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Draft Planning Guidance on the Residential Amenity Impacts of Wind Turbine Development

November 2010

Cherwell
DISTRICT COUNCIL
NORTH OXFORDSHIRE

Executive Summary

There is considerable interest in proposing commercial scale wind turbines in Cherwell and the surrounding districts. The purpose of this document is to help ensure that the wider benefits resulting from renewable energy generation are balanced with local issues including landscape impacts, and the economic, social and amenity impacts on local communities.

The document has been prepared as informal planning guidance, linked to Draft Core Strategy policy SD 3 which listed the issues of particular local significance when considering proposals for renewable energy schemes in the district. If approved in draft form by the Executive, the draft document will be subject to a period of public consultation. After this, members will be asked to approve the document as informal (non statutory) planning guidance. It will be shared with anyone considering a wind turbine proposal within the district, and will be a material consideration that the Planning Committee can take into account in considering proposals.

This document recommends separation distances between turbines and settlements or dwellings, firstly as a general standard for amenity reasons and then for a variety of reasons including landscape, noise, heritage, safety and shadow flicker. Where possible the standards set out in this document are linked to national guidance, or a local evidence base. The document does not provide a comprehensive list of the issues to be considered in determining applications for large scale wind turbine development.

This document will typically apply to commercial scale, large turbines but the principles could also apply to medium scale turbines (Chapter 2 provides more information).

Table 1 below lists the distances suggested in this document (see the individual chapter for further information and justification):

Table 1 Suggested Distance Summary

Impact or Issues	Chapter	Suggested 'Indicative' Distance
Dwellings and Settlements	Chapter 3	Normally a minimum of 800m from dwellings or settlements No less than 3 times turbine height (ground to blade tip) Settlements of more than 10 dwellings should not have turbines in more than 90 degrees of their field of view for a distance of 5km Individual dwellings should not have turbines in more than 180 degrees of their field of view for a distance of 10km
Landscape and Visual	Chapter 4	At least 400m from dwellings or settlements
Noise	Chapter 5	At least 400m from dwellings or settlements
Heritage	Chapter 6	Proposals resulting in significant adverse impacts on heritage assets within 2km will be unacceptable Detailed consideration of impacts on heritage assets to extend to 5km
Safety	Chapter 7	Ground to blade tip height + 10% between occupied buildings and roads
Shadow Flicker	Chapter 8	10 rotor diameters from dwellings or settlements

Wind turbines within these distances will not normally be considered appropriate. However, proposals will be considered on a case by case basis. For example, appropriate separation distances may also be influenced by the orientation of views, and the local land cover and topography. It will be for the applicant to demonstrate to the Council that amenity and other consideration are not harmed by the proposal.

Finally, this document also lists sources of further information which will be of assistance in determining wind turbine proposals in Appendix 1.

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Chapter 1 Introduction

- 1.1 Renewable energy generation is seen by all parliamentary parties as a key priority in reducing carbon emissions in order to meet national and international targets. Various national documents including the UK Renewable Energy Strategy (2009) and the Energy White Paper (2007) are clear on the importance attached to onshore wind as a sustainable source of energy. The White Paper identifies onshore and offshore wind, and biomass, as potentially the most cost effective ways of limiting carbon emissions.
- 1.2 The existing national planning policy guidance (particularly PPS1: Delivering Sustainable Development and PPS22: Renewable Energy) follow the same direction in terms of promoting renewable energy. The PPSs are to be replaced by a National Policy Framework as part of the Localism Bill. However, the overall policy direction is likely to remain similar given the direction of the letter sent to chief planning officers revoking Regional Spatial Strategies (RSS) (6 July 2010) which stated that:
- "Through their local plans, authorities should contribute to the move to a low carbon economy, cut greenhouse gas emissions, help secure more renewable and low carbon energy to meet national targets, and to adapt to the impacts arising from climate change".
- 1.3 The most recent 'evidence gathering' study relating to renewable energy potential in the South East, Oxfordshire, and Cherwell district is the 'Review of Renewable and Decentralised Energy Potential in South East England' (LUC and TV Energy, June 2010). This study was originally intended to inform the new Regional Strategy, but despite RSS revocation the report continued to be finalised and released in order to help local authorities prepare their own local targets and renewable energy strategies.
- 1.4 In the study, Oxfordshire was found to have the most potential for commercial scale wind energy across the region (Figure 3.1 of the above study). Cherwell district was found to have the most potential across Oxfordshire (Appendix 3.1 of the above study).
- 1.5 The Renewable Energy and Sustainable Construction Study (CAG, 2009) undertaken for the Council focused on strategic policy formulation rather than detailed spatial identification of the potential for renewable energy, but nevertheless illustrates in more local detail the kinds of factors constraining wind farm development in the district. These factors were subsequently listed as part of a 'criteria based' policy in Draft Core Strategy policy SD 3.
- 1.6 Draft Core Strategy policy SD 3 set out the Council's general position towards assessing renewable energy proposals. It makes clear that the Council supports renewable and low carbon energy where appropriate. In assessing planning applications, it identifies a number of issues which are of local significance to Cherwell District which need to be considered. These include the impact of proposals on landscape designations, visual impact upon local landscapes and impacts upon the historic environment and residential amenity.

Purpose and Status of this Document

- 1.7 The purpose of this document is to provide additional detail on the criteria set out in Draft Core Strategy policy SD 3, specifically relating to proposals for commercial scale wind turbines and the need to protect residential amenity. As it does this, the document seeks to respond to a motion passed by the Council in July 2010 relating to the distance between turbines and settlements or individual

dwellings (see para 1.10 below). This is necessary to ensure that the wider benefits resulting from renewable energy generation are balanced with local issues including landscape impacts, and the economic, social and amenity impacts on local communities.

- 1.8** This document recommends separation distances between turbines and settlements or dwellings for use in Cherwell, firstly as a general standard for amenity reasons and then for a variety of reasons including landscape, noise, heritage, safety and shadow flicker. Where possible the standards set out in this document are linked to national or local policy, or a local evidence base. The document does not provide a comprehensive list of the issues to be considered in determining applications for large scale wind turbine development.
- 1.9** This document will form informal planning guidance. If approved in draft form by the Executive, the draft document will be subject to a period of public consultation. After this, members will be asked to approve the document as informal (non statutory) planning guidance from the Council on the subject of wind turbines. It will be shared with anyone considering a wind turbine proposal within the district, and will be a material consideration that the Planning Committee can take into account in considering proposals before them.

Context

- 1.10** This document has been prepared in response to a motion adopted by Full Council on 19 July 2010, which read as follows:

"That this Council develops, as a matter of urgency, a policy setting minimum acceptable distances between proposed wind turbines and dwellings".

- 1.11** There is currently no minimum separation distance in English planning law or guidance. What separation guidelines do exist in Scotland and Wales are explained as a general guide rather than a rule. Scottish Planning Policy 6 Annex A ⁽¹⁾ states that:

"[Wind turbine] development up to 2km is likely to be a prominent feature in an open landscape...[T]his approach is being adopted solely as a mechanism for steering proposals to broad areas of search, and, within this distance, proposals will continue to be judged on a case by case basis".

- 1.12** In Wales, Technical Advice Note 8⁽²⁾ discusses distances specifically in relation to noise impacts, and states that:

"500 metres is currently considered a typical separation distance between a wind turbine and residential property to avoid unacceptable noise impacts. However, when applied in a rigid manner it can lead to conservative results and so some flexibility is advised".

- 1.13** Jane Davidson (Environment Sustainability and Housing Minister), in response to a written question to the National Assembly for Wales, confirmed that:

1 <http://www.scotland.gov.uk/Resource/Doc/171491/0047957.pdf>
2 <http://wales.gov.uk/topics/planning/policy/tans/tan8/?lang=en>

"The issue is less to do with distance than the need to limit noise from wind farms to 5 decibels above background noise for both day and night time. The separation distances between wind turbines and residential properties can be examined as part of the refinement work by local planning authorities and on a case by case basis, taking into account topography and orientation, when decisions on planning applications are taken".

1.14 There are no statutory distances relating to residential amenity currently in place in England.

1.15 Two Private Member's Bills relating to minimum statutory distances have recently been proposed in Parliament . The first, a 'Ten Minute Rule' Bill, set out the following:

Turbine Height (metres)	Distance from Homes Suggested in Bill (miles)
25 to 50	0.5
50 to 100	1
100 +	1.5

1.16 The Bill also suggested an alternative approach, specifying 'set back distances' by using a fixed multiple in proportion to height.

1.17 This Bill was criticised in the planning press, and was reported as being 'arbitrary', 'ill founded' and 'inflexible' (Planning, 13 November 2009). It did not progress to a second reading, although this is not uncommon for 'Ten Minute Rule' Bills.⁽³⁾

1.18 A second Bill originated in the House of Lords and had its first reading on 27 July 2010. The date of the second reading is still to be announced. This set out the following:

Turbine Height (metres)	Distance from Homes Suggested in Bill (metres)
25 to 50	1000
50 to 100	1500
100 +	2000

1.19 The first and second Bills use miles and metres respectively to measure distance. Both Bills propose exceptions to these distances, where residents (the first bill) or owners (the second) of dwellings within the 'buffer zone' agree to the construction of the turbines.

1.20 It could be, therefore, that in the future, separation distances are set out in national planning law or policy.

1.21 In the absence of this, this document proposes a local approach to be taken towards wind turbine development in Cherwell. It adds detail to draft Local Development Framework policy (draft Core Strategy policy SD 3) in setting out minimum separation standards to protect residential amenity, and to reduce noise, safety and shadow flicker impact, and adverse impacts on landscape and heritage.

3 <http://www.parliament.uk/about/how/laws/bills/private-members/>

Chapter 2 Wind Turbine Size and Wind Speed

Wind Turbine Size

- 2.1** Wind turbines are measured in terms of height (hub height (a), rotor diameter (b) and ground to blade tip ($a + (b/2)$), and in terms of generating capacity (in watts, kilowatts (kW) or megawatts (MW); $1000w = 1kw$ and $1000kw = 1 MW$). The output of a wind turbine depends on the rotor diameter. Doubling the rotor diameter quadruples a turbine's output. Similarly, wind speed also increases generating capacity. A doubling of wind speed results in a roughly eight fold increase in power output.⁽⁴⁾
- 2.2** Although there are no rigid categories relating to the scale of wind turbines, individual onshore turbines tend to fall within four size bands: micro, small, medium and large.⁽⁵⁾
- 2.3** A combination of sources⁽⁶⁾ has been reviewed to suggest how we could broadly quantify these groupings. This is complicated by the fact that different turbine models have differing capacities compared to their heights. Consequently there is considerable overlap between the 'small' and 'medium' categories. Turbine efficiencies are also dynamic and constantly evolving, so our categorisation below represents only an approximate 'snapshot' at the current time.

Table 2 Wind Turbine Sizes

Grouping	Capacity	Ground to Blade Tip Height	Comments
Micro	Less than 100w	N/A	Used to charge 12 or 24 volt batteries
Small	0.6kW - 1 or 2.5kW	N/A	2.5kW typically the limit of building mounted (roof mounted) turbines.
	6 - 10kW	10 - 15m	Typically mast mounted turbines for domestic use
	Up to 100kW	20 - 50m	Typically suited for other applications, such as serving a village hall, a school, or a business. 100kW likely to be the absolute maximum in the 'small' banding although there is likely to be some overlap between 'small' and 'medium' in terms of height.
Medium	100s kW up to 1MW	50 - 80m	Larger than domestic application. A number of applications have been received by the Council for such turbines at farm locations.
Large	1 - 3MW	90 - 135m	Commercial scale turbines. This grouping represents the majority of planning applications submitted for wind turbines, according to the DECC.

4 'PPS22 Companion Guide', Technical Annex: Wind, CLG (2004)

5 'Review of Renewable and Decentralised Energy Potential in South East England', LUC & TV Energy (2010)

6 Renewable UK (formerly the British Wind Energy Association), the Department for Energy and Climate Change, the CAG Study, the Energy Saving Trust and planning applications received by the District Council

- 2.4 Onshore wind farms typically comprise a number of commercial scale or 'large' turbines, and at the largest are capable of generating tens of MW. Applications for schemes generating 5MW or more (or 15m or taller, or two or more turbines) are subject to Environmental Impact Assessment. Applications for schemes generating 50 MW or more are decided by the Infrastructure Planning Commission (or its future replacement).

Context

The turbines allowed at the Fewcott Appeal (APP/C3105/A/09/2116152) have an individual rating of between 2 and 2.5MW. Four turbines are proposed.

The turbines at the Westmill Community Wind Farm in the Vale of White Horse have an individual rating of 1.3 MW. There are five operational turbines generating enough electricity to power around 2,500 homes each year.

- 2.5 This document will typically apply to commercial scale, large turbines but the principles could also apply to smaller turbines, in particular medium scale turbines. As Table 2 shows, measurements can be made in terms of height and megawatts, so as a rough guide this document applies to any turbine with a ground to blade tip height of over 50m. It is noted that Planning Policy Statement 22 states that authorities should not set arbitrary limits on the numbers of turbines that will be acceptable in particular locations (para 21). This document recognises that there are likely to be more significant impacts arising from larger turbines and highlights the key policy guidance and thresholds to be used in siting these larger turbines. It does not, in itself, impose a limit on the specific numbers of turbines but rather focuses on their appropriate location.

Wind Speed

- 2.6 DECC guidance⁽⁷⁾ states that the benchmark currently used for the minimum commercially viable average wind speed varies between 5 metres per second (m/s) and 7m/s at 45m above ground level. In practice, most developers currently consider sites with wind speeds of over 6m/s at 45m. These speeds are noted in the Appeal Decision relating to the Fewcott proposal. Here, the Inspector also acknowledged that wind technology is constantly improving (meaning that turbines could become viable at lower wind speeds).
- 2.7 PPS22 recommends measuring wind data onsite for at least 12 months prior to finalising a scheme, which can be achieved through the use of historical meteorological data and onsite anemometers.⁽⁸⁾

7 Renewable and Low-carbon Energy Capacity Methodology, January 2010 at http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/renewable20energy/ored/1_20100305105045_e_@@_methodologyfortheenglishregions.pdf

8 PPS22 Companion Guide, Technical Annex para 32

Chapter 3 Settlement Distance

What are the Issues?

- 3.1** Cherwell is a rural district with a dispersed pattern of development. There are over 90 villages and hamlets in the district, containing 35.3% of the population. Most of these villages are relatively small, with populations under 500.⁽⁹⁾ Because few areas are far from existing settlements or individual dwellings, the amenity impacts of wind development are likely to be significant in many parts of the district. Additionally, many of the roads in the district pass through these small settlements and are unsuited to large vehicles.⁽¹⁰⁾
- 3.2** This chapter focuses on separation distances between wind turbines and settlements or dwellings for reasons of residential amenity. It is important to distinguish between impacts on residential amenity and other impacts arising from wind proposals such as landscape and wider visual impacts, noise impacts, or safety issues. Accordingly this document is split into several chapters which discuss how and why separation distances could be used to minimise the various impacts. However, there are inextricable links between this chapter and all others in the document - for example, residential amenity is heavily affected by noise levels.

National and Local Policy Guidance

- 3.3** Planning Policy Statement 22: Renewable Energy states that proximity to dwellings, and whether a site is constrained by a population centre or scattered dwellings, is one of the factors to be considered in appraising suitable sites for wind energy. It does not suggest the appropriate minimum proximity.
- 3.4** The Draft National Planning Policy Statement on Renewable Energy (2009) (intended to provide the basis for decisions by the Infrastructure Planning Commission) states that "Appropriate distances should be maintained between wind turbines and residential properties to protect residential amenity". It does not define 'appropriate'.
- 3.5** The 'Renewable Energy and Sustainable Construction Study' (2009) undertaken to inform future Core Strategy policies recommends that impact on residential amenity within the district be assessed by a 'residential survey' which considers the visual impact on individual dwellings closest to the proposal, and groups of dwellings, as distance increases. The Study suggests that separation distances for reasons of visual amenity are likely to be similar to those required for other reasons such as noise (which will, of course, differ on a case by case basis).
- 3.6** The Study was not undertaken specifically to recommend separation distances between dwellings and turbines. It did however examine the theoretical potential for renewable energy development (not just wind energy) in Cherwell. In doing so, the desk based study undertaken by the consultants across a broad study area used a notional separation distance of 800m between large scale turbines and dwellings (for noise and visual impact reasons) in order to assess general constraints on development and to identify areas that were less constrained. It noted that the use of different turbines or site layouts could justify smaller distances, whilst smaller turbines would also require smaller distances. In addition, local topography may mean that a smaller distance buffer may be appropriate.

9 Living in Cherwell, CDC (2010) at http://www.cherwell.gov.uk/media/pdf/i/g/Living_in_Cherwell_FULL_MMCL_July_2010.pdf

10 Renewable Energy and Sustainable Construction Study, CAG (2009) at http://www.cherwell.gov.uk/media/pdf/W/Renewable_Energy_and_Sustainable_Construction_Study_%28September_2009%29.pdf

Guidance from Appeal Decisions

- 3.7** A brief review of appeal decisions indicates that there is no general rule that is strictly applied in relation to distances between turbines and dwellings. Rather, a judgement is made according to the specifics of each case and the local circumstances that justify larger or smaller distances.
- 3.8** The Appeal Decision relating to the Fewcott Inquiry (APP/C3105/A/09/2116152) considered the effect of the proposals on individual views. It states that:
- "The appeal development would be prominent in the outlook from some 50 houses in Ardley and Fewcott, another 50 or thereabouts in Fritwell, some 12 in Stoke Lyne and the house at Green Farm. But I remind myself that no protection exists for the benefit of a private view. Consequently I do not regard as unacceptable the situation in which a turbine is prominent in the view from a domestic window. Rather, my concern is to recognise cases in which the effect on living conditions of people in such houses would be one of unacceptable dominance or overbearing. Evidence was given at the Inquiry that there is a risk of such an effect within up to 3 times the turbine height (to rotor tip) which in this case is 375m. This was based on observations at a wide number of finished wind farms." (paras 55 & 56)
- 3.9** The Inspector noted that one dwelling would experience an 'overbearing effect' created by the turbines, but that there would be no perceptible harm to the views in the wider area.
- 3.10** This appears to suggest that a minimum distance for residential amenity could be three times the turbine height. The minimum approximate 400m buffer resultant in this instance is in accordance with Chapter 4 Landscape and Visual Impacts, where it is suggested that turbines within 400m of a dwelling will have a dominant visual impact.
- 3.11** An Appeal Decision relating to a proposal in South Devon for 3 turbines up to 100m high (APP/K1128/A/08/2072150) discussed the impact of the turbines on a dwelling 500m away. The Inspector noted that the turbines would:
- "...fundamentally change the outlook from this property...[H]owever, the turbines would be slender structures and I do not believe that they would, at this distance and height, have an overbearing or dominating impact that would harm the residential amenity that the occupiers could reasonably expect in this rural agricultural setting".
- 3.12** Other dwellings in the locality (53 dwellings within 2km of the site) were noted as being unlikely to be adversely affected by impact on outlook. Given a combination of the separation distances, orientation of views, and the local effects of trees, other buildings and the topography, the Inspector was satisfied that the turbines would not significantly affect the living conditions of other occupiers.
- 3.13** An Appeal Decision relating to a proposal in Cumbria for 6 turbines up to 100m tall (APP/M0933/A/08/2090274) found that the visual impact of turbines on the amenity of occupiers of a dwelling 600m from the turbines would not be highly prominent - the turbines would not be so dominant or oppressive as to be unacceptable. The 600m distance was also noted as being acceptable in an Appeal Decision relating to a proposal in Essex for 5 turbines up to 125m tall (APP/P1560/A/08/2088548) although the Inspector states that this is not a general rule, but appropriate in that particular instance due to tree screening around the dwellings.
- 3.14** The Inspector in an Appeal relating to a proposal for 11 turbines 125m tall in Leicestershire (APP/F2415/A/09/2096369) found that the impact on the living conditions of residents 670m from the site of the turbines would not be unacceptable.

- 3.15** A distance of 700m from the nearest residential dwelling was found to be appropriate in the Appeal Decision relating to a proposal for 7 wind turbines 125m tall in Norfolk (APP/L2630/A/08/2084443).
- 3.16** A distance of between 600 and 800m from the nearest residential dwelling was also found to be appropriate in the Appeal Decision relating to a proposal for 5 turbines 100m tall in Nottinghamshire (APP/B3030/A/08/2072487).
- 3.17** 800m was also the distance between the nearest dwelling and 10 turbines up to 100m tall in a proposal in South Northamptonshire (planning application reference KE/03/0559), which was approved.
- 3.18** Other Inspectors consider turbines unacceptable at these distances. In one case (5 turbines at 125m tall in Dover, APP/X2220/A/08/2071880) the closest dwelling stood 360m from the nearest turbine. For this dwelling, the Inspector found that the turbine would be 'looming', 'unpleasantly overwhelming' and 'unavoidable'. This 'unpleasantly overwhelming and unavoidable' impact extended to dwellings within 800m. At a settlement 1km away from the turbines, the impact too would be dominating and unavoidable, although in this case it was the widely spaced spread of the turbines, rather than their height, that would be visually invasive. The Inspector noted that there were some more closely located properties that would be less affected, because the turbines would be more closely grouped rather than spread out.
- 3.19** At an appeal relating to a proposal for 16 turbines in Cambridgeshire (APP/W0530/A/05/1190473) the Inspector considered that the impact of the turbines on a settlement 800m away would be significant. The impact was exacerbated by the particular circumstances of the location; the settlement was surrounded by small, low level agricultural enclosures with hedgerows and trees, which made a significant contribution to the character of the area and the pastoral component to the setting of the village. The turbines were found to completely dominate the character and appearance of the area, and the appeal was dismissed.
- 3.20** This brief review of appeal decisions serves to demonstrate that there is no general rule being applied, for a number of reasons. Separation is clearly required for residential amenity, but the distance depends on a number of factors present in each case including topography and land cover.

Other Examples

- 3.21** Fenland District Council has produced 'Wind Turbine Development Policy Guidance' which considers each of the impacts raised by wind energy and suggests criteria or thresholds beyond which wind turbine development is unlikely to be acceptable. It does not have a section of residential amenity specifically. However the criteria referred to in the document's 'Landscape and Visual Impact' section are of interest. It suggests that the visual impact of turbines within 400m will be 'dominant', forming the principle element of the view and overpowering the viewer. It further suggests that, based on professional judgement, settlements of more than 10 dwellings should not have wind turbines in more than 90 degrees of their field of view from public or residential viewpoints for a distance of 5km. Individual dwellings should not have wind turbines in more than 180 degrees of their field of view for a distance of 10km. This focus on the 'field of view' occupied by wind turbines appears to tackle the issue raised by the Inspector in the Dover appeal (see para 3.18).
- 3.22** South Northamptonshire District Council's draft 'Wind Turbines in the Open Countryside' SPD has a section entitled 'Local Amenity' but the issues and guidance discussed in that section relate entirely to noise levels.

- 3.23** Torridge District Council's 'Wind Energy Policy' statement establishes a minimum distance between dwellings and turbines of 600m for reasons of 'local amenity', again defined specifically as noise and visual impact issues. The document acknowledges that in some cases lesser separation distances might be required.

Conclusions

- 3.24** The brief review of appeal decisions indicates that there is no single 'separation rule' relating to residential amenity being applied across the country, with judgements in each case being determined by local circumstances.
- 3.25** Looking specifically in Cherwell, we know that the district is 89.3 % rural,⁽¹¹⁾ with an evenly scattered dispersed distribution of settlements and isolated farmsteads.⁽¹²⁾ Most settlements in the district are small villages and hamlets.⁽¹³⁾ and typically, the setting of these settlements is tranquil and agricultural. Topography across the district is complex, but on the whole the district is relatively flat (particularly in the south of the district, although less so in the north/western part with its hills and valleys) and unlikely to provide any significant screening of turbines, whilst the district as a whole is 'noticeably lacking in woodland cover'.⁽¹⁴⁾
- 3.26** The combination of these factors means that within Cherwell, large scale wind turbines are likely to have a dominant impact within a broad distance. It is recommended that a separation distance of 800m is normally required between large scale wind turbines and dwellings.

Guidance within Cherwell District

A minimum separation distance of 800m between large scale wind turbines and dwellings will normally be expected. Appropriate separation distances may be influenced by the orientation of views, and the local effects of trees, other buildings and the topography, as well as other issues such as noise, safety, shadow flicker, and impacts on landscape or heritage assets.

Large scale wind turbines should always be separated from dwellings by a distance of at least three times the turbine height (ground to blade tip) for reasons of residential amenity.

Settlements of more than 10 dwellings should not have wind turbines in more than 90 degrees of their field of view from public or residential viewpoints for a distance of 5km from the viewpoint. Individual dwellings should not have wind turbines in more than 180 degrees of their field of view for a distance of 10km from the property.

Further Information

- 3.27** See Appendix 1 - 'General'.

11 Key Facts in One Place - Cherwell District, (GOSE), 2008 at <http://www.go-se.gov.uk/497648/docs/170192/179006/179028/Cherwell.pdf>

12 Cherwell Landscape Assessment, CDC (1995) at http://www.cherwell.gov.uk/media/pdf/7/n/CDC_Landscape_Assessment_-_Cobham_Nov_1995_-_lr.pdf

13 Living in Cherwell, CDC (2010) at http://www.cherwell.gov.uk/media/pdf/i/g/Living_in_Chерwell_FULL_MMCL_July_2010.pdf

14 CDC (1995)

Chapter 4 Landscape and Visual Impacts

What are the Issues?

4.1 A key consideration of proposals for wind turbines will be impacts on landscape character and visual amenity. Cherwell is a largely rural district with highly valued local landscapes. The Cherwell District Landscape Character Assessment (1995) states that:

"The landscape character of Cherwell district is immensely varied, with large areas of unspoilt countryside".

4.2 Making a planning judgement on the acceptable level of landscape or visual impact can be difficult since there is no guidance in relation to such 'acceptable levels' and landscape impacts cannot be quantified, unlike other impacts such as noise levels.

4.3 However, there are well established approaches to assessing the capacity of landscapes to accommodate wind turbines based on the following process:

Landscape Sensitivity + Visual Sensitivity + Landscape Value = Landscape Capacity.

4.4 Each of these elements will be informed by Landscape Character Assessment, whilst overall conclusions on capacity will also require an understanding of what level of change within the landscape would be acceptable.

4.5 Guidance on assessing landscape and visual impacts is discussed in more detail below.

National and Local Policy Guidance

4.6 In terms of national landscape designations, a small part of the district falls within the Cotswolds Area of Outstanding Natural Beauty (AONB). PPS22 states that within national designations, planning permission for renewable energy projects should only be granted where it can be demonstrated that the objectives of the designation of the area will not be compromised by the development, and any significant adverse effects are clearly outweighed by environmental, social and economic benefits (para 11). The Cotswolds AONB Conservation Board has produced a Management Plan for the AONB, which this District Council has adopted for use as supplementary guidance (it is therefore a material consideration in determining applications). This Management Plan encourages and supports appropriate scale renewable energy generation (including small scale single wind turbines) but states that wind farms are likely to be inappropriate.

4.7 In terms of locally valued landscapes, it is very clear in government guidance (PPS22 and PPS7) that local landscape designations should not be used to justify blanket restrictions on renewable energy development within broad areas. Instead, the approach should be to identify the different landscape characters of an area, and assess the capacity of those different landscapes to accommodate turbines using the approach set out in para 4.3. This could be undertaken by the local authority at a district level (see 'Other Examples', below) or could be undertaken on a smaller scale and on a case by case basis within the Landscape and Visual Impact Assessment (LVIA) submitted as part of a wind farm proposal in accordance with the Environment Impact Assessment Regulations.

4.8 The main source of guidance for producing a landscape character assessment is 'Landscape Character Assessment Guidance', Countryside Agency (2002) (weblinks are in Appendix 1).

4.9 The main sources of guidance to assess landscape and visual impact are:

- 'Guidelines for Landscape and Visual Impact', Landscape Institute and the Institute of Environmental Management and Assessment (2002)
 - 'Visual Representation of Windfarms Good Practice Guidance', Scottish Natural Heritage (2006)
 - 'Guidelines on the Environmental Impact of Wind Farms and Small Hydroelectric Schemes', Scottish Natural Heritage (2001)
 - PPS22 Companion Guide.
- 4.10** In brief, LVIAs should distinguish between landscape and visual effects. Landscape Impact Assessment considers change to individual landscape elements; change to landscape character; and change to designated landscapes and settings. Visual Impact Assessment considers change to views and visual amenity.
- 4.11** Within Cherwell, Landscape and Visual Impact Assessments can be informed by the Landscape Capacity and Sensitivity Assessment (LCSA) and the Oxfordshire Wildlife and Landscape Study (OWLS) (see Appendix 1) which are useful sources of local information. However, neither of these studies refers to wind turbines specifically, and the LCSA focuses on the landscapes around the main settlements of Banbury and Bicester.
- 4.12** In terms of policy guidance, Land Use Consultants⁽¹⁵⁾ advise that a policy prohibiting wind turbine developments "if significant landscape effects are created" is meaningless, because significant effects, or change, will occur inevitably. This view was echoed by the Inspector at the Fewcott appeal who noted, in that particular case, that "there would be change but not harm" (APP/C3105/A/09/2116152, para 54). Examples of how policies can be used to define acceptability or harm are discussed in para 4.17 below.
- 4.13** **It is important to note that landscape and visual impacts are likely to be assessed as part of the Environmental Impact Assessment process, in order to demonstrate that significant adverse effects are being avoided or mitigated.**

Guidance from Appeal Decisions

- 4.14** An Appeal Decision relating to a proposal in South Devon for 3 turbines up to 100m tall (APP/K1128/A/08/2072150) noted that the turbines would exert a characterising influence over the local landscape within a radius of 500m - 600m. In this case, the impact was exacerbated by the fact that the turbines would be sited near to the edge of a plateau and would be about double the height from the ridge, on which they would be sited, to the nearby valley floor. In visual terms, effects would be 'high' up to 1.5km/2km away, dropping to 'medium' at a distance of 3-5km.
- 4.15** At an Appeal Decision relating to a proposal in Cumbria for 6 turbines up to 100m tall (APP/M0933/A/08/2090274) found that the turbines would give rise to a significant change in the appearance of the immediately surrounding area (within 600m and 1km). However, the landscape was found to be 'sufficiently robust and of a scale that could assimilate the six structures without being dwarfed by them' (para 38).
- 4.16** An Appeal Decision relating to a proposal in Essex for 5 turbines up to 125m tall (APP/P1560/A/08/2088548) found that the turbines would exert a characterising influence over the landscape within and up to 700m distance. However a number of 'mitigating' factors were noted including existing human influence on the landscape, the topography, and the capacity of the exposed and windswept landscape to accommodate the turbines.

15 In a training event provided on behalf of CLG and the Centre for Sustainable Energy

Other Examples

4.17 There are several examples of studies and Supplementary Planning Documents (SPDs) prepared by other local planning authorities which consider in detail the capacity of the different landscape types within the district to accommodate wind turbines. Huntingdonshire District Council has produced an SPD on wind power (2006) which considers landscape issues, whilst Vale Royal Borough Council has produced an SPD on Landscape Sensitivity and Wind Turbine Development (2007). South Holland District Council's SPG on Wind Energy also follows the detailed landscape character assessment and subsequent landscape capacity approach. Fenland District Council's "Wind Turbine Development Policy Guidance" quantifies the impact that turbines are likely to have on each of the district's landscape types, and draws conclusions on the extent to which each landscape type can accommodate different 'magnitudes' of impact. It sets out the following:

Table 3

Distance from Turbines	Magnitude of Visual Impact
Within 400m	Dominant
400m - 2km	Prominent
2 - 5km	Conspicuous
5 - 15km	Apparent
15 - 30km	Inconspicuous
Over 30km	Negligible

4.18 Fenland's guidance document also refers to the proportion of a 'field of view' occupied by turbines in relation to residential visual amenity (see Chapter 3).

4.19 Torrington District Council's 'Wind Energy Policy' statement establishes minimum separation distances between turbines and designated landscapes (500m from AONB). In terms of non designated landscapes, it adds that developers are required to provide information on how the turbine proposal will integrate into the existing landscape, taking into account identified landscape character areas. A district wide Landscape Character Assessment was underway at the time the document was produced (May 2010) and it is stated that once this work is completed, it would be possible to produce a landscape sensitivity assessment to wind energy development in the district.

Conclusions

4.20 It is important to distinguish between landscape impacts and visual impacts, and between these impacts and residential amenity impacts, which are covered in Chapter 3.

4.21 Impacts on the wider landscape, and conclusions on the capacity of landscapes to accommodate large scale wind turbines, will need to be assessed in the Landscape and Visual Impact Assessment submitted with large scale wind proposals. This, in turn, can be informed by existing information on the landscape characters and types in Cherwell (the Oxfordshire Wildlife and Landscape Study and the Cherwell Landscape Character Assessment undertaken in 1995, listed in Appendix 1).

- 4.22** In terms of the visual impact of large scale turbines when experienced within a local landscape (i.e the landscape surrounding a settlement), it is considered that the Council could make use of the distances established by Fenland District Council in Table 3 above. For example, at a distance of 400m, large scale wind turbines are likely to have a dominant visual impact on the local landscapes around the settlement, and this is considered to be inappropriate.
- 4.23** Additionally, 15% of the district⁽¹⁶⁾ is covered by landscape designation (the AONB) or designations requiring careful consideration of the visual impacts of developments (the Green Belt). It is therefore necessary to include guidance relating to designated areas specifically. This can be directly influenced by national policy and the guidance of bodies such as Natural England.

Guidance within Cherwell District

Large and medium scale wind turbine developments within the AONB are unlikely to be permitted. Within the Green Belt, they will only be permitted where they do not compromise the openness of the Green Belt.

Large and medium scale wind turbine developments that would result in a 'dominant' landscape and visual impact (i.e within 400 metres of settlements) are unlikely to be permitted.

If a suitable broad location can be found, the following principles should guide the location of turbines:

- the direction and flow of the landscape and contours should be followed
- layouts should be designed to avoid (1) visual confusion and disordered clutter, (2) 'tangles' of turbines where multiple turbines are seen behind each other, and (3) isolated turbines that are remote from the rest of the group.

Adverse impacts should be minimised through appropriate mitigation. The local planning authority will seek to influence mitigation at the earliest stages in a proposal, and will enforce mitigation measures through the use of planning conditions.

- 4.24** The guidance documents set out in Appendix 1 - 'Landscape and Visual Impacts' should be used to avoid significantly adverse landscape impacts.
- 4.25** A thorough district wide landscape capacity assessment would enable the Council to develop more specific evidenced based guidance.
- 4.26** In undertaking a Landscape and Visual Impact Assessment of wind turbine proposals, reference should be made to the landscape characters within the district identified in the Oxfordshire Wildlife and Landscape Study.

Further Information

- 4.27** Please see Appendix 1 - 'Landscape and Visual Impacts'.

16 Key Facts in One Place - Cherwell, GOSE (2008) at <http://www.go-se.gov.uk/497648/docs/170192/179006/179028/Cherwell.pdf>

Chapter 5 Noise

What are the Issues?

- 5.1 Noise can have an adverse impact on the environment and the quality of life enjoyed by individuals and communities. There are two distinct types of noise source within a wind turbine - the mechanical noise produced by the gearbox and generator, and the aerodynamic noise produced by the passage of blades through the air.

National and Local Policy Guidance

- 5.2 The framework for assessing noise impacts is currently 'The Assessment and Rating of Noise from Wind Farms', produced by the Energy Technology Support Unit for the DTI in 1997 (ETSU-R-97). This provides the framework for the measurement of wind farm noise and for deriving suitable noise limits to offer a reasonable degree of protection. PPS22 recommends the use of ETSU-R-97 for assessing operational wind farm noise generation (standards outside of the planning system exist to manage construction noise generation (i.e. BS 5228 1997)).
- 5.3 ETSU-R-97 recommends the application of noise limits at the nearest noise sensitive properties (i.e. at numerous sites). Limits should be set relative to the existing background noise levels (which may increase with wind speed). The predicted noise levels from wind turbines are then compared with the limits to determine acceptability.
- 5.4 It further states that noise from wind farms should be limited to 5 decibels (dB A) above background levels for both day and night time. A fixed limit of 43 dB A is recommended for night time. Both day and night time lower limits can be increased to 45 dB A where the occupier of a property has some financial interest in the wind farm. It is important to note that noise levels are therefore measured in relation to the increase above the background noise levels. Therefore a noisier location could potentially accommodate noisier wind turbines.
- 5.5 The PPS22 Companion Guide contains a comparison between typical wind turbine noise at a distance of 350m and other common noise sources. It stresses that:
- Noise levels from turbines are generally low and, under most conditions, it is likely that turbine noise would be completely masked by wind-generated background noise
 - Aerodynamic noise from wind turbines is generally unobtrusive
 - Varying the speed of the turbines can, if necessary, reduce the sound output
- 5.6 Low frequency noise (infrasound) is sometimes raised as an issue in response to wind farm proposals. The PPS22 Companion Guide asserts that there is no evidence that ground transmitted low frequency noise from wind turbines is at a sufficient level to be harmful to human health.
- 5.7 Some non statutory research reports recommend that buffer zones are applied between turbines and dwellings for reasons of noise protection. This buffer zone could be 2km, or greater if the individual turbine has a capacity of over 2MW. This advice has not yet been incorporated into statutory guidance.
- 5.8 The guidance on assessing the noise impacts of wind farms is currently under review by the DECC to ensure that the ETSU-R-97 guidance is applied in a consistent and effective manner (Planning, 6 August 2010).
- 5.9 **It is important to note that noise impacts are likely to be assessed as part of the Environmental Impact Assessment process, in order to demonstrate that significant adverse effects are being avoided or mitigated.**

Guidance from Appeal Decisions

- 5.10** In the Fewcott Appeal, the Inspector concluded that a precautionary approach should be taken, limiting noise levels at each site to the lowest background noise level (rather than the less demanding common practice of relating the noise limit to wind speed). Existing and proposed noise levels were assessed at six locations. At the property closest to the nearest wind turbine (400m) the noise generated was found to be within the limits proposed by ETSU-R-97 (i.e 5 dB A above background noise levels).
- 5.11** At an Appeal Decision relating to a proposal for 10 turbines in Lincolnshire (APP/E2530/A/08/2073384) the Inspector discusses the 2km buffer zone suggested in a research document referred to him. He notes that "I could not find (among the 3 references to the subject in the reported studies) any scientific or other justification for its precise recommendation of a 2km separation distance between turbines and dwellings" (para 19).
- 5.12** It is of note that the Inspector at an Inquiry relating to proposals for 5 turbines 120m tall in Dover (APP/X2220/A/08/207/1880) discussed ETSU-R-97's rejection of minimum separation distances but concluded that "separation distance is the best insurance against unacceptable noise impact, whatever its cause" (para 59).

Other Examples

- 5.13** Cumbria County Council's guidance document on wind turbines refers to PPS22 and the ETSU-R-97 document but does not specify separation distances.
- 5.14** The national planning policy in Wales (as set out in Chapter 1) refers to a typical distance of 500m to avoid unacceptable noise impacts.
- 5.15** South Northants' draft SPD, 'Wind Turbines in the Open Countryside', examines the approach set by ETSU-R-97, finds there to be shortcomings, and refers to a '600m distance recommendation' between turbines and residential properties for noise reasons. It does not identify the source or justification for this figure.
- 5.16** Fenland District Council's 'Wind Turbine Development Policy Guidance' again refers to ETSU-R-97 and adds that 'common practice suggests that for 2-3MW turbines, a buffer of between 400m and 700m is required to minimise noise impacts'. This specific distance is not justified in any more detail.
- 5.17** It is of note that the ETSU-R-97 document states that a minimum separation distance of between 350 and 400m (as suggested in the predecessor to PPS 22) would be unlikely to offer an adequate level of protection today due to the difference in noise emissions from different types of turbines, the increase in scale of turbines today, and topographical reasons.

Conclusions

- 5.18** It is concluded that there are clear guidelines by which the acceptability of wind turbine proposals in relation to noise impacts can be quantified. The review of policy guidance and appeal decisions does indicate however that the important consideration is the level of noise generated over background noise levels (which will differ at different locations across the district). The review of policy guidance (PPS22 and its endorsement of ETSU-R-97) does indicate a 'minimum separation distance' within which noise impacts are likely to be unacceptable (400m).

Guidance within Cherwell District

In accordance with PPS22, wind farms should be located so that increases in ambient noise levels around noise sensitive developments are kept to acceptable noise levels with relation to existing background noise. The level of acceptability is as set out in 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97).

As a general rule, a separation distance of less than 400m would be contrary to the advice set out in ETSU-R-97.

However, the important consideration is noise generation above background levels, rather than distance. If background noise levels are particularly high (for example, adjoining the M40), noise generated by turbines situated at or around 400m of dwellings may fall within the limits established in ETSU-R-97

Planning conditions or obligations will be used to safeguard local amenity, such as to secure mitigation measures including those set out in PPG24.

- 5.19** ETSU-R-97, PPS22 and its Companion Guide and PPG24: Planning and Noise offer further advice.
- 5.20** Early consultation with the Council's Environmental Health Department and the Anti Social Behaviour Manager is recommended.

Further Information

- 5.21** Please see Appendix 1 - 'Noise'.

Chapter 6 Heritage

What are the Issues?

- 6.1** Wind turbines may have adverse impacts on Scheduled Ancient Monuments, Conservation Areas, Listed Buildings and Registered Parks and Gardens, either directly (ground disturbance to archaeological sites) or indirectly (on the setting of such features). Many of Cherwell's villages and the town centres are protected by Conservation Areas, the district has approximately 3000 listed buildings, 55 Scheduled Ancient Monuments and a number of registered parks and gardens and historic battlefields.
- 6.2** The consideration of impacts on heritage assets focuses around two key issues - the significance, or value, of the heritage asset itself, and the significance of the impact that would be caused by wind turbine development. These issues are considered below.

National and Local Policy Guidance

Significance of Heritage Assets

- 6.3** Heritage assets can be designated or undesignated. Planning Policy Statement 5: Planning for the Historic Environment (PPS5) sets out a presumption in favour of the conservation of designated heritage assets. It states that heritage assets can be harmed by development which occurs within their setting, and suggests a 'hierarchy' of assets in para HE9.1:

"Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, including scheduled monuments, protected wreck sites, battlefields grade I and II* listed buildings and grade I and II* registered parks and gardens, World Heritage Sites, should be wholly exceptional".

- 6.4** PPS5 also contains advice on the balance between protecting heritage assets, and mitigating the effects of climate change.
- 6.5** Under the Planning (Listed Buildings and Conservation Areas) Act 1990, the Council has a statutory duty to have regard to the desirability of preserving listed buildings or their settings, and the desirability of preserving or enhancing the character of appearance of Conservation Areas. What constitutes the 'setting' is not universally defined and may vary on a case by case basis.
- 6.6** Planning Policy Statement 22: Renewable Energy advises against establishing fixed buffer zones around Scheduled Ancient Monuments, Conservation Areas, Listed Buildings, Registered Historic Battlefields and Registered Parks and Gardens. What is important is to consider how the objectives of the designation would be affected by a wind turbine proposal. It states that planning permission should only be granted 'where it can be demonstrated that the objectives of designation of the area will not be compromised by the development' (para 11).

Significance of Impacts

- 6.7** The Scottish Planning Advice Note 45 (Renewable Energy Technologies) suggests that indirect visual effects on the setting of nationally important monuments are not considered likely to be significant beyond 15km of the wind turbine and the indirect visual effect on the setting of an historic site of regional significance is not likely to be significant beyond 5km. It also provides useful guidance on how perception of a wind farm changes as distance increases.

- 6.8 In 2005 English Heritage issued guidance on 'Wind Energy and the Historic Environment'. This includes guidance on how to assess the impact of wind turbines on the setting and visual amenity of historic sites. It suggests six factors to be considered when assessing the acceptability of wind turbines: visual dominance, scale, intervisibility, vistas and sight lines, movement, sound or light effects, and the existence of previously unaltered settings. For example, in relation to movement, sound and light effects, the guidance states that 'adequate distance should always be provided between important historic sites and wind turbine developments'. It does not define adequate.
- 6.9 Combining the guidance in PAN 45 and the six English Heritage criteria makes it possible to consider the severity and significance of impact on historic sites. Severity and significance is typically measured on a point scale ranging from minimum to maximum, although differing categories are frequently used to describe points on the scale. There is no universal definition of when impacts are and are not considered to be significant, nor the point at which 'significant' becomes 'unacceptable'. The review of appeal decisions, below, briefly discusses some examples.
- 6.10 The assessment of impacts on heritage assets will be closely linked to the assessment of landscape and visual impacts, since impacts in both cases will depend on the Zone of Theoretical Visibility (ZTV) (i.e where the turbines will be seen from).
- 6.11 **It is important to note that heritage impacts are likely to be assessed as part of the Environmental Impact Assessment process, in order to demonstrate that significant adverse effects are being avoided or mitigated.**

Guidance from Appeal Decisions

- 6.12 At the Fewcott appeal, the Inspector assessed the impact on a range of listed buildings in the vicinity of the wind turbine site (there were 26 listed buildings within 2km of the turbines). The impact on one Grade II listed building, 500 metres from the nearest turbine, was found to be 'slight', ranking 3 on a scale of 8. At Rousham Park, a Grade I Registered Park and Garden 7km from the turbines, the impact was found to be of moderate/slight significance (ranking 4 on a scale of 8), reducing in significance in the summer months when trees are in leaf.
- 6.13 In other appeals there are frequently found to be adverse impacts on the setting of listed buildings and conservation areas within 2km of turbine sites, and up to 5km (as found in the Appeal Decision relating to a proposal for 6 turbines 125m tall in Norfolk, APP/K2610/A/05/1180685). This was not found however to justify refusal of the turbine development in an appeal relating to 7 turbines 125m tall in Norfolk (APP/L2630/A/08/2084443), nor in an appeal relating to a proposal for 5 turbines 100m tall in Nottinghamshire (APP/B3030/A/08/2072487).
- 6.14 In other cases, such as the appeal relating to a proposal for 10 2.3MW wind turbines in Lincolnshire (APP/E2530/A/08/2073384), there was found to be unacceptable harm caused to a number of heritage assets including a Grade I listed country house 9km from the proposed turbines, and this was one of the primary reasons for dismissing the appeal.

Other Examples

- 6.15 Fenland District Council's Wind Turbine Development Policy Guidance states that wind turbine developments within 2km of Conservation Areas and Listed Buildings will need to be carefully assessed to ensure there are not significant adverse effects on the settings of these features.
- 6.16 South Holland District Council's Supplementary Planning Guidance on Wind Energy similarly states that turbines demonstrated to have a significant adverse effect upon the views of church towers or spires (within Conservation Areas) within a 2km radius will be considered unacceptable.

- 6.17** South Northamptonshire's draft SPD 'Wind Turbines in the Open Countryside' requires proposed developments to be accompanied by a cultural heritage impact assessment which takes into account all listed buildings, conservation areas and historic parks and gardens within 5km of the site boundary.
- 6.18** Torrington District Council's 'Wind Energy Policy' statement contains a section on cultural heritage, and the need to consider the impacts of wind energy development on historic sites, although it does not recommend specific separation distances.

Conclusions

- 6.19** Due to the high number of heritage assets within Cherwell District, detailed consideration will be given to the direct and indirect impacts of wind turbine proposals on the historic environment. The guidance in this document relates particularly to the indirect impacts on the setting and visual amenity of historic sites. Like many of the other impacts discussed in this document, the significance of impacts on heritage assets, and the acceptability of these impacts, will vary on a case by case basis and will depend, for example, on sight lines or topography. Significance and acceptability will also depend on the 'significance' or value of the heritage asset itself, and the extent to which the asset, and the reasons for its designation or protection, would be compromised by the development. This document does not define the 'significance' of heritage assets or the impacts upon them. However, the established categorisation of assets such as Listed Buildings could inform an appropriate definition of significance (for example, Grade I listed buildings are of a higher, and more significant, value, than Grade II or Grade II* listed buildings).
- 6.20** One key theme emerging from the brief review of appeal decisions and other authorities' guidance documents is that significant impacts are more likely within 2km of the heritage asset, and may extend to a distance of up to 5km. There are examples where impacts were found to be unacceptable at a distance of over 5km but this is more likely to apply in exceptional circumstances dependent on the sensitivity of the asset and the details of the proposal.

Guidance within Cherwell District

Large scale wind turbines that are demonstrated to have significantly adverse impacts on designated heritage assets within a 2km radius will be considered unacceptable.

Significant impacts are likely up to a distance of 5km, and a detailed assessment will be undertaken to ensure no harm is caused to designated heritage assets within this distance.

- 6.21** Proposals for large scale wind turbines will be consulted upon with English Heritage, with the Archaeology team at the County Council, and the District Council's own specialist design and conservation team.

Further Information

- 6.22** Please see Appendix 1 - 'Heritage'.

Chapter 7 Safety

What are the Issues?

- 7.1** PPS 22 states that properly designed and maintained wind turbines are a safe technology. The only source of possible danger would be the loss of a piece of the blade or, in most exceptional circumstances, of the whole blade. Many blades are composite structures with no bolts or other separate components and blade failure is therefore most unlikely. Even for blades with separate control surfaces on or comprising the tips of the blade, separation is most unlikely (PPS22 Companion Guide, paras 49 and 50).
- 7.2** The build up of ice on turbine blades is unlikely to present problems on the majority of sites in England. For ice to build up on wind turbines, particular weather conditions are required that in England occur for less than one day per year. In those areas where icing of the blades does occur, fragments of ice might be released from the blades when the machine is started. Most wind turbines are fitted with vibration sensors which can detect any imbalance which might be caused by icing of the blades; in which case operation of machines with iced blades could be inhibited (PPS22 Companion Guide para 79).
- 7.3** Finally, concern is often expressed in public consultation responses about the effects of wind turbines on car drivers, who may be distracted by the turbines and the movement of the blades.

National and Local Planning Guidance

- 7.4** The minimum desirable distance between wind turbines and occupied buildings calculated on the basis of expected noise levels and visual impact will often be greater than that necessary to meet safety requirements. Fall over distance (i.e. the height of the turbine to the tip of the blade) plus 10% is often used as a safe separation distance (PPS 22 Companion Guide, para 51).
- 7.5** With regards to highway safety, PPS22 states that drivers are faced with a number of varied and competing distractions during any normal journey, including advertising hoardings, which are deliberately designed to attract attention. At all times drivers are required to take reasonable care to ensure their own and others' safety. PPS 22 highlights that turbines should not be treated any differently from other distractions a driver must face and should not be considered particularly hazardous.

Guidance from Appeal Decisions

- 7.6** At the Fewcott Appeal (APP/C3105/A/09/2116152) the Inspector concluded that the stability of built structures is not often a planning consideration because adequate checks are imposed on their design by other legislation or procedures. The Inspector was satisfied that certified compliance with European Standard IEC61 400-1 and with BS EN 61400 - 1:2005 Wind Turbine Design Requirements would provide adequate assurance of the safety of the development, and this could be secured by condition (Appeal Decision, para 93).
- 7.7** In one appeal case reviewed, relating to a proposal for 16 turbines 100m tall in Cambridgeshire (APP/W0530/A/05/1190473), safety issues featured prominently, particularly highway safety issues. Here, the closest turbines were to be 250m from the A14 Trunk Road. The Inspector noted that the road carried a substantial volume of traffic and an unusually high proportion of lorries. The road was operating significantly over its theoretical capacity and the Highways Agency was concerned about the number of accidents, whilst the highway authority had objected to the proposal. Although the Inspector highlights that "there are now a large number of wind farms adjoining or close to road networks with no history of accidents resulting from their installation" (para 59), he concluded that

the very little margin for driver error on the A14 and the particular combination of circumstances in this case (including the number and design of junctions on the road) could be especially critical to the point where optimum driver performance starts to decline. The proposed development was found to have a harmful impact on road safety.

Other Examples

- 7.8** In other authorities' Supplementary Planning Documents, it appears that safety is rarely discussed in its own right, separately from issues covered elsewhere in this document including Chapter 8.
- 7.9** Fenland District Council's Wind Turbine Development Policy Guidance states that, in order to ensure a safe zone around turbines in relation to ice build up, the following distance should be applied:

$$d = (D + H) \times 1.5$$

Where:

d = maximum falling distance of ice (in metres)

D = rotor diameter (in metres)

H = hub height (in metres)

Conclusions

- 7.10** It is concluded that there is adequate guidance in PPS22 relating to the positioning of turbines and safety concerns, which is worth reiterating in this document in order to present a comprehensive consideration of the recommended separation distances. Beyond this, it is clear from the brief review of appeal decisions that safety is rarely an issue discussed in its own right, particularly since other compliance procedures (for example British Standards) exist to ensure safe engineering and construction. Similarly in relation to highways safety, it is for the Highways Agency or highways authority to advise on the acceptability of proposals.

Guidance within Cherwell District

'Fall over distance' (the ground to blade tip height + 10%) will be required between wind turbines and occupied buildings and roads.

- 7.11** The advice in PPS22 is to be followed and compliance is to be achieved with the other relevant consent procedures relating to turbine safety.
- 7.12** The highways authority and the Highways Agency will be consulted on applications on a case by case basis.

Further Information

- 7.13** Please see Appendix 1 - 'Safety'.

Chapter 8 Shadow Flicker

What are the Issues?

- 8.1** Shadow flicker occurs as a result of the sun passing behind the rotors of a wind turbine, casting a moving shadow over nearby properties within 130° either side of north (PPS22). The likelihood of this occurring and its severity depends upon:
- The direction of the dwelling relative to the turbine (s)
 - The distance from the turbine (s)
 - The turbine height
 - The time of year (the effect is greater when the sun is brightest)
 - The proportion of daylight hours in which the turbine (s) operate
 - The frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon)
 - The prevailing wind direction.
- 8.2** Shadow flicker will not occur in periods of full cloud cover, and its impact will be reduced in overcast skies. Turbine blades will also not rotate continually during daylight hours, as the blades will not rotate during calm periods or very high winds and so shadow flicker would not occur in such conditions.
- 8.3** Turbines can also cause flashes of reflected light, which can be visible for some distance. It is possible to ameliorate the flashing but it is not possible to eliminate it. Careful choice of blade colour and surface finish can help reduce the effect. Light grey semi-matt finishes are often used for this.

National and Local Policy Guidance

- 8.4** The PPS 22 Companion Guide advises that flicker effects have been proven to occur only within ten rotor diameters of a turbine. Within this distance, the duration shadow flicker effects are likely to be very limited: 'A single window in a single building is likely to be affected for a few minutes at certain times of the day during short periods of the year'. There are no set thresholds for the acceptability of shadow flicker in the UK, but guidelines adopted by the Irish Government recommend that shadow flicker at dwellings and offices within 500m of a turbine should not exceed 30 hours per year or 30 minutes per day.
- 8.5** The 'Onshore Wind Energy Planning Conditions Guidance Note' (BERR) states that shadow flicker can be mitigated by siting turbines at sufficient distances from residences likely to be affected (the 10 rotor diameter distance suggested in PPS22); using tree planting and fitting window blinds; and using technology to stop turbines during episodes of shadow flicker.

Guidance from Appeal Decisions

- 8.6** An Appeal Decision relating to a proposal in Cumbria for 6 turbines up to 100m tall (APP/M0933/A/08/2090274) found that shadow flicker could potentially affect two dwellings for up to 25 hours per year. It was noted that:

"In practice the likelihood of shadow flicker occurring will be reduced by meteorological conditions and intervening structures. Whilst shadow flicker can be a source of nuisance, its effects are relatively easy to mitigate, not least by shutting down the relevant turbines during periods when it could occur...[S]hadow flicker is a matter which can appropriately be addressed by a condition which requires a protocol to be in place prior to the operation of the wind turbines" (para 72).

- 8.7** This appears to be a common approach in the majority of appeal decisions reviewed. In one appeal, relating to a proposal for 5 120m turbines in Dover (APP/X2220/A/08/2071880), the Inspector reviewed the effects of shadow flicker in much more detail and visited a sample of the properties with the potential to be affected (in that case 105 buildings within 820m distance), and found that for the most part shadow flicker effects would be avoided by a combination of distance, contours and building orientation. However, some dwellings fell within the 'ten rotor diameter' recommended in PPS22 and these dwellings would be adversely affected.

Other Examples

- 8.8** South Northants' draft SPD on Wind Turbines in the Open Countryside contains a section relating to shadow flicker and reflected light which states that proposals should ensure that shadow flicker does not affect residential properties. Shadow flicker may occur within ten times the rotor diameter of a turbine, so turbines should be located to avoid these locations.
- 8.9** Fenland District Council's Wind Turbine Development Policy Guidance sets out that proposals for wind turbines should ensure that shadow flicker does not affect any residential properties, A roads or B roads. Shadow flicker can affect properties within 130° either side of north and may occur within ten times the rotor diameter of a turbine, so turbines should be located to avoid these locations.

Conclusions

- 8.10** In conclusion, there is clear guidance that, to avoid shadow flicker, wind turbines should normally be located at a distance of at least 10 rotor diameters from dwellings. It has also been proven (PPS22) that within this 10 rotor diameter, shadow flicker will only occur in some conditions for some of the time and will only affect nearby properties within 130° either side of north. It is important however that the guidance discusses mitigation opportunities to ameliorate the effects of shadow flicker where they cannot be completely avoided.

Guidance within Cherwell District

To avoid shadow flicker, wind turbines should normally be located at a distance of at least 10 rotor diameters from dwellings.

Within this distance, investigations will be undertaken to identify any properties likely to be affected by shadow flicker. If there are found to be unacceptable shadow flicker impacts, mitigation measures should be taken including moving the position of the turbine, using technology to stop turbines during episodes of shadow flicker, or, as a last resort, using tree planting and fitting window blinds to ameliorate the effect.

Further Information

- 8.11** Please see Appendix 1 - 'Shadow Flicker'.

Chapter 9 Cumulative Impacts

What are the Issues?

- 9.1** Cumulative impact assessment requires the consideration of additional effects that may arise as a result of a wind turbine proposal in combinations with one or more existing or proposed schemes. This might include:
- Operational development
 - Developments under construction
 - Approved developments
 - Submitted applications
 - But not schemes at an earlier stage, for example where the local planning authority has been consulted on whether Environmental Impact Assessment would be required (a 'screening opinion'), or what issues the Assessment should consider (a 'scoping opinion').
- 9.2** Cumulative impact assessment is therefore somewhat speculative - the number of projects which will be built, and when, is uncertain (because the assessment can include 'submitted' - not approved - applications).
- 9.3** Cumulative assessment is focused on the potential relationship between different developments. The term 'cumulative impact' is often used to refer only to landscape and visual effects (hence there is a relationship between this section and Chapter 4), but there can be a wide range of other environmental, social and economic cumulative impacts.
- 9.4** 'Cumulative' does not necessarily mean a simple addition of the impacts of wind proposal A + wind proposal B. For example, wind proposal A may give rise to minor impacts on bird populations, well within the capacity of that bird population for regeneration and hence has little effect on the overall bird population level. The same would apply to wind proposal B, taken on its own. However, the level of bird mortality occasioned by proposals A and B taken together may exceed the capacity of the population for regeneration, in which case the bird population would go into decline. Whereas the impact of A and B, each on their own, is not discernible, the impact of A + B is to cause population collapse (Scottish Natural Heritage, 2005).
- 9.5** The definition of the 'cumulative impact' will vary according to the impact being considered. For example, when considering cumulative landscape and visual impacts, effects can be
- Combined (when multiple schemes are seen when looking in one direction)
 - Successive (when schemes are seen one after the other, such as when looking in an opposite direction)
 - Sequential (when schemes are seen one after the other when travelling through the landscape along roads or paths).
- 9.6** Key issues to consider will be:

Landscape

- Will wind farms become a significant or defining characteristic of the landscape?
- Will wind farms appear at odds with each other?

Visual

- Will the visible number of wind turbines increase?
- Will proposal lead to a feeling of being 'surrounded' by development?
- How will wind turbines or farms appear and relate to one another when seen together from viewpoints or routes?

9.7 Cumulative impacts will also result from the way in which different impacts of the same scheme interact with each other (planting to reduce noise or visual impacts may have positive or negative impacts on local wildlife depending on the species planted).

National and Local Policy Guidance

9.8 The document frequently referred to is the guidance on cumulative impact produced by Scottish Natural Heritage (see below). This explains how setting thresholds for the acceptability of cumulative impacts is likely to be simpler for infrastructure or road systems, where there are likely to be established upper limits for capacity which further development must not breach. Cumulative ecology assessment is best undertaken by appropriate agencies concerned with national populations (rather than a developer concerned with one proposal). Cumulative landscape assessment should be informed by an analysis of landscape sensitivity or capacity studies. It is unlikely that thresholds or capacities can be simply expressed in terms of turbine numbers or power output; they are more likely to be expressed in terms of acceptable limits of change.

9.9 **It is important to note that the consideration of cumulative impacts is a requirement of the Environmental Impact Assessment process, along with a consideration of the relevant alternatives.**

Guidance from Appeal Decisions

9.10 In an appeal decision relating to a proposal for 11 turbines up to 125m tall in Leicestershire (APP/F2415/A/09/2096369), the Inspector briefly discussed cumulative impact. He noted that two wind farms nearby were at application and scoping stages. Possible cumulative impacts were a material consideration, but the Inspector agreed with the cumulative impact assessment undertaken by the Appellant, which did not show that the proposed scheme would add undue harm to the local landscape nor to protected species and wildlife.

9.11 Cumulative landscape impacts were discussed in some detail in the appeal relating to a proposal for 6 turbines 100m tall in Cumbria (APP/M0933/A/08/2090274). Here, there were two existing wind farms 7km to the north and 25km to the south of the appeal site. The Inspector found that the gap between the schemes and the differences in land cover were sufficient to dispel an impression of a landscape dominated by wind farms. Nor, he found, would there be significant adverse cumulative effects in terms of serial (successive) and sequential views.

9.12 Shortly before the Cumbria application was determined by the Council, an application was submitted for 3 turbines 110m tall, 2km from the appeal site. The Inspector noted that this second scheme was not obviously going to be the 'preferred' scheme - the turbines were taller but smaller in number and so capable of generating less renewable energy. He found that it was not necessary to consider the cumulative impacts of both of the proposals together, since the application for the second scheme had not yet been determined. The cumulative impacts of the proposals should be considered at the Inquiry into the second scheme, when the full facts about the second scheme's impact were known.

- 9.13** Intervening distance and the degree of separation were considered to render cumulative impacts insignificant in an appeal relating to a proposal for 5 turbines 125m tall in Essex. (APP/P1560/A/08/2088548). Finally, the proliferation of single turbines and wind farms within a 60km radius of the appeal site in a proposal relating to 16 turbines in Cambridgeshire (APP/20530/A/05/1190473) was not considered to justify a conclusion that the additional turbines would be unacceptable on proliferation grounds.

Other Examples

- 9.14** Fenland District Council's SPD contains thresholds and criteria on cumulative visual impacts. It states that proposals for new wind turbine development, detached from existing sites by more than 500m but within 4km of existing turbine developments are unlikely to be acceptable in visual terms. There may be circumstances where it can be demonstrated that a distance greater than 500m is required. Proposals within 10km of existing turbine developments will need to be carefully considered.
- 9.15** Other SPDs are less quantitative but require careful judgements for each individual scheme to determine the acceptability of cumulative effects.

Conclusions

- 9.16** The cumulative assessment of proposals, whether the consideration of the combined impacts of numerous schemes, or the consideration of the interaction of impacts generated by a single scheme, is an important consideration in determining acceptability. It is considered that within the Cherwell district, the assessment of cumulative impacts should continue to be undertaken on a case by case basis.

Guidance within Cherwell District

Assessment of cumulative environmental, social and economic impacts will be undertaken on a case by case basis, founded on a well considered judgement of the information surrounding a proposal.

The Council will expect applicants to consider the cumulative impact of their proposal alongside any other approved, under construction, or operational schemes when they submit proposals.

Further Information

- 9.17** Please see Appendix 1 - 'Cumulative Impacts'.

Appendix 1 References

General

Planning Policy Statement 22: Renewable Energy, ODPM (2004), at <http://www.communities.gov.uk/publications/planningandbuilding/pps22>

Planning for Renewable Energy: A Companion Guide to PPS22, ODPM (2004), at <http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable>

'Renewable Energy and Sustainable Construction Study', CAG Consultants for Cherwell District Council (2009), at http://www.cherwell.gov.uk/media/pdf/l/i/Renewable_Energy_and_Sustainable_Construction_Study_%28September_2009%29.Pdf

Review of Renewable and Decentralised Energy Potential in South East England, Land Use Consultants and TV Energy (2010), at <http://www.se-partnershipboard.org.uk/page/5/view/175/sub/77/energy>

'Wind Energy Policy', Torrington District Council (2010), at <http://www.torrington.gov.uk/index.aspx?articleid=5050>

'Wind Power in the UK', Sustainable Development Commission (2005), at http://www.sd-commission.org.uk/file_download.php?target=/publications/downloads/Wind_Energy-NovRev2005.pdf

'Wind Turbine Development Policy Guidance', The Landscape Partnership for Fenland District Council (2009), at <http://www.fenland.gov.uk/ccm/content/development-policy/ldf/evidencedocs/wind-turbine-study/wind-turbine-development-policy-guidance.en>

'Wind Turbines in the Open Countryside' (Draft), South Northamptonshire District Council (2010), at http://www.southnorthants.gov.uk/documents/Draft_Wind_Turbines_SPD_%28May_2010%29.pdf

'Wind Turbine Study', The Landscape Partnership for Fenland District Council (2008), at <http://www.fenland.gov.uk/ccm/content/development-policy/ldf/evidencedocs/wind-turbine-study/wtsd.en>

Landscape and Visual Impacts

'Cherwell Landscape Character and Sensitivity Assessment', Halcrow for Cherwell District Council (2009), at <http://www.cherwell.gov.uk/index.cfm?articleid=3244>

'Designing Windfarms in the Landscape', Scottish Natural Heritage (2008), at <http://www.snh.gov.uk/docs/A337202.pdf>

'Guidelines for Landscape and Visual Impact Assessment', Landscape Institute and IEMA (2002)

'Landscape Character Assessment: Guidance for England and Scotland', Countryside Agency and SNH (2004), at <http://www.landscapecharacter.org.uk/lca/guidance>

'Landscape Institute Advice Note 01/04', as amended, Landscape Institute (2008)

'Making Space for Renewable Energy', Natural England (2010), at <http://naturalengland.etraderstores.com/NaturalEnglandShop/NE254>

'Oxfordshire Wildlife and Landscape Study', at

<http://owls.oxfordshire.gov.uk/wps/wcm/connect/occ/OWLS/Home/>

'Visual Representation of Windfarms: Good Practice Guidance', SNH (2006), at <http://www.snh.org.uk/pdfs/publications/heritagemanagement/Visual%20Representation%20of%20windfarms%20-%20excerpt.pdf>

'Bats and Onshore Wind Turbines', Technical Information Note TIN051, Natural England (2009), at <http://www.snh.gov.uk/docs/C245244.Pdf>

'Bats and Single Large Wind Turbines', Joint Agencies Interim Guidance TIN059, Natural England (2009), at <http://naturalengland.etraderstores.com/NaturalEnglandShop/TIN059>

'Bird Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities', Scottish Natural Heritage (2005), at <http://www.snh.gov.uk/docs/A305435.pdf>

'Guidelines for the Consideration of Bats in Wind Farm Projects', EUROBATS (2008), at http://www.eurobats.org/publications/publication%20series/pubseries_no3_english.pdf

'Making Space for Renewable Energy', Natural England (2010), at <http://naturalengland.etraderstores.com/NaturalEnglandShop/NE254>

'Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action', Scottish Natural Heritage (2000), at <http://www.snh.gov.uk/docs/C205425.pdf>

'Wind Farm Development and Nature Conservation', English Nature, RSPB, WWF-UK, BWEA (2001), at <http://www.bwea.com/pdf/wfd.pdf>

'Public Rights of Way' section on Oxfordshire County Council's website at www.oxfordshire.gov.uk

'Wind Farms: Advisory Note 20', British Horse Society (2010)

'CAP 168: Licensing of Aerodromes', Civil Aviation Authority (2010), at <http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=232>

'CAP 670: Air Traffic Services Safety Requirements' (2010), at <http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=200>

'CAP 764: CAA Policy and Guidelines on Wind Turbines', Civil Aviation Authority (2010), at <http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=2358>

'Wind Energy and Aviation Interests: Interim Guidelines', Wind Energy, Defence & Civil Aviation Interests Working Group (2002), at <http://www.caa.co.uk/default.aspx?catid=7&pagetype=90&pageid=1209>

'Wind Farm Assessment Tool', BBC & OFCOM, at http://www.bbc.co.uk/reception/info/windfarm_tool.shtml

'Windfarms and Wireless Services: Coordination and Guidance', OFCOM, at <http://licensing.ofcom.org.uk/radiocommunication-licences/fixed-terrestrial-links/guidance-for-licensees/wind-farms/>

Noise

'Noise Radiation from Wind Turbines Installed Near Homes: Effects on Health', Frey and Haddon (2006)

Planning Policy Guidance 24: Planning and Noise, ODPM (1994), at <http://www.communities.gov.uk/publications/planningandbuilding/ppg24>

'The Assessment and Rating of Noise from Windfarms', ETSU (1997) at <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/energy/sources/renewables/explained/wind/onshore-offshore/page21743.html>

Heritage

Planning Policy Statement 5: Planning for the Historic Environment', CLG (2010) at <http://www.communities.gov.uk/documents/planningandbuilding/pdf/1514132.pdf>

'Scottish Planning Advice Note 45 (Renewable Energy Technologies)', Scottish Executive Development Department (2007), at <http://www.scotland.gov.uk/Resource/Doc/171491/0047957.pdf>

'Supplementary Planning Guidance on Wind Energy', South Holland District Council (2004) at <http://www.sholland.gov.uk/environment/plandev/localplan/Supplementary+Planning+Documents.htm>

'Wind Energy and the Historic Environment', English Heritage (2005), at [http://www.helm.org.uk/upload/pdf/Wind_Energy_\(final\).Pdf](http://www.helm.org.uk/upload/pdf/Wind_Energy_(final).Pdf)

Safety

'Planning Applications for Wind Turbines Sited Close to Trunk Roads', Highways Agency (2009) at http://www.highways.gov.uk/business/documents/Wind_Turbines_SP_12-09.Pdf

'Wind Turbines: Design Requirements', BS EN 61400-1:2005, British Standards Institution (2005), at <http://shop.bsigroup.com/ProductDetail/?pid=00000000030095699>

Shadow Flicker

'Onshore Wind Energy Planning Conditions Guidance Note', Renewables Advisory Board and BERR (2007), at <http://www.berr.gov.uk/files/file35240.pdf>

'Onshore Wind: Shadow Flicker', BIS, at <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html>

Cumulative Impact

'A Guide to Assessing the Cumulative Effects of Wind Energy Development', Volume 1, ETSU for DTI (2000), at <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file17844.pdf>

'Cumulative Effects of Windfarms', Scottish Natural Heritage (2005), at <http://www.snh.org.uk/pdfs/strategy/cumulativeeffectsonwindfarms.pdf>

'Review of Guidance on the Assessment of Cumulative Impacts on Onshore Windfarms' Phase 1 Report, Entec (2008), at http://www.entecuk.com/downloads/windfarm_cumulative_impacts_report.pdf

