

**A Study for an Approach for Dealing With Wind
Turbine Applications within St Ender Parish**

Cllr Calvin Malham

Introduction

Increasing numbers of planning applications across the UK are being made for single unit and small clusters of medium to large wind turbines due to currently favourable payments to developers, land owners and investors in the form of Feed In Tariffs (FITs)⁽¹⁾ and Renewable Obligation Certificates (ROCs)⁽²⁾ which vary in the way in which they are administered, but both with the intention of rewarding ‘early adopters’ of renewable energy technologies. They are intended to be an incentive and impetus to enable society to gradually wean itself away from reliance on rapidly dwindling fossil fuels. ROCs are more commonly used by national power generation companies to comply and meet with legal obligations imposed upon them to produce a percentage of energy from renewable sources, whereas FITs are geared to lower volume producers of power.

The complex and wide ranging national and international governmental negotiations that bring us to this point are not being explored in this study, but suffice to say that there is a requirement for 15% of UK energy consumption to come from renewable energy sources by 2020. This energy accounts for heating, electricity and transport. Furthermore, studies by the Government’s Renewable Energy Strategy suggests that 30% or more of our electricity generation could come from renewable sources⁽³⁾. This is part of a further strategy to significantly de-carbonise the power sector by 2030, to a level of emissions 80% lower than those in 1990. This strategy is the Government’s response to European Directive 2009/28/EC which stipulates the percentage renewable energy consumption each country must achieve so that the total EU renewable energy proportion, when averaged across the community will be 20% by 2020⁽⁴⁾.

It is against these overarching national and international renewable energy strategies that Cornwall Council has adopted targets of 15% by 2015, and 20% by 2020. Cornwall has some of the highest sustained wind speeds in the UK, making it an obvious choice for those wishing to build and operate wind turbines. (See Fig.1)

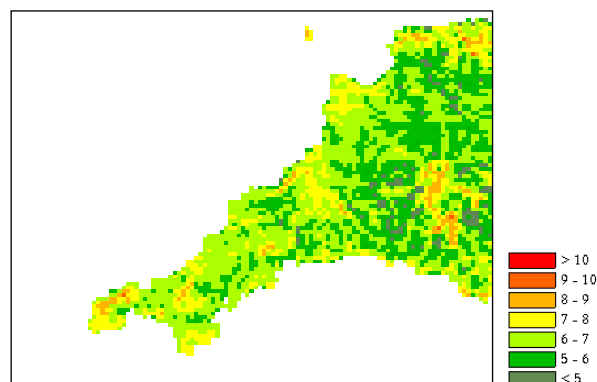


Fig.1 Annual Mean Wind Speed m/s (Cornwall/West Devon)

From this it must be appreciated, that as well as other renewable energy resources such as wave, tidal, geothermal and offshore wind power, which Cornwall has in abundance, sensitively sited onshore wind power will necessarily have to be part of the mix. If local desires, concerns and opinions are to influence future planning decisions regarding such installations, a robust, clear, consistent and carefully considered response to each application will be necessary. Renewable energy will become a vital part of our electricity generation if Government targets are to be met, ensuring a more secure, environmentally responsible, and safer future, but it will involve some sacrifices if future generations are to enjoy anything remotely like recent standards of living that have been possible during the (now ending) era of 'cheap energy'. It has been estimated that Cornwall's annual energy bill is around £579 million, of which 98% leaves the local economy⁽⁵⁾. As Cornwall can provide no sizeable coal, gas or nuclear power installations, renewable energy will necessarily have to be relied upon to provide for a significant proportion of our energy demands in the future, becoming less reliant on electricity supplied from outside of the County. Energy is likely to become scarcer as the energy gap widens when obsolete coal and nuclear power stations become decommissioned toward the end of this decade.

Purpose of this study

What this study does not address are the arguments in advance of Cornwall Council's Core Strategy for and against wind power *per-se*. Studies regarding whether or not there are potential adverse impacts on wildlife particularly birds, whether they cause depreciation in local property prices, perceived visual impact on the landscape and the supposed 'skewing' of grants and incentives are many, and are counterproductive to what we require. There are ample sources of debate regarding these matters, and they are not realistically concerned with planning.

Any proposed wind turbine installations will usually, depending on overall height (ground level to tip height), be subject to the County Council planning process with Screening Opinions to determine whether there is a requirement for example, for a full Environmental Impact Assessment (EIA) for the development⁽⁶⁾. The detailed machinations of the full planning process will not be considered by this study, it is intended to provide a framework of potential criteria relating to individual applications for wind turbines that are put before St Enoder Parish Council. It is envisioned that applications that do not meet criteria that have been voted upon beforehand would not be likely to be supported by the Parish Council. This would, of course, hold little sway over the eventual outcome of the application once moved further up the planning chain, but it would be a formal means of registering the feelings of the Parish, and perhaps more relevantly, might serve to reduce the time expended on individual applications as they come before the Planning Committee.

Proposals for wind turbine developments are usually very polarising with respect to those for or against them. Those *against* them, either being averse to what is perceived as unwanted visual impact or implied impacts on the health of those living near to the installations, will usually be faced by those similarly immovable in their opinions *for* wind turbines, and the benefits that they insist will be forthcoming from wind power. This can have the potential for causing unnecessary friction within the community irrespective of the final planning decision.

By examining what other authorities and countries have used as criteria to aid decision making for wind turbine applications, it is hoped that the Parish Council should be able to decide upon what is suitable, and more importantly *fair*, for both residents and developers. It is also quite likely that the developer could be a Parish resident for ‘small’ to ‘medium sized’ installation proposals (see Appendix I, extract from Cornwall Council draft guidance notes). Due to the strength of feelings on both sides of the arguments for and against wind energy, it should be argued that Parish planning meetings should be able to make decisions without having to referee opposing arguments, allowing each application to be considered on its own merits by using criteria previously agreed and developed by the Parish Council.

Planning guidance and criteria from other sources

There are many criteria relating to the installation of a wind turbine, and most of them would be considered irrelevant to this study. For example, foundation construction and other civil engineering matters would not be considered at Parish Planning level, so will be disregarded. It is proposed that the Parish Council should be concerned primarily with wind turbine location, specifically, its proximity to inhabited structures, with related noise issues being considered concurrently, because noise level at a site is a function of how far it is away from a source. By considering what other countries consider acceptable, we might be able to decide what is appropriate to developments in this Parish. Table 1 gives a quick guide to what others have deemed ‘acceptable’ (although the strictness of planning enforcement in other countries may, or may not be, quite as rigorous as in the UK).

Country	Criteria		
	Setback	Noise	Other
Belgium	Draft legislation gives 350m, more likely 500m, although some as close as 150m		
Czech Republic	No regulations, in practice, 400-800m		
Denmark	4x turbine height minimum. Installations closer than 6x height will be eligible for compensation		
France	‘Recommended’ 1500m, in practice, 500m, currently undergoing new stricter regulation/legislation	Limited by statutory noise legislation	
Germany	Varies- 1500-600m depending on State	Varied setbacks according to local area (‘quiet’ country areas require greater separation distance than ‘noisier’ areas)	Depends on make and model of specified turbine
Italy	Varies according to region. Some specify distances, others do not. Varies between 5 and 20x height, or 2km from ‘urban’ areas		
Netherlands	4x <i>mast</i> height, but not a legal stipulation	Noise levels are legally stipulated (40dB)	
Northern Ireland	10x rotor diameter (minimum 500m)		
Scotland	Case by case within 2km of built-up areas (not individual properties)		

Spain	Regional variations, from 500m, to 1000m 'from any piece of land that could be built upon		
Sweden	500m 'normally' used	Limited by 40dB	
Switzerland	No clear policy		
England/Wales	No clear policy, although a minimum distance Bill is currently going through House of Lords	ETSU-R-97, noise levels experienced at dwellings drive 'setback' distances	

Table 1: Distance and sound criteria for some European wind turbine installations⁽⁷⁾
(The table above gives an indication of the possible complexity of criteria governing the installation of wind turbines across Europe. This is by no means an exhaustive list, and some of the distances or sound levels have possibly changed as national laws and regulations may have been recently amended.)

Proposed criteria for wind turbine development within St Enoder Parish

It should be appreciated that there are many criteria relating to wind turbine installations, and most that have been developed are a result of conditions pertaining to each area, state or country, and the attitudes and laws existing within them. If the Parish were to adopt the minimum setback conditions present within the Wind Turbines (Minimum Distances from Residential Premises) Bill⁽⁸⁾, then even the most modest installation of less than 50m in height would be subject to a setback distance from residential premises of 1000m and this would immediately prohibit any further wind turbine developments within the Parish. Figure 2 has been constructed to show circles with diameters of 500m around residential areas, equating to a setback distance of 250m. This shows that even at a modest distance away from premises, a large proportion of the Parish area immediately becomes unavailable for development. What is not shown on the map are other operational considerations, such as air traffic control restrictions, microwave transmission 'lines-of-sight' between telecommunication masts, and proximity to power cables to transmit the electricity generated. These together considerably reduce the sites suitable for wind turbines, which should be a comfort to those with concerns that they will appear everywhere all over the Parish. (Note: Figs 2 & 3 are representative, not exhaustive, in identifying all inhabited buildings)

Setback Distances

Referring to Fig. 3, a setback distance of 500m around premises is shown, which equates to 1000m diameter circles. It can be seen that there is virtually no area within the Parish where an installation would be permitted. With a 'blanket' 500m setback, most, if not all of the wind turbines at Carland Cross cluster would not have been permitted due to their proximity to dwellings. From this, and the relatively stringent requirements of the above mentioned Bill, it is probably not an exaggeration to note that no wind turbines would ever have been built in Cornwall if it were law.

A 500m setback criterion would probably prevent the development of most, if not all, future turbines within the Parish, and it is therefore proposed that this setback distance is not adopted. By choosing this distance as a setback, what the Parish would effectively be doing would be to support no further wind turbine installations, thus removing the Parish Planning Committee from considering any

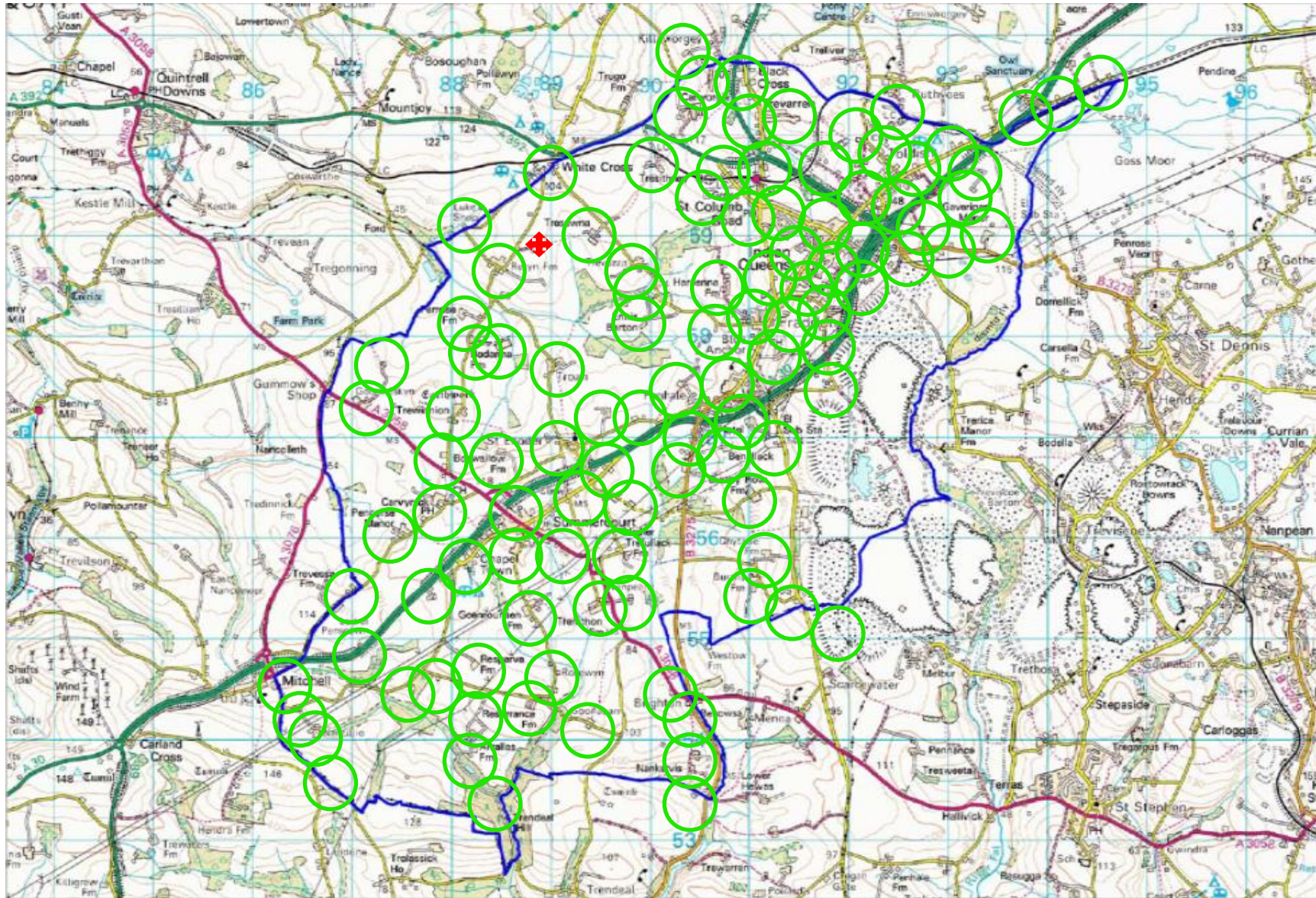




Fig. 2. Map to show radii of 250m 'setback' around dwellings

 = circle diameter approximately 500m

 Ennis Barton 500kW turbine, commissioned February 2012

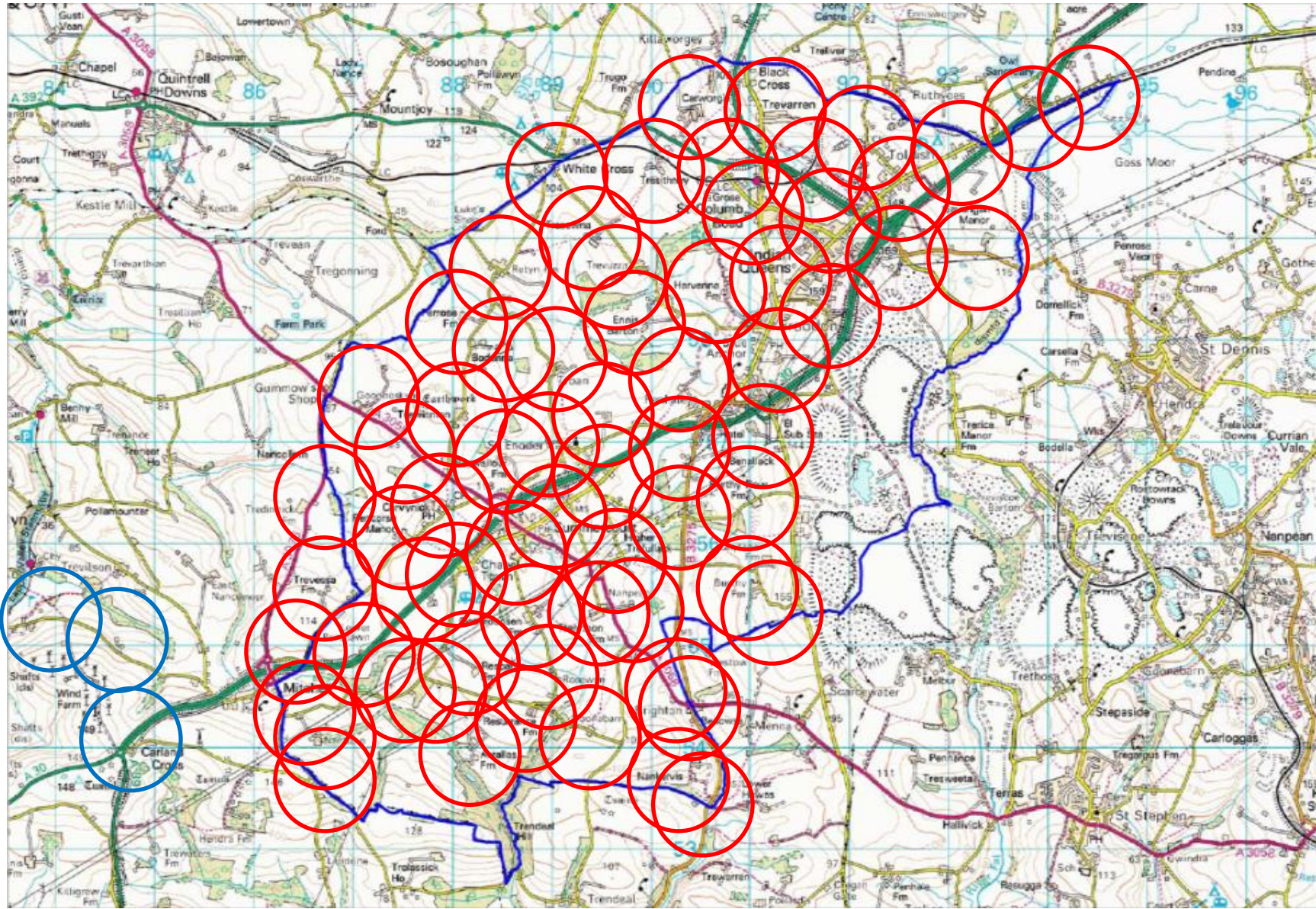
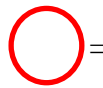
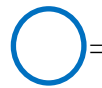


Fig. 3. Map to show radii of 500m 'setback'

 = circle diameter approximately 1000m,

 = setback from Carland Cross

installation on its own merits, thus passing over the full responsibility to Cornwall Council Planning for their consideration, without local input.

A setback criteria of not less than 250m, unless justified, and supported locally is proposed as a starting point. This would provide a fair, transparent way for developers and/or landowners to identify those premises within a 250m radius of each proposed turbine, and for them to approach any individuals affected for individual approval, which if forthcoming, would allow the Parish Council to be predisposed to look favourably upon the application. Conversely, if a majority is opposed to the application, then the Parish Council would be predisposed to investigate all relevant issues very carefully.

Height of structures within the landscape

Most developers and landowners proposing to install wind turbines are probably aware of the strong feelings surrounding wind power applications, and most duly consult to a greater or lesser degree with local people before formally applying for planning permission, which is to be commended. However, most people's perception of what any large structure will look like, once built, is probably inaccurate. The often used 'Height of Nelson's Column' would have little meaning for a resident of Truro, and equally, something as tall and imposing as Truro Cathedral transplanted to the Cornish countryside is also potentially misleading. *It is proposed that for 'medium' and 'large' turbines, (total height >60m), that two static balloons, one at hub height, the other at blade tip height, should be flown* at a predetermined and widely publicised date and time to give residents a representation of how the structure would appear within the environment. This would be at the developer's expense, *and should ideally be witnessed by invited Cornwall Council Planning representatives.* (Nelson's Column is incidentally, just over 51m to the top of his hat, Truro Cathedral at its highest point is 76m). *A comprehensive suite of accurate photomontages of how the installation is predicted to appear in the landscape would be required* to be presented to a Parish Council meeting for consideration when plans are presented. As a priority, *a Full Parish Council site visit should be deemed appropriate for 'medium' or 'large' wind turbine applications.*

Noise related criteria

This is the most contentious, and complicated aspect of planning considerations for wind turbine installations. The level of the 'ambient' background noise conditions at a proposed site is most important. The planning guidance used for this is contained in ETSU-R-97⁽⁹⁾ which defines upper limits for noise generated by wind turbines at different wind speeds in different locations. Although the work has its detractors, it is still currently used by national planning authorities, until a revised or updated version is made available. For example, in a quiet rural spot, well away from main roads, on a still day, background noise levels would probably be around 35dB(A). At this location, the noise from the wind turbine would have to be less than 40dB(A), 5dB(A) above background levels *at the nearest residential site.* If this were to be replicated at a site near a busy road, for example, where the background noise level is at 70dB(A), then 75dB(A) recorded at the residential site would be within limits. This has the effect of requiring setback distances at quiet sites to be *greater* than those where the

background noise level is higher, which would appear to be logical. A decibel scale, and equivalent everyday sounds is reproduced in Figure 4.

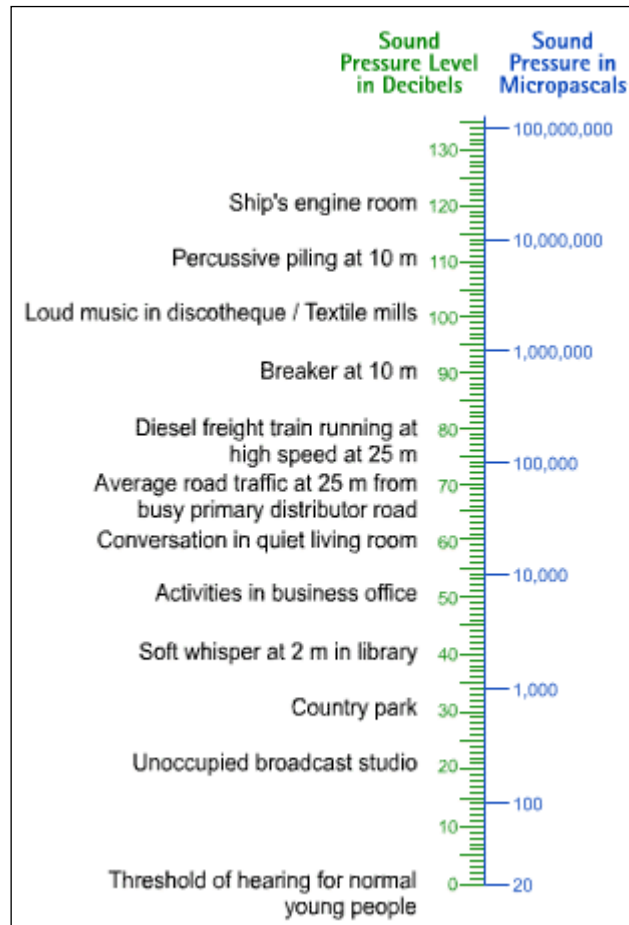


Figure 4. Decibel scale and examples of some environmental sound levels

Improved designs and technological advances have made wind turbines much quieter, at much greater power output levels for a given installation size. This could have the effect of allowing much larger structures to be sited closer to dwellings, because they are quieter than a smaller, 'earlier technology' model of lower power. With this in mind, to prevent wind turbines from being sited too close to occupied buildings, the minimum setback figure of 250m (800') proposed above would be advisable for 'medium' sized turbines, and would require the support of any households found within this radius before the Parish could be minded to support the application.

What needs to be realised from this rather complicated state of affairs, is the eventual 'setback' distance between wind turbines and buildings can vary considerably, and is arrived at after considering the 'background' noise level, the make and model of the turbine itself, the topography of the landscape, and ultimately, what the sound pressure level will be experienced when the installation is running.

An arbitrary setback of 400m for 500kW wind turbines has been noted elsewhere (windfarm constraints maps), but this is not stipulated in any law. Sound levels that

will be experienced at dwellings adjacent to wind turbines *are* however, tightly controlled. As explained above, setback distances are very variable, depending on ambient noise levels. Additionally, ‘acceptable’ sound levels experienced at night can actually be higher than daytime levels, the inference being that generally, people will be indoors at night, and therefore less affected by noise issues. Modern turbines are able to address any arising sound issues by using fine-tuned control measures, whereby blades can be adjusted automatically to reduce airflow induced noise. Although setting an arbitrary upper power limit on individual turbines would probably be unworkable, *it would be prudent to question whether turbines with a rated power output that exceeds 750kW can be comfortably accommodated within St Enoder Parish.*

Infrasound and ‘Wind turbine syndrome’

Infrasound is relatively easy to define, but difficult to ‘explain’. Humans with healthy hearing are able to hear sounds as low as 20Hz, (a very deep bass). Anything below this cannot be ‘heard’ directly, but can be detected. However, the sound ‘power’ level would need to be around 120dB(A), (see Fig.4) for it to become ‘sensed’, either within internal organs or the inner ear. Researchers have thus far been unable to determine a physical ‘syndrome’ caused by wind turbines⁽¹⁰⁾. However, it is still a problem to those experiencing stress and anxiety due to a perception of being unable to ‘control’ their environment, possibly due to the imposition of external factors (wind turbines, and/or the planning system in general perhaps) over which they feel they have little control.

‘Smaller’ Wind Turbines

Most of the above is concerned mainly with medium to large size wind turbines, as these will have the most impact when first constructed. Smaller turbines, from around 20 to 60m in height, although less visually intrusive, tend to rotate faster, and are not necessarily quieter than larger units. ‘Very small’ domestic turbines are now deemed permitted developments provided they do not exceed 11.1 metres overall height (15m if attached to a building), are less than 3.8 square metres in swept area, and are sited more than 5m from any boundary. This type of installation would not require parish involvement. Turbines designated ‘small’, however, could still be up to 60m tall at their highest point. These will be subject to comprehensive planning, conservation, environmental, highways, landscape and cumulative impact assessments at County Planning level. It is therefore proposed if there is a majority (60%) of local residents within the predetermined radius of 250m of the installation who *support* the application, then the fairest option for both residents and applicants would be for the Parish Council to be minded to support the application. If less than 60% of residents do not support it, then the Parish Council would need to further investigate all issues regarding the application. The onus would thus fall upon the applicant to garner support for the installation.

Maximum capacity limit for total wind power installations

This could become a criterion for limiting the number of individual installations, large and small, to a total not exceeding a predetermined power level, in kilowatts. What must be appreciated is that ten 50kW machines scattered around the Parish could have

a far greater cumulative impact than a single, larger machine producing 500kW. The smaller machines would produce less power for a total blade swept area due to scale considerations. An arbitrary figure chosen for total wind power capacity installed within the Parish would, it could be argued, be a false economy for the reasons outlined above. A cursory look at the Wind Turbine Screening & Scoping Opinions (Central)⁽¹¹⁾ shows that there are approximately six applications within the Parish (as of 17 Feb 2012) pending Environmental Impact Assessment screening, and any one of these could potentially exceed any maximum figure that had been previously chosen somewhat at random. *Further work by St Enoder Parish Low Carbon Work Group should explore the cumulative impact of wind power applications within the Parish at greater detail as a future consideration.*

Summary

This study highlights the complexity of planning considerations for even modest wind turbine installations, and its purpose is to define a fair, but properly defined set of criteria, with St Enoder Parish Council approval, for future wind turbine applications that are to be considered.

The proposed criteria, in the preferred process order, are:

- 1) Full St Enoder Parish Council site visits for all 'medium' or 'large' wind turbine installation applications.
- 2) Presentation of representative, comprehensive and accurate photomontages supplied by applicant/developer (via Cornwall Council), to St Enoder Parish Council before consideration of applications.
- 3) St Enoder Parish Council should question whether proposed *individual* wind turbines with a rated power output of 750kW and above can be accommodated within the Parish.
- 4) For 'medium' or 'large' turbine installations, static balloons to show hub height and blade tip height should be flown on predetermined, well publicised day(s) to demonstrate the scale of the structure.
- 5) Request attendance of Cornwall Council Planning representatives to a site meeting to witness 4) above.
- 6) Parish Council would seek that 'medium' or 'large' wind turbine installations ideally be sited over 250m away from dwellings, however may support if the developer/landowner can provide evidence of support from more than 60% of households falling within the above distance from the turbine.
- 7) St Enoder Parish Council Low Carbon Working Group should consider the cumulative effects of wind turbine applications with regard to installations that are already proposed or existing at the time an application.

- (1) <http://www.ofgem.gov.uk/Sustainability/Environment/fits/Pages/fits.aspx>
[accessed 6 Mar 12]
- (2) <http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx> [accessed 6 Mar 12]
- (3) http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx [accessed 5 Mar 12]
- (4) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>
[accessed 5 Mar 12]
- (5) Renewable Energy Office for Cornwall. Renewable Energy: A Strategy for Cornwall 2002-2010.
- (6) Draft guidance notes (#4), 'The Development of Onshore Wind Turbines in Cornwall', Planning and Regeneration Service, Cornwall Council (October 2011)
- (7) <http://www.wind-watch.org/documents/european-setbacks-minimum-distance-between-wind-turbines-and-habitations/> Note: this site is from a US 'anti' wind farm organisation, National Wind Watch. Criteria may have changed since the website was published.
- (8) Wind Turbines (Minimum Distances from Residential Premises) Bill, 26th July 2010, Lord Reay
<http://www.publications.parliament.uk/pa/ld201011/ldbills/017/2011017.pdf>
- (9) The assessment and rating on noise from wind turbines. ETSU-R-97. The Working Group on Noise from Wind Turbines. Final Report, September 1996. On behalf of the Department of Trade and Industry
- (10) http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects-Executive_Summary.pdf
- (11) Wind turbine screening and scoping opinions (Central Cornwall)
<http://www.cornwall.gov.uk/default.aspx?page=25182>

Appendix I

Definition of Turbine Size and Associated Information

Turbine Size

Throughout this guidance the description of a wind turbine in kilowatts (kW) refers to the rated power or installed generating capacity of that wind turbine. That is its maximum electrical output in ideal and consistent wind conditions.

For the purposes of this guidance document Cornwall Council uses the following definitions as used in previous Council reports and studies based on tip height of wind turbines from ground level;

Domestic <18 metres

Very Small 18-25 metres

Small 26-60 metres

Medium 61-99 metres

Large 100-150 metres