006 to review the results of recent research into the causes of complaints about low-frequency noise effects, and I am a member of the consortium engaged by RenewableUK (formerly the British Wind Energy Association) in November 2010 to carry out research into some aspects of wind turbine noise emission and perception.

Wind Farms - Noise Impact Assessments Reviewed on behalf of Local Authority or Residents' Group

| <i>For Local Authority Client</i> | <i>For Residents' Group Client</i> |
|---|---|
| <ul style="list-style-type: none"> * Hore Down – Torridge DC (Devon) * Darracott – Torridge DC (Devon) * Fullabrook – North Devon DC Parham Airfield – Suffolk Coastal DC * Bradwell-on-Sea – Maldon DC (Essex) * Rossie (Auchtermuchty) - Fife Council * Penpell – Restormel BC (Cornwall) Batsworthy Cross – North Devon DC Laughton – West Lindsey DC (Lincolnshire) Sedborough – Torridge DC (Devon) Dunsland Cross – Torridge DC (Devon) Cannock – Cannock Chase Council (Staffs.) Bickham Moor – Mid-Devon DC Ray, Steadings, Green Rigg, Kiln Pitt Hill, Kirkharle – Tynedale Council Silton - North Dorset DC Wareham – Purbeck DC (Dorset) | <ul style="list-style-type: none"> * Beech Tree Farm – South Devon * Tween Bridge/Humberhead Levels – E Yorkshire * Little Cheyne Court – Romney Marsh, Kent Watchfield – Berkshire Carsington Pasture - Derbyshire Den Brook - Devon Bagot's Farm - Staffordshire Roskrow Barton - Cornwall Hinwick – Bedfordshire Sykehouse - Yorkshire Scout Moor – Lancashire Stonish Hill – Lincolnshire Thackson's Well – Bottesford, Lincolnshire Marden – Kent Upper Vaunces Farm – Diss, Norfolk * Matlock Moor – Derbyshire * Baumber - Lincolnshire Tavira Wind Park - Algarve, Portugal |

* Expert evidence given at Planning Appeal