CUMBRIA WIND ENERGY SUPPLEMENTARY PLANNING DOCUMENT

CONSULTATION DRAFT

August 2006

Allerdale borough council www.allerdale.gov.uk

CARLISLE CITY COUNCIL www.carlisle.gov.uk

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Cumbria County Council

Eden District Council

Lake District National Park Authority

SOUTH LAKELAND DISTRICT COUNCIL

Contents

This Supplementary Planning Document has been prepared by jointly by

Cumbria County Council
Allerdale Borough Council
Carlisle City Council
Copeland Borough Council
Eden District Council
Lake District National Park Authority
South Lakeland District Council

It supports 'saved' Local Plan Policies produced by each local authority and the Joint Structure Plan 2006 and the emerging Local Development Frameworks being developed by each of the above local authorities.

Barrow Borough Council will consider adopting the Supplementary Planning Document following the development of the Core Strategy of the Local Development Framework.

The County Council acknowledges inputs on landscape capacity assessment, landscape and visual impact assessment, cumulative effects and design guidance from Coates Associates, Chartered Town Planners and Landscape Architects, Kendal

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EIGHT STEPS TO DEVELOPING A WIND ENERGY PROPOSAL

This guidance has been developed jointly by 7 of the 8 Cumbrian local planning authorities to support the implementation of policies in the Local Development Frameworks and provide consistent guidance for wind energy development across the County.

1 Understanding Cumbria

Past experience in Cumbria has shown landscape and visual impacts as the key issues for any scheme to address. This is set to continue as turbine sizes increase and renewable energy targets are developed for Cumbria.

Find out more in Part 1.
Applies to your scheme? See Part 3.

2 Understanding the Local Community and Stakeholders

Engaging with the local community and other stakeholders at the pre and post application stages can bring many benefits. Positive engagement and good quality information can result in the community understanding a scheme better, and potentially taking ownership of it. This could reduce the time spent considering a planning application and assist in identifying constraints and opportunities for a scheme.

Find out more in Part 1 Chapter 2.
Applies to your scheme? See Part 1 Chapter 2.

3 Understanding the Local Planning Authority

It is important to engage with local planning officers at an early stage. They can provide signposting to relevant policies and background information, contact with other officers and assist in interpreting guidance when developing a scheme. Pre application scoping meetings with officers, held very early on in the process, can help ensure that all relevant issues are considered by the EIA and can help with the iterative design process.

4 Understanding Landscape Capacity

It is important that future decisions are made against a robust assessment of the landscape capacity of Cumbria to accommodate wind energy development. A detailed landscape capacity assessment that specifically relates to wind energy development provides the foundation for future development and decisions. This is based on landscape character, sensitivity and value.

Find out more in Part 2.
Applies this to your scheme? See Part 2.

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5 Understanding Cumulative Effects

As wind energy continues to be the most common renewable energy technology put forward in Cumbria by developers, and Regional Spatial Strategy seeks to determine how much wind energy development should be accommodated in Cumbria, the issue of how many schemes and how close together they might be sited becomes more important. Any scheme will need to consider cumulative effects and demonstrate the potential impacts on landscape character, visual amenity, biodiversity, cultural heritage, aircraft and telecommunications and the local economy. Key guidance advice is highlighted in bold in Chapter 4.

Find out more in Part 1 Chapter 4.
Applies to your scheme? See Part 3.

6 Understanding Site Characteristics and Good Design

The landscape capacity assessment provides a broad indication of the scale and appropriateness of wind energy development. This needs to be applied to individual sites following a thorough assessment of the characteristics on and surrounding the site. If an appropriate site is selected, careful design can ensure a scheme relates well to its environs and can assist in mitigating adverse effects on all the issues highlighted in step 7. Key guidance advice is highlighted in bold in Chapter 5.

Find out more in Part 1 Chapter 5.
Applies to your scheme? See Part 1 Chapter 5.

7 Understanding other Effects

Landscape and visual effects are just one set of effects that a wind energy scheme can have. Although they are often the key consideration in Cumbria, decisions will only be made after careful consideration of a range of issues. These include biodiversity, cultural heritage, local amenity, local economy, aircraft and telecommunications and engaging with local communities.

Find out more in Part 1, Chapter 2 and 6.
Applies to your scheme? See Part 1 Chapter 6.

8 Understanding Environmental Impacts

A crucial tool to inform communities, councillors and professionals about potential effects of a wind energy development is the Environmental Statement. This should set out the findings and approach of the Environmental Impact Assessment. It is important to include stakeholders when scoping this report and to provide a clear and thorough analysis of any surveys/mitigation undertaken. It should cover the relevant impacts of those highlighted in Step 7. A landscape and visual impact assessment will form part of this and specific guidance on what is expected from a developer has been produced.

Find out more in Part 1, Chapter 6 and Part 3.
Applies to your scheme? See Part 1, 2 and 3.

PART 1

GUIDANCE ON PREPARING WIND ENERGY PROPOSALS

CUMBRIA WIND ENERGY SUPPLEMENTARY PLANNING DOCUMENT

CONSULTATION DRAFT

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PART 1 GUIDANCE ON PREPARING WIND ENERGY PROPOSALS

1 Introduction

Why the guidance is needed

1.1 The need to tackle climate change is firmly on Cumbria's and the Government's agenda. Key to this is the reduction of carbon dioxide (CO_2) and other green house gas emissions. If steps are not taken to do this, changes to the climate could affect rainfall patterns, raise temperatures, result in more frequent extreme weather events and cause sea level to rise. Action to tackle climate change includes:

- minimising the demand for energy
- increasing energy efficiency
- developing cleaner energy sources

1.2 Cleaner energy sources can be secured through renewable energy technology and through cleaner fossil and other fuels. Targets are being set to help reduce CO_2 emissions and the need to support renewable energy sources in Cumbria is set out in national and regional planning guidance and reflected in County policy. As wind energy continues to be the most common renewable energy option for developers it is important to have clear up to date policies and advice to guide such development in the future and support the need to tackle climate change.

1.3 This Guidance aims to provide advice to support policies in the Local Development Frameworks, and replaces previous supplementary planning guidance for wind energy issued in 1997.

1.4 The guidance is divided into three parts.

- Part 1 – guidance on addressing landscape, visual and other environmental and social effects when preparing wind energy proposals.
- Part 2 – contains the landscape capacity assessment.
- Part 3 – guidance on landscape and visual impact assessments.

1.5 The Guidance focuses mainly on landscape and visual impact issues because these continue to be important in all parts of the County, are often the most controversial aspects of any wind energy proposal, and can be difficult to mitigate. The Guidance covers landscapes in rural and urban areas. Key guidance is highlighted in bold in Chapter 4 and 5 for design and cumulative effects.

1.6 When preparing wind energy proposals a range of other environmental, social and economic impacts need to be taken into account, such as noise and damage to wildlife. This is reflected in current policy. Any developer is expected to address such impacts when preparing a scheme. This guidance does not seek to provide detailed advice on all of these issues, but provides some guidance along with signposting to other more detailed guidance in chapter 2 and 6.

1.7 This Guidance supports the implementation of a range of policies. It sets out a consistent approach to be applied across the County to assist developers in preparing wind energy developments. It also provides broad locational guidance. It does this primarily by reference to the assessment of the character of Cumbria's landscape (outside the National Parks) contained in the Cumbria Landscape Classification.[1] The landscape character classification of the Lake District National

[1] Cumbria County Council 1995

Park will be carried out during 2007. The landscape capacity assessment in Part 2 may need to be amended as a result of this.

1.8 The Guidance applies to schemes of less than 50MW which are normally determined by Local Planning Authorities and schemes above 50MW which are determined by the DTI. This Guidance does not extend to offshore schemes which lie outside the areas of local authority planning control.

1.9 Micro-generation wind turbines, which are sited on buildings or within their proximity and provide energy to be used by that building, are likely to become more popular in the coming years. Cumbrian local planning authorities support the principle of micro-generation, and such proposals will be dealt with on their individual merits against relevant policies. The local planning authorities may provide further guidance on this in due course. This guidance does not apply to micro generation turbines but to turbines above 15m in height that provide energy either directly to an individual or a group of buildings or for the sole purpose of producing electricity to support the national grid.

Policy Guidance

National Policy Guidance

1.10 The primary source of national guidance is set out in Planning Policy Statement 22: Renewable Energy (PPS22), 2004. The guidance advises that policies in regional spatial strategies and local development documents should only focus on key criteria that will be used to judge applications. More detailed issues may be appropriate to include in supplementary planning documents. This Guidance reflects this and should be read in conjunction with PPS22.

Regional Spatial Strategy

1.11 The Regional Spatial Strategy (RSS) for the North West of England contains guidance and targets for renewable energy. Although at a draft stage the RSS is suggesting that by 2015 onshore wind energy developments in Cumbria should provide around 256MW of electricity. Operational and consented schemes currently provide 71 MW of installed capacity.[2] The RSS target will be subject to public examination in winter 2006/07 and may change. However, the Government's recent Energy Review has confirmed the importance of wind energy in achieving renewable energy targets.

Cumbria and Lake District Joint Structure Plan

1.12 The Joint Structure Plan (JSP) is broadly supportive of the increasing use of renewable energy and the need to encourage greater energy efficiency and conservation. Renewable energy projects ranging from large scale commercial developments through to domestic or community projects each have their own locational characteristics and requirements. The Plan recognises that the development of wind energy within the County has been the most emotive given the visual impact and the influence it has on the character of important landscapes and their settings. Renewable energy developments in general are addressed by Policies R44, for developments outside the Lake District National Park (LDNP) and Areas of Outstanding Natural Beauty (AONBs), and R45 for developments within the National Park and AONBs.

1.13 Under Policy R44, renewable energy developments will be favourably considered if

[2] April 2006.

a number of requirements are met. These relate to the effect on landscape character, biodiversity and the natural and built heritage; the effect on local amenity, economy and highways, aircraft operations and telecommunications; and that the proposals take all practical steps to reduce any adverse impacts. It also requires for the environmental, economic, social and energy benefits to be given significant weight and for measures to show how a proposal will be dealt with once operation ceases.

1.14 Under Policy R45, developments within the LDNP or AONBs have to show that their scale, form, design, materials and cumulative impacts can be satisfactorily assimilated into the landscape or built environment and wouldn't harm their appearance. They must also be shown not to impact on the local community, economy, nature conservation or historic interests. In these areas wind schemes requiring more than one turbine or a turbine with a ground to hub height of 25 metres or more is unlikely to be acceptable.

1.15 A technical study[3] was undertaken in 2003 to identify the potential for further grid connected renewable energy development in Cumbria. This took into account economic, social and environmental factors as well as technical and viability considerations. The study identified broad 'Areas of Search' for renewable energy developments in the County (including wind) and assessed broad capacities for the development of this technology. This Guidance takes into account its findings but moves away from broad Areas of Search, and is instead based on the findings of a detailed landscape capacity assessment. This is contained in Part 2.

Local Plans and Local Development Frameworks.

1.16 This Guidance should be read in conjunction with adopted policies of the appropriate local authority and emerging policies supporting the Local Development Frameworks.

Cumbria's Context

Wind Resource

1.17 The wind resource in Cumbria is greatest on west facing upland sites and along the coast. Map 1 shows estimated mean wind speeds in metres per second for values over 6.5metres/second.[4] This provides a generalised indication of Cumbria's wind resource. It does not take into account that wind energy developments are now being built in areas of lower wind speeds or the technical, environmental or cultural constraints that may affect land. Neither does it provide a basis for individual development decisions.

The Nature of Schemes and Experience in Cumbria

1.18 In recent years a significant increase in the size and proportion of individual wind turbines has prompted a re-evaluation of the criteria under which the landscape and visual impact of schemes is assessed. Trends in turbine design are summarised in Table 1 below. This shows the ranges of heights to the hub/nacelle level, the overall diameter of blades, the overall height to blade tip and the spacing between turbines for typical schemes proposed between 1991 and 2004. Clearly the larger the turbines, the more electricity they can produce. While earlier turbines had an installed capacity of 400-600 kW, a single turbine today has a capacity in the range of 1.3 – 2.5 MW. Based on past trends these figures are expected to continue to increase. For a given output, fewer turbines are needed than in past schemes.

[3] Technical paper No 6: Planning and Renewable Energy Development in Cumbria by AXIS, CCC and LDNPA, 2003.
[4] ETSU Energy Technology Support Unit

However, as the size of turbines and electricity output increase, so does the amount of space needed between each turbine. Although fewer turbines may be needed to produce a given amount of electricity, the amount of land they take up and their visual dominance may not reduce proportionately.

Table 1 Trends in Turbine Design

Dimensions (m)	1991-93	1994-99	2000-04
Height to Hub	25	40-45	60-70
Diameter of Blades	24-33	37-47	62-94
Overall height	37-41.5	58.5-68.5	91-117
Spacing[5]	72 – 132	111 – 470	186 - 940

1.19 Some 32 applications for non-domestic wind turbine developments have been considered by Cumbrian planning authorities since 1991 and a further 3 are under consideration (June 2006). There have also been smaller numbers of applications for domestic scale turbines, usually based on individual properties. The main distribution of non-domestic wind energy developments is shown in Map 2. This shows developments that have planning permission and are operational as well as others that either have not yet been through the planning process or have been refused or dismissed at appeal. Unsurprisingly the map shows a marked clustering of schemes in areas where there is the highest wind resource i.e. along the coast of West Cumbria, along the northern fringes of the Lake District National Park, in the Furness area and in the uplands to the north and east of Kendal.

1.20 Developments can be found in exposed upland and coastal locations, but more recently development opportunities are being found in less exposed inland locations and, for single or twin turbine developments, within the grounds of existing industrial sites. Cumbria has also seen a trend towards the extension of existing schemes and development either directly adjacent to existing sites or in very close proximity.

Landscape Designation Boundary Review

1.21 The Countryside Agency is currently working towards designating extensions to the Lake District and Yorkshire Dales National Parks. This work follows agreement in 2005 by the Agency on broad areas adjacent to the Lake District and Yorkshire Dales National Parks, Arnside & Silverdale and the North Pennine Areas of Outstanding Natural Beauty that meet the statutory criteria for designation. This decision was informed by a report by Alison Farmer Associates[6]. It will be some years before the designation process is complete and any such extensions designated. It is not considered appropriate for this guidance to pre-empt this process, and the landscape capacity assessment has been carried out to reflect existing designation boundaries only.

1.22 It is acknowledged that designation of new land areas as National Park or Area of Outstanding Natural Beauty would impact on the guidance and the landscape capacity assessment. If any further areas are so designated the impact of any proposals coming forward in these areas would have a greater significance due to the national recognition of their value for natural beauty and also in the case of

[5] Taken from PPS 22 companion guide – spacing 3-10 times the blade diameter.
[6] Recommended areas of search for land worthy of national landscape designation in the North West Region, Alison Farmer Associates 2005.

National Parks open air recreation opportunities, especially if the designated qualities are sensitive to wind energy development. The relevant planning policies will apply to any new or extensions to the nationally recognised landscape designations. In accordance with current Structure Plan policy R45, it is unlikely that development above a single turbine with a hub height of up to 25m will be acceptable in such areas.

1.23 Developers' attention is drawn to the fact that until the current boundary review being undertaken by the Countryside Agency (Natural England with effect from 2 October 2006) is completed, careful attention should be paid to the impact of any wind energy proposals coming forward in the areas agreed by the Countryside Agency as worthy of designation in terms of natural beauty and also for those areas worthy of inclusion in a national park in terms of enjoyment of open air recreation opportunities.

1.24 Developers should also bear in mind the decision in the Whinash windfarm enquiry which confirmed that the impact of the proposed development on the landscape and its amenity is a major consideration, irrespective of whether a particular area of land is eventually included in a designation.

2 Guidelines for Community Support

Engaging with communities

2.1 The benefits of renewable energy through the provision of wind turbines and the associated reduction in CO_2 emissions are shared by everyone in England. However, it is local communities that are directly affected by them.

2.2 Wind energy developments can have a range of effects on nearby communities, both actual and perceived. Landscape and visual effects, although often subjective, are the main issues that have become universal across England when considering community impacts. However, other issues including noise, shadow flicker, reduction in house value, loss of amenity and impacts on tourism all cause concern to local communities.

2.3 It is important that developers engage with local communities early on, and throughout, the development process. Gaining an insight into local concerns early on in the process can help with planning the overall scheme and mitigation against any negative impacts.

2.4 Developers are expected to carry out positive engagement with community stakeholders early on in the process, both before a planning application is prepared and after it has been submitted to the local council for consideration. However, it is also helpful to continue liaison with the local community during the construction and operational stages too.

2.5 Consideration should be given to the ways in which engagement is carried out. Often communities feel they have no ownership of the development of a scheme if they are presented with the scheme at an exhibition or meeting. Recent studies have also suggested that lack of information or awareness on renewable energy can result in people feeling unable to give positive support[7].

2.6 Community stakeholders could be involved in identifying constraints and opportunities such as landscape character, biodiversity enhancement, links to local schools and colleges, and possibly even community benefits that could result from a scheme. Information and examples showing how community concerns have been

[7] Community Benefits from Wind Power, Centre for Sustainable Development et al, 2005.

successfully dealt with elsewhere should be used. A package of exhibitions, newsletters, briefing packs and public meetings could be adopted. Community Liaison Groups could be set up with a representative sample of local stakeholders to discuss issues at the pre and post application stages. A dedicated person could be identified to carry out community liaison.

2.7 Organisations and people to include in pre and post application engagement could include:

- landowners
- local residents, businesses, schools, residents groups
- local and Parish councils
- other organisations that may be affected, eg MoD
- local media (as they are often the mechanism that the local community receive information from)
- local action group (particularly in areas subject to previous wind energy interest/applications)
- local Friends of the Earth groups could also assist in disseminating information to the local community.

2.8 More detailed advice can be found in the following resources:

- Summary of recent research on public attitudes to wind development, Section 9, Wind Power in the UK, SDC 2005.
- Guidance on running consultation events can be found at the Environment Council http://www.the-environment-council.org.uk/ or other similar organisations.
- Guidance on running Planning for Real or other community events can be found at the Community Development Foundation http://www.cdf.org.uk/

Benefits for communities

2.9 When developing a wind energy scheme, developers when engaging with the community should explore the potential for community benefits. Although this is not a material planning consideration, developers in Cumbria are encouraged to work more closely with local communities to ensure wind energy schemes enhance, and don't harm community interests. Work has recently been carried out by the Centre for Sustainable Development on this issue on behalf of the DTI.

2.10 Elsewhere in Europe, particularly Germany, Denmark and Spain, the provision of significant local benefits is built into the heart of wind energy developments. This may include community compensation, local taxes, creation of jobs and opportunities for local ownership. In the UK several developers have worked with the local community to provide them with voluntary contributions, often in the form of a community fund. Such contributions have been in the region of £700 - 1000 per MW installed per year of operation. The exact model followed and how the fund could be used for has varied across the UK. Developers could consider supporting the local community when engaging with community stakeholders and developing a proposal, including opportunities for local cooperatives to purchase turbines as part of the development. This concept was pioneered in Cumbria and experience should be taken from the Baywind scheme and its investment model. In addition financial contributions could support a range of other benefits, such as:

- site conservation and habitat creation
- improved footpath access
- job creation for site management/consideration initiatives
- educational visits to local schools/colleges
- grant funding for energy efficiency schemes

2.11 Although the current planning system does not support such community benefits as material planning considerations and the provision of community benefits is still voluntary it may help obtain community acceptance of a scheme, and reduce delays in the planning process due to community objections. In England community funds can be secured through a non planning legal agreement with a community group/trust. However, land management for biodiversity is a material planning consideration and could be agreed through a S106 agreement.

2.12 More detailed advice can be found in the following resources:

- Community benefits from wind power. A study of UK practice and comparison with leading European Countries, DTI 2005.
- Baywind Energy Cooperative www.baywind.org.uk.

3 Cumbria's Landscape Character and Capacity

Aims of the Landscape Capacity Assessment

3.1 A landscape capacity assessment has been carried out for each of the main landscape types in Cumbria. This considered the specific landscape characteristics that are sensitive to wind energy development along with their value. This enabled the potential capacity for each character type to be determined. The landscape capacity assessment is set out in Part 2, and it:

- indicates the relative capacity of the County's landscapes to accommodate wind energy development, and
- defines the landscape criteria used to judge capacity.

3.2 This guidance aims to help developers when carrying out initial investigations to determine the possible capacity of a site to accommodate wind energy development. It intends to take a proactive approach to development, guiding it to the most appropriate locations and ensuring that the key characteristics and quality of Cumbria's landscapes are safeguarded.

3.3 However, it only provides an indication of the relative capacity of different landscapes. It should not be used in a definitive sense, ie to mean that a particular proposal is acceptable on any given site. Every site is unique, and any proposal involving wind turbines must be accompanied by an Environmental Impact Assessment that includes a detailed landscape and visual impact assessment following to the guidance set out in Part 3. Proposals will also need to address cumulative and other environmental effects which are dealt with in chapter 4 and 6.

Landscape Character

3.4 The capacity guidance builds upon earlier landscape character assessment work undertaken by the County Council. The Cumbria Landscape Classification[8] (CLC) identified 13 main landscape types ranging from Estuary and Marsh to Fells and

[8] Cumbria Landscape Classification, Cumbria County Council 1995

Scarps. Whilst townscape character was not specifically assessed urban fringe sub-types were included and the main urban areas differentiated. For the purposes of this guidance it is necessary to consider Urban Areas and Fringes as a separate landscape type because of their unique urban characteristics and key sensitivities in relation to wind energy development. Consequently the landscape capacity assessment considered 14 landscape types. These are set out in Map 3.

3.5 To date landscape character assessment and classification has not been undertaken in the Lake District National Park. This will take place during 2007 and the landscape capacity assessment in Part 2 may need to be amended as a result of this. As the Structure Plan does not cover the Yorkshire Dales National Park, the area of Cumbria within the Yorkshire Dales National Park is not covered by this guidance.

Summary of methodology

3.6 The methodology for the Landscape Capacity Assessment is set out in detail in Part 2. It adopts a 'character approach' to managing the potential change brought about by wind energy development in a way that respects or enhances landscape character. It builds on descriptions established in the CLC and has been informed by the nature of schemes coming forward in Cumbria, current best practice and guidance on landscape sensitivity and capacity. It highlights the characteristics of each landscape type that are sensitive to turbine development, considers any special values that might be affected and determines the landscape capacity.

Sensitivity and Value

3.7 Criteria for gauging the sensitivity of each landscape type and the relevant values attached to it were established. These are contained in Part 2 and should provide a tool for assessing specific proposals for wind energy development. The appropriate scale of wind turbine development has also been considered, primarily in relation to landscape scale and enclosure but also in relation to the size of settlements wherever these form a key characteristic of the landscape.

3.8 When considering sensitivity the following key characteristics were used:

- Scale and Enclosure
- Complexity and Order
- Manmade Influence
- Remoteness and Tranquillity
- Settlement and Key Views
- Visual Interruption
- Skyline
- Connections with Adjacent Landscapes

3.9 Appendix 1 of Part 2 provides further detail on these key characteristics and how they relate to landscape and visual sensitivity.

3.10 Once the relative sensitivity has been assessed, the value of the landscape types was considered. The key indicators of value are:

- Landscape designation
- Rarity
- Cultural Associations
- Designated elements or features
- Conservation Interests

3.11 It must be clearly recognised that a highly valued landscape, whether nationally designated or not, does not automatically, and by definition, have high sensitivity. It is entirely possible for a valued landscape to be relatively insensitive to wind energy development because of both the characteristics of the landscape itself and

the nature of the development. The vital consideration is whether the objectives of the designation and the qualities for which the area has been designated are likely to be compromised by the change brought about by wind energy development[9].

Scale of development

3.12 The potential capacity has been assessed in relation to six scales of development[10]. These are:

- Single or twin turbines
- Small group (linear or cluster arrangement of 3-5 turbines)
- Large group (linear or cluster arrangement of 6-9 turbines)
- Small wind farm (10-15 turbines)
- Medium wind farm (16-25 turbines)
- Large wind farm (25+ turbines)

3.13 This range reflects both the nature of schemes currently coming forward and an appreciation of the scale of the receiving landscape in Cumbria. Although small and large groups are referred to above they are considered to be wind farms for the purpose of interpreting PPS22 and its Companion Guide, and regional and local policy documents.

3.14 Turbine heights of 95 – 120m (to blade tip) have been assumed which are typical of the current generation of turbines. However this assumption should not preclude the possibility of using smaller turbines in order to ensure that they are in scale and proportion with the effected landscape. Turbines in the larger range might not be appropriate due to their scale.

Summary of Potential Capacity for Cumbria

3.15 The overall capacity, determined by considering the sensitivity and value attached to each landscape type, is expressed on a five point scale on the following basis:

High	Low landscape sensitivity and landscape or key characteristics of low value. Indicates opportunity to accommodate wind energy development at an appropriate scale without significant landscape impact.
Moderate/High	
Moderate	
Moderate/Low	
Low	High landscape sensitivity and landscape or key characteristics of high value likely to be compromised. Indicates that any type of wind energy development would be likely to have a significant landscape impact and would not generally be appropriate.

3.16 A summary of the capacity of each of the County's landscape types to accommodate wind energy development is provided in Table 2 and illustrated in Map 4. An indication of the appropriate scale of development is also provided in

[9] Planning Policy Statement 7: Sustainable Development in Rural Areas, OPDM 2004
PPS22: Renewable Energy

[10] It should be noted that the guidance does not address small domestic installations ie less than 15m in height

the table.

3.17 The summary information in Table 2 and Map 4 should not be used in isolation. They must be read in conjunction with the sensitivity and value assessment sheets and capacity statements in Part 2.

Table 2 Summary of Cumbria's Landscape Capacity Findings

Landscape Type	Landscape Capacity	Appropriate Scale of Development
1: Estuary and Marsh	Low	All scales generally inappropriate
2: Coastal Margins	Low/moderate	Up to a small group, exceptionally a large group in most extensive parts and where unconstrained by settlement
3: Coastal Limestone	Low	All scales generally inappropriate
4: Coastal Sandstone	Low/moderate	Up to a small group beyond St Bees Head Heritage Coast
5: Lowland	Moderate	Up to a small group, exceptionally a large group
6: Intermediate Land	Moderate	Up to a small group, exceptionally a large group
7: Drumlins	Low/moderate	Single turbines or a small group
8: Main valleys	Low/moderate	Up to a small group, exceptionally a large group, in broader valleys
9: Intermediate Moorland and Plateau	Moderate/high	Up to a large group, exceptionally up to a medium wind farm on a broad moorland plateau
10: Sandstone Ridge	Moderate	Up to a small group, exceptionally a large group
11: Upland fringes	Low/moderate	Up to a small group, exceptionally a large group on broader topographic sweeps
12: Higher Limestone	Low/moderate	Up to a small group, exceptionally a large group, in blander parts
13: Fells and Scarps	Low	All scales generally inappropriate
14: Urban Areas and Fringes	Moderate	Up to a small group, exceptionally a large group in coastal contexts

3.18 Table 2 refers only to the potential of the landscape to accommodate a single wind energy development of a certain scale. It is particularly important to read the advice on cumulative development in Chapter 4. Developers need to consider whether there are any cumulative effects and if so, to assess these in accordance with the guidance set out in Part 3 and determine if the proposal is acceptable. The scale of development suggests that in exceptional circumstances the landscape characteristics of an area might support a larger development. Any proposal would need to demonstrate this through its Landscape and Visual Impact Assessment.

3.19 Due to the height of current turbines and their wide ranging visual influence any proposal will normally affect the landscape type where it is located and also neighbouring types. Due to the interwoven nature of Cumbria's landscape, the capacity of neighbouring landscape types (within 12 km of a site) should also be considered by developers, and will be taken into account by the Local Planning Authorities in assessing specific proposals.

3.20 In Cumbria the Lake District National Park, the Arnside and Silverdale, North Pennines and Solway Coast Areas of Outstanding Natural Beauty account for the County's national landscape designations. The Yorkshire Dales National Park and Forest of Bowland AONB, situated in North Yorkshire and Lancashire, are national landscape designations that might also be affected by proposals in Cumbria.

3.21 In Cumbria, within the boundary of the National Park and AONBs, as set out in Policy R45 of the Cumbria and Lake District Joint Structure Plan 2001 – 2016, it is likely that wind energy development will be restricted to single turbines of less than 25m to hub height. Anything larger is likely to be unacceptable in landscape character terms. However, proposals of a larger size may be considered, where appropriate, against other Structure Plan policies (for example Policy ST4) and must demonstrate that there would be no harm to the intrinsic character of the designation. This is defined in detail in the Landscape Character Assessments published for each of the designations. Although the assessment indicates that there may be some low/moderate and moderate capacity in areas that form part of the national landscape designations, when detailed landscape and visual impact assessments are carried out for such areas their landscape characteristics, relationship and proximity to neighbouring low capacity areas needs to be taken into account. It is unlikely that wind energy development of a scale above that set out in Policy R45 will be acceptable in such areas.

3.22 The visual settings of the national landscape designations also need to be taken into account. The potential harm from any proposal coming forward is likely to have a greater significance to both designated areas and their settings. Any proposal must pay particular attention to the reason the landscape was designated and the qualities that they are now valued for – the settings to such areas are often highly valued by local communities and visitors alike. The scale, form, design and cumulative impacts need to be assimilated into the landscape to accord with Policy R45 of the Structure Plan. If it is considered that harm would be caused to the settings it is unlikely that a scheme will be acceptable in accordance with Policy E34 of the Structure Plan. This must be demonstrated through the landscape and visual impact assessment on a site by site basis.

3.23 As a landscape capacity assessment has not yet been carried out for the LDNP, the information contained in Table 3 provides an indicative capacity where the same landscape type is identified.

4 Guidelines for Cumulative Effects

The importance of cumulative effects

4.1 Cumulative effect is a complex issue which will be increasingly relevant to the assessment of wind energy schemes. As there are already a number of wind energy developments across Cumbria, it is likely that increasing significance will be attached to cumulative effects in the future.

4.2 Although the geographic distribution of schemes in Cumbria is becoming more widespread (see Map 2), the focus of more and larger developments towards areas that have the best wind resource and the fewest technical constraints continues particularly across the Solway Basin/ West Cumbria and in Furness. Recent trends suggest that pressure will increase in the Lune and Eden Valleys and around the Lake District National Park boundary. Since the previous guidance the combined effects of coastal onshore schemes with offshore schemes has also become a consideration in coastal areas.

4.3 Cumulative impacts may present an eventual limit to the extent of wind energy development in particular areas. PPS 22 firmly states the need to take account of

cumulative impacts and it notes that: "*Such impacts should be assessed at the planning application stage and authorities should not set arbitrary limits in local development documents on the number of turbines that will be acceptable in particular locations*". However, unacceptable cumulative effect may on its own provide sufficient justification to oppose a scheme which was otherwise acceptable.

4.4 The consideration of cumulative effects can only be undertaken on a case by case basis in the light of existing baseline conditions, accurate descriptions and visualisations of effects on key receptors, and relationships with other developments. These are impossible to predict at a broader level. This Guidance does not stipulate separation distances or the number of schemes that might be accommodated in the County. However, when considering cumulative capacity the Countryside Agency suggests an indicative separation distance in the order of 12km and advises that related infrastructure, such as grid connection, on countryside character must also be considered[11]. Experience in Cumbria suggests that where small group schemes are considered appropriate this distance might be reduced to a minimum of 6km. At this distance schemes could remain as separate, single cohesive entities with a buffer of open space around them and problems of over dominance and compatibility might generally be avoided. However, the appropriate separation distance is likely to increase with both the size of development and scale of the landscape.

What are Cumulative Effects?

4.5 Cumulative effect may occur as a result of more than one scheme being constructed and is the combined effect of all the developments, taken together. This may be in terms of their effect on landscape and visual amenity but also on bird populations and other wildlife, the local economy, tourism or any other matter. This chapter provides specific advice on landscape and visual impact only. Other issues are dealt with in Chapter 6.

4.6 Scottish Natural Heritage has developed considerable experience in dealing with the cumulative effects of wind energy development and has published guidance dealing with this issue[12]. An earlier version of this informed the Companion Guide to PPS22[13] and it is considered appropriate to draw on definitions from both of these sources. The following summary should influence any cumulative impact assessment carried out by developers.

4.7 Cumulative landscape effects concern the degree to which wind energy development change the:

- Physical Fabric of the landscape when two or more schemes affect the extent, condition or integrity of existing landscape components such as woodland, heather moorland or hedgerows (where gains secured through enhancement measures or losses incurred by removal or physical damage).

- Landscape Character through the introduction of schemes as a new recurring element or feature in the landscape.

4.8 The degree of landscape change will depend on the net loss or gain to the physical fabric of the landscape and whether the wind energy development read as an isolated feature, a key characteristic in the landscape or a dominant characteristic by which the landscape may be defined ie they create a different character type in a similar way to large scale afforestation.

[11] Annex 3.Renewable Energy Developments: The Role of the Countryside Agency. AP 99/50
[12] Scottish Natural Heritage Guidance: Cumulative Effect of Windfarms, Version 2 revised 13.04.05
[13] Planning for Renewable Energy: A Companion Guide to PPS22, ODPM 2004

4.9 Cumulative effects on visual amenity are concerned with the degree to which wind energy developments become a feature in particular views and the effect this has on the people experiencing those views. They can occur as:

- Combined visibility where the observer is able to see two or more developments from the same viewpoint either in combination (simultaneous visibility) where several schemes are within the observer's arc of vision at the same time or in succession (repetitive visibility) where the observer has to turn to see the various schemes.
- Sequential visibility where the observer has to move to another viewpoint to see different developments say on a journey along a major road, long distance trail or cycle route. This type of cumulative effect may impact across a broad tract of landscape and not just within a particular locale.

4.10 The degree of visual change will depend on changes to the composition of the view brought about by the introduction of multiple wind energy developments. This will not only reflect the density, proximity and proportion of view occupied by developments but also their apparent prominence as determined by a number of modifying factors. These include the relative contrast or integration of each development reflecting the sensitivity of the affected landscape character and the siting and design of each scheme. Other factors relate to compositional structure for example skylining, relative elevation, framing and partial visibility. The dynamics of the view are also relevant, that is the physical nature, duration and frequency of combined and sequential views eg oblique, filtered or direct; glimpses or more prolonged views; frequent with short time lapses between views or occasionally with long time lapses between views depending on either the speed of travel or the distance between viewpoints.

4.11 Multiple wind energy developments can appear as separate individual entities in the landscape or where a new proposal either extends or is adjacent to an operational or approved scheme, the cumulative effect will principally be that of enlargement of the original scheme (ie where the distance between developments is less than the length of either scheme). Even if physically separated developments may be close enough (within approx. 6km) to appear as a single entity from some viewpoints. In both instances the combined visual effect is likely to be greater than the original scheme or for each development alone. Where developments appear together and overlap differences in design such as size, turbine height, layout and blade rotation speeds may also create a jarring effect and cumulative effects may be judged unacceptable on the basis of incompatibility in design (for further design guidance see Chapter 5).

4.12 Cumulative issues may also arise from the combined effects of turbines and other vertical structures such as pylons, telecom masts and transmitters in terms of the degree to which they dominate the landscape. Conflicts of form and function between verticals may also give rise to a compatibility issue. (see Table 3 Cumulative Sensitivity Criteria: Skyline)

4.13 As with any other type of environmental effect the significance of cumulative effects will be influenced by the sensitivity of the receptor. Significance is likely to be heightened if the landscape or visual receptor is sensitive by virtue of scarcity, special importance (eg designated landscapes, recognised viewpoints, popular trails, settings and 'gateways'), underlying trends (eg recovery from another type of development like opencast mining), geographical extent and the number of people affected. The nature of change will not necessarily be adverse and will depend on siting and design, whether developments complement and consistently relate to key characteristics, and varying landscape perceptions or expectations of viewers.

Cumbria's experience

4.14 Since the previous guidance in 1997 the number of sites with permission has increased from 8 to 21 outside the Lake District National Park, with 2 single small scale turbines located within the Lake District National Park. The prospect of cumulative effects with offshore schemes emerged with the Robin Rigg proposal in the Solway Firth in 2002 and continues with current licences being given to several locations around the Morecambe Bay, Walney and Duddon Estuary areas. The last three years has seen a marked increase in the number of applications and expressions of interest for onshore sites for wind energy development. Map 2 illustrates the geographical distribution of sites. In the past there has been a marked clustering of schemes in areas with the highest wind resource, however this may change in the future as technology enables schemes to be built in areas with lower wind speeds.

Solway Basin and West Cumbria

4.15 Across the Solway Basin and West Cumbria coastal belt considerable interest has focused on a sequence of landscape types from coastal margins and urban fringe through low rolling farmland to moorland and upland fringes. Cumulative issues impact on landscape and seascape character across a substantial area between Carlisle and Whitehaven, some 50km long. A total of nine onshore schemes (54 turbines), from twin turbine to small wind farm size, have already been built or have planning approval. In addition there are seascape character impacts arising from these and the approval for 60 turbines, 12km offshore, at Robin Rigg. Several more onshore schemes are currently under consideration with scoping opinions being sought from prospective developers. There is a real prospect that developments could extend further south as far as the Duddon Estuary. In a recent appeal decision the inspector recognised the perception that the Solway, on and off shore, is playing host to a significant number of wind turbines and "approaching the stage where the character across a number of types is shifting towards a distinct change"[14]. Some argue for a broader policy look at the environmental capacity of this area bounded by highly sensitive landscapes of international and national value, such as Hadrian's Wall, the Solway Coast AONB and Lake District National Park.

4.16 Multiple developments across this area also raise serious issues of cumulative effects on visual amenity in respect of residents and tourists. Lower lying parts are heavily populated with a dense pattern of settlements and there is a need to ensure that schemes do not become too dominating or overbearing. The setting of Workington, already substantially surrounded by turbines, is an obvious example of this. However the sense of scale and character of smaller settlements and amenity of residents within them are also vulnerable. The experience of tourists in terms of both sequential views from routes such as Cumbria Coastal Way as well as static viewpoints from resorts, holiday parks and viewpoints need consideration. Prospects from popular open or elevated routes and viewpoints are particularly sensitive such as Hadrian's Wall Trail and outer fell tops within the Lake District National Park.

4.17 Some existing developments date back 10 years to first generation schemes such as Siddick. There is an increasing tendency for new and adjacent schemes to concentrate along the narrow coastal strip or in proximity to the 33kv power lines found in this area. This raises the issue of compatibility between smaller, older turbines and newer, higher, wider spaced turbines with slower rotation speeds and/or pylons.

4.18 Issues that will need careful consideration by developers include:

[14] Appeal Decision APP/G0908/A/05/1172183: Land at High Pow Farm, Bolton New Houses, Wigton

- capacity for character change
- whether developments are overbearing/dominant
- impacts on tourist experience
- impacts on residents
- compatibility of small and larger newer turbines
- seascape character impacts
- settings of designated landscapes

Furness

4.19 In Furness the existing onshore pattern is a more clustered one focused on the open coastal urban fringe and moorland landscape types of this exposed peninsula, covering an area approximately 25km across. A total of five onshore schemes (32 turbines), of up to small wind farm size, have been built. In addition a 30 turbine scheme is operational 7km offshore from Barrow. Four more offshore schemes are under consideration 7km and 14.5km offshore, and interest in onshore schemes is set to continue. In terms of cumulative landscape effects one of the main issues is skyline clutter and for seascape effects there are concerns regarding the scale of the developments proposed and the capacity of the seascape to accommodate this. The coastal horizon naturally draws the eye in any peninsula landscape, onshore schemes on the coast together with large offshore schemes could result in a substantial portion of the horizon being developed. Any further schemes on the open moorland are likely to compromise the positive functional and sculptural image of the existing developments which are sufficiently spaced to form distinctive focal points in this open landscape. Picturesque estuarine compositions with fells in the Lake District National Park are vulnerable as well as the sense of remoteness and wildness of dune belts and moorland.

4.20 Multiple developments here also raise the issue of cumulative effects on the visual amenity of residents and tourists. In an area striving to develop its tourism potential cumulative effects on views from popular coastal routes and attractions as well as the southern gateway into the Lake District National Park demand serious consideration.

4.21 Issues that need careful consideration include:

- impacts on tourist experience
- skyline clutter
- maintaining sense of remoteness
- maintaining spacing between existing on/offshore schemes
- seascape character impacts
- settings of designated landscapes

Lune Valley

4.22 Interest has also focused on the South Cumbria Low Fells with a string of applications west of the Lune Valley, and increasingly west of the Eden Valley. Whilst there have been four applications for schemes on the fringes or the Lune Valley only one has been successful, that being a scheme of 5 turbines at Lambrigg Fell. Interest in some of these sites has recently been revived and new sites are also coming forward. This area of potential cumulative effects extends across the county border into Lancashire, stretching approximately 40km in total between Whinash and the existing development on Caton Moor, near Lancaster. Again skyline clutter is a key cumulative issue in the open receiving fells and moorland landscapes. Valley rims are especially sensitive in relation to scenic and relatively tight valley landscapes of the Lune and the setting of villages and towns within it such as Tebay, Sedbergh, Kirkby

Lonsdale. Consideration of cumulative effects on the sense of remoteness and unspoilt qualities of the receiving uplands and the setting of adjacent national parks and prospects from them is also essential.

4.23 Issues to be considered include:

- skyline clutter
- sensitivity of valley rim
- sense of remoteness
- settings of designated landscapes

Greystoke and Inglewood

4.24 There has been growing interest recently in the area of limestone foothills and intermediate farmland fringing the north-eastern fells of the Lake District National Park. Two schemes at Lamonby and Skelton are awaiting decisions. Apart from the busy M6 and A66 corridors, along the western and southern boundaries, this area is relatively unspoilt with a peaceful backwater quality. Multiple developments are likely to compromise these rural qualities. In the Inglewood area there may be some opportunity to complement repetitive patterns of geometric fields and shelterbelts and correspond to existing occasional verticals, such as the Skelton masts, provided an adequate spatial buffer is maintained. However multiple developments across the more open and elevated foothills around Greystoke raise issues of visual clutter. There are also cumulative issues in respect of tourism and recreation. Sequential views from the A66 north eastern 'gateway' into the northern Lake District National Park and the coast to coast national cycle route (NCR 71) demand consideration.

4.25 Issues to be considered include:

- relationship to repetitive patterns
- visual clutter
- impacts on recreation and tourism
- settings of designated landscapes

Other areas within Cumbria

4.26 Although the above areas reflect the current experience of wind energy development in Cumbria it does not refer to all land within Cumbria. However, if in the future development extends beyond the above areas cumulative effects will need to be addressed in relation to both landscape and visual effects and other environmental, social and economic effects. The issues highlighted above may be relevant to these other areas, and other issues may become important.

Carrying out a cumulative effects assessment

4.27 The assessment of the cumulative effects of wind energy developments should be an integral part of the design process. Part 3 contains advice on the scope and content of such an assessment. Appendix 1 therein provides guidance on the relationship between distance and the likely appearance of third generation wind energy developments (turbine blade tip height of 95-120m). This can be summarised as follows:

- Dominant as a key focus in close range views up to 2.4 km
- Prominent as a key element in close to mid range views of the landscape,

between 2.4-6km.

- Conspicuous as a noticeable feature in mid to long range views of the wider landscape with blade movement perceptible, between 6-12km
- Apparent as a visible feature in long range views of a wide landscape, turbines being perceived as a group rather than individual entities and blade movement only perceptible in clear weather conditions, between 12-18km
- Inconspicuous as a minor feature in distant views of a broad landscape only seen in very clear visibility, between 18-30km

4.28 This assumes an open landscape, in practice visual interruption by a variety of screening features can limit visibility and apparent prominence can be affected by a variety of modifying factors, as discussed above.

4.29 These distance bands help to envisage how effects of multiple schemes might accumulate in areas where their individual Zones of Visual Influence (ZVI) overlap and to determine the radius of cumulative study areas. In theory a 60km radius would enable the consideration of a receptor midway between proposal A and proposal B at 30km from each. However at this distance both schemes are likely to appear inconspicuous and cumulative effects are likely to be insignificant unless the receptor is exceptionally important or there are also effects from several other schemes.

4.30 Cumulative assessment will normally be required where there is another development, proposed, approved or operational, within 30km. Proposed developments should be taken to mean those live within the planning system for which an application has been formally registered or an appeal has been lodged. Developers should also take account of prospective schemes at the scoping stage of a project and which may have become live by the time an application is submitted. The local planning authority or BWEA should be able to provide advice on this. Prospective schemes include: those schemes refused but where an appeal may be expected; schemes where a formal scoping opinion has been provided; schemes in the public domain as a result of developer publicity or a formal request for a scoping opinion; and sites with an existing or consented anemometer.

4.31 The 30km minimum radius follows SNH guidance[15]. In some circumstances the Planning Authority may request an extension of the assessment area or inclusion of additional developments in order to address specific issues. For instance where an exceptionally important landscape or visual receptor is located midway between proposals but 18km from each (requiring an extension to 36km) or issue extend beyond a particular locale and is one of where wind energy developments are sequentially seen from key routes across a broader geographical area. Developers are advised to produce a 60km base plan showing the footprint of any constructed, consented, proposed or prospective development the Planning Authority deems relevant. This base plan should be produced at the scoping stage and taken to early meetings with the Planning Authority so that relevant issues can be identified.

G1 Submission of a cumulative landscape and visual impact assessment will normally be necessary where new development is being proposed:

- **Within an area already containing one or more operational or approved developments**
- **As an extension to an operational or approved development**
- **At the same time as one or more other developments are being proposed within an area**

The assessment area should be a minimum radius of 30km from the centre

[15] Scottish Natural Heritage Guidance: Cumulative Effect of Windfarms, April 2005

point of the new proposal and accompanied by a Cumulative ZVI(s) covering all developments within that radius.

4.32 In the case of enlargements, extensions and siting new development adjacent an existing scheme, the landscape consequences are essentially those for a single site. In assessing the new proposal therefore the overall landscape and visual impact of the original site and the new proposal need to be considered as a whole against a baseline of the pre-development landscape[16]. The ability of the landscape to accommodate a larger composite feature and any extended visual influence need to be taken into account. It will usually be necessary to provide comparative ZVIs as part of this assessment which should enable the comparison of both the original and the enlarged development.

G2 Where proposals are extensions or adjacent, the assessment of cumulative impact should include a consideration of both developments as a single entity.

Judging the acceptability of cumulative effects

4.33 As set out above this guidance does not seek to set thresholds that determine when cumulative impacts are unacceptable. A judgement needs to be made for each individual scheme. When judging acceptability of a new proposal it is crucial to determine the "threshold" beyond which wind energy developments in a particular area become unacceptable in landscape and visual terms. In other words, although the effect of a single scheme is limited, when added to the effect of other schemes in the area, operational, approved or proposed, it creates unacceptable cumulative impacts[17].

4.34 In order to meet government targets for renewable energy multiple schemes may have to be accepted as a defining characteristic in some of Cumbria's landscapes. Such change may be acceptable in landscape types with a moderate or above landscape capacity as defined in Part 2 and summarised in Chapter 2: Table 2. However a consistent and coherent approach to the siting, design, spacing and scale of schemes in relation to the receiving landscape type will be required to ensure that they make a positive contribution to the overall image. A succession of schemes with different designs and relationships to the landscape can appear confusing as well as raise questions about the visual rationale and suitability of each development.

4.35 In assessing the cumulative effect on the landscape, it is important to bear in mind that landscape character does not generally occur in single homogeneous blocks. The characteristics of neighbouring landscape types must also be taken into account. Effects on the characteristics of neighbouring landscape types must also be taken into account. The Landscape Capacity Assessment in Part 2 identifies limited capacity for cumulative development within the visual setting of international and national landscape designations. Contribution of the setting to qualities recognised under the designations, wider landscape compositions and key views are particular sensitivities in the relevant capacity statements. These demand rigorous consideration in the context of cumulative assessments.

G3 The limiting threshold for wind energy developments should be based on a well-considered judgement informed by analysis of:

- **Degree or magnitude of change (see definitions above)**

[16] Landscape Institute and Institute for Environmental Management and Assessment 'Guidelines for Landscape and Visual Impact Assessment 2nd Edition 2002

[17] Scottish Natural Heritage Guidance: Cumulative Effect of Windfarms, April 2005

- **Nature of the potential change reflecting the inherent sensitivity of the effected landscape(s) character and visual context (see Table 3 Cumulative Sensitivity Criteria)**

- **Value attached to the effected landscape(s) or specific elements in it and key views (see Chapter 3 and Part 2 Capacity Statements)**

- **Landscape change objectives for the effected landscape(s) (see Landscape Strategy[18] visions and relevant management plans for designated landscapes)**

[18] Cumbria County Council 'Cumbria Landscape Strategy' 1998

Table 3: Cumulative Sensitivity Criteria

Key Characteristic	Attributes indicating lower sensitivity to cumulative wind energy development	⟷	Attributes indicating higher sensitivity to cumulative wind energy development
Scale and Enclosure	Frequent broad scale elements to which multiple schemes might relate or complement eg ridges, woodland, settlements Wide views with room to accommodate multiple schemes	⟷	Widespread presence of human scale indicators and older developments with smaller turbines where multiple large modern schemes are likely to exacerbate dominance and distort sense of distance Narrow views vulnerable to over crowding by multiple schemes
Complexity and Order	Structured landscapes with simple and repetitive patterns (eg geometric field pattern defined by strong framework of hedges or interlocking ridges in consistent alignment) which offer scope for multiple schemes to appear as just another recurring element in an ordered landscape	⟷	Unstructured landscapes with complex and irregular patterns (eg fragmented mixed land uses on the urban fringe with weak run down boundaries or random undulating landform strewn with spoil heaps) where multiple schemes likely to compound visual confusion Simple featureless landscapes eg moorland where a solitary WED may illuminate vastness and emptiness whilst multiple schemes likely to dilute character
Manmade Influence	Frequent occurrence of large modern built or engineered elements and managed land use to which multiple schemes can relate and share a working or industrial image	⟷	Wild, traditional or designed landscapes in which modern manmade aspects are absent or rare where multiple schemes likely to appear unrelated and incongruous
Remoteness and Tranquillity	Widespread movement and noise (eg network of transport routes or industrial activity)	⟷	Strong sense of peace, space remoteness and solitude likely to be compromised by multiple schemes
Settlement and Key Views	Inaccessible lowly populated areas Nucleated or introspective settlements Large industrialised edges unlikely to be intimidated by multiple schemes Unremarkable views	⟷	Dense pattern of small historic settlements with vulnerable sense of scale and character Settlements with a distinctive orientation or context (eg linear looking to or set down below a resource area) likely to exacerbate dominance or sense of being surrounded by multiple schemes Attractive settings, 'gateways', vistas, or panoramas
Visual Interruption	Frequent interruption by landform, vegetation or buildings whereby multiple schemes likely to appear individually and intermittently	⟷	Exposed open landscapes where multiple schemes likely to be visible in same views and for prolonged periods
Skyline	Low density pattern of isolated existing vertical focal points (eg existing schemes, shelterbelts and silos) which multiple schemes could complement without impinging on space surrounding them Indistinctive skylines	⟷	High density pattern of existing vertical focal points of varied size and form where schemes could exacerbate sense of clutter and confusion Bare undeveloped skylines vulnerable to clutter Skylines that draw the eye (eg coastal horizons, landmark fells valley rims) where multiple schemes likely to appear disproportionately dominant
Connections with Adjacent Landscapes	Broad tracts of the same or similar character types to which multiple schemes can consistently relate	⟷	Tight sequences of contrasting landscape types which multiple schemes are seen against likely to appear incoherent and confusing

5 Guidelines for Siting and Good Design

Why is this important?

5.1 This section examines the issues arising from the unique visual characteristics of wind energy developments and provides generic design guidance. Following this advice should help design a development that fits into its chosen landscape or townscape and minimise negative impacts on visual amenity. It is considered important to focus on the landscape and visual impacts of wind energy developments due to their unique characteristics:

- prominently vertical,
- significant movement
- relative unfamiliarity in parts of Cumbria.

They are frequently located in open areas where they are highly visible and it is normally unrealistic to seek to conceal them. Individually or in groups, they will create distinctive features in the landscape.

5.2 The process of site selection and design should be an iterative process informed by and responding to an ongoing environmental assessment. Landscape and visual aspects should be set alongside economic and technical requirements as well as other environmental considerations from the outset of a project and throughout all stages of its development. More guidance on landscape and visual impact assessment is set out in Part 3.

Site Selection and Initial Sizing

5.3 At the project feasibility stage site selection and the initial sizing of development should be determined by reference to:

- the capacity guidance in Part 2
- assessments for each landscape character type
- a preliminary survey and
- analysis of the landscape character sensitivity and values

5.4 Every site is unique and local variations in character that heighten overall sensitivity or value may be so significant that, in some cases, they become determining factors to the principle of whether or not a wind energy proposal is acceptable. Careful consideration of the potential effects on local landscape value and associated contributions to recreation, tourism and image in relation to economic development should be made.

5.5 The capacity guidance contained in Part 2 considers visual amenity in general terms by reference to settlement patterns and key views. It does not specifically address potential visual dominance and intrusion. At the site selection stage this must be analysed by use of a preliminary ZVI, identification of key views and preliminary survey. More information is provided in paragraphs 4.16 – 4.23. Cumulative impacts also need to be considered at this stage. Having made these considerations initial decisions on sizing of the development may need to be revisited or, alternatively a different site sought.

G4 Confirm landscape acceptability of a specific site and appropriate sizing of development by weighing preliminary analysis of landscape and visual aspects against the landscape sensitivity and value criteria (Tables 1 and 2 of Part 2) and by considering potential cumulative effects.

5.6 Locations within a tight sequence of contrasting landscape types or sub-types may make it difficult to ensure that a development appears logical and clearly related to a consistent set of key characteristics. Care should be taken when determining locations for new schemes in such areas. This is endorsed by Scottish Natural Heritage[19]

"The potential for visual confusion, where it is unclear how a windfarm development directly relates to the landscape characteristics of an area, is increased where a windfarm is sited within, or experienced from, different landscape character types."

G5 Seek to centre developments within discrete landscape types with broad separation from types of contrasting character in order to achieve a simple image.

Composition: General

5.7 After a site has been chosen it is essential that landscape and visual considerations are primary in conceiving the overall form and composition of the development (much like designing and placing a piece of sculpture). The basic visual composition should be guided by common design principles such as balance, proportion, stability and image. These principles are summarised in Appendix 3 of the SNH guidelines[19]. A composition that responds to key characteristics is more likely to harmonise with the landscape and portray a positive rational image. Generally this will entail finding the most comfortable fit with the scale or pattern of the receiving landscape. However, it may include compositions where turbines contrast with key characteristics, for example where a single isolated development creates a vertical point of focus on a simple horizontal skyline or plain, and in doing so reinforces the compositional qualities of that landscape. When considering how a development will relate to key characteristics, it will be important to consider how these will be experienced and observed in the key views of the development.

5.8 The detailed design of the layout of turbines is likely to be influenced by the engineering constraints of yield, and other environmental constraints such as ecology, hydrology, noise and archaeology. This process of micro-siting may change any initial layout.[20] Any layout changes should be informed by an understanding of the consequences on three-dimensional composition including the landscape and visual effects.

G6 Consider wind turbine developments as three-dimensional objects within the landscape and investigate alternative compositions to find the optimum response to key landscape characteristics as appreciated from key views.

Composition: Scale and Proportion

5.9 The increased size of third generation wind turbines raises major issues in terms of the scale and proportion of developments in relation to settlements and other landscape elements. The size of developments is increasingly driven by available technology and maximising output. There could be a temptation to fill any particular site with turbines with little or no regard to landscape fit. Consequently schemes have come forward which overwhelm the scale of existing landscape elements and create an image of sprawl. The increased height of turbines, the consequent increase in separation distance between turbines and the trend towards extensions of developments next to existing ones are likely to exacerbate problems of sprawl. The scale of turbines can be indiscernible in an open featureless

[19] Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes, Scottish Natural Heritage 2001
[20] Windfarms in Scotland, Marc van Grieken etal, Landscape Design Journal Oct 2003

landscape such as a moorland plateau or estuary mouth. However, generally, there will be elements or features against which the development can be directly scaled. The large scale of wind energy developments, in terms of both height and extent, tends to relate best to the broad shapes and main elements of the landscape, such as ridges, woodland or settlements, as appreciated in the middle distance (> approx. 2.4km) and beyond.

5.10 In some instances it may be necessary to consider the use of turbines smaller than current industry standards as well as fewer turbines to achieve a comfortable fit with landscape elements such as small hills or drumlins and built forms on the urban edge. Close range human scale indicators such as hedges, trees and houses are likely to be intimidated by the large industrial scale of today's turbines; this is largely a site selection issue as these awkward relationships will be difficult to overcome through design and composition.

G7 Ensure that the scale of developments, in terms of height and extent, relate to and are in proportion with key landscape elements such as valleys, ridges, hills, field systems, woodland or settlements and appear subservient to these elements. In urban or industrial contexts ensure that developments respond to the scale of the built form and sit comfortably alongside existing large buildings or structures.

Composition: Order and Pattern

5.11 The rationale for the outline shape of the development needs to be clear. An arrangement of turbines that relates to some kind of order or hierarchy in the receiving landscape will be easier to comprehend and therefore more likely to portray a positive image. It may be more difficult to achieve in complex landscapes, comprised of a number of overlapping elements. Visual confusion needs to be avoided by careful placement within a hierarchy of visual dominance or visual separation of the developments from other elements in the landscape including other wind energy developments.

G8 Complement distinctive patterns and organising elements within the landscape, such as the broad grain of the topography, geometric field systems or dominant lines along coasts or infrastructure corridors. Create a simple image by respecting the hierarchy of elements in any landscape composition or separating developments from other surrounding elements or features that compete for attention.

Composition: Stability and Balance

5.12 It is important for a wind turbine development to appear visually stable in relation to the visual dynamics of the landscape. A feeling of balance should be created with opposite visual forms and forces compensating each other. Consideration of the visual dynamics between individual turbines within a development is also important. For example twin turbine developments are like to result in unresolved duality where the eye jumps from one turbine to the other, however this might be avoided if balanced against a form or structure of comparable visual weight.

G9 Respect visual forces and weights to create a stable and restful composition between the wind turbines and the receiving landscape, and also between each other. In the context of built forms or structures seek to achieve a balanced composition that enhances any existing focal point.

Composition: Relationship between Turbines

5.13 While spacing is normally determined by the need to avoid 'shadowing' (by wake

and turbulence effects) if it is excessively wide, the visual coherence of a turbine group can be damaged; the turbines appear 'disconnected'. This problem is often exacerbated by increased heights and consequent separation distances, (which have as much as doubled since the previous guidance was issued in 1997). The arrangement of turbines can also adversely affect cohesion with gaps appearing in the composition. For instance, from some aspects turbines in a triangular arrangement can appear offset and disconnected from the rest of the group; linear or grid arrangements can often result in turbine overlaps where the movement of blades seem to clash. Clearly the orientation of such groups could be critical in relation to key views.

G10 **Through careful spacing and arrangement of turbines and overall orientation of the group ensure that turbines read collectively to form a single cohesive element in the landscape particularly with regard to key views, whilst avoiding the disturbing effects of blade overlaps.**

Composition: Image and Association

5.14 Association with manmade influences and the functional rationale of exposed sites are recognised as a favourable characteristic in terms of sensitivity or site selection criteria (see Part 2: Table 1). The design of a turbine composition can further assist in creating a positive image by reinforcing associations and symbolism and appearing rational.

5.15 However, it is important to avoid adding to local visual clutter and confusion. Other vertical features common in the rural landscape, such as telecommunications masts are usually individual items or have linear links such as pylons and power lines. As well as being generally much larger in scale, wind turbines introduce movement and are therefore more akin to urban or industrial installations. It is important that they don't compromise landmark skylines.

G11 **Compositions should complement the form and function of settings which already exhibit engineered aspects, structures or land cover patterns and have a logical and sculptural quality in relation to exposed settings. Avoid diluting the value of existing symbolic landmarks and conflicts of form and function with other vertical structures.**

Composition: Dominance and Visual Intrusion

5.16 The design should take account of dominance, intrusion and physical visibility. The degree of dominance is the proportion of the view occupied by the development. This depends on the overall size of a scheme (height and width), distance from the viewpoint and breadth of existing view. Further information on this can be found in Appendix 1, Part 3.

5.17 Turbine height and bulk has most influence on the degree of dominance within close range views. For the purposes of this guidance, it is considered that where the angle to the top of the rotor is more than 10° above the horizontal from the observer, the turbine can be expected to be dominant. (4° for "main views" from a dwelling or frequently used part of the curtilage). The perceived sense of dominance will be influenced by skylining, positioning turbines on a hilltop above the viewer and from turbine movement. Careful consideration should be given to appearance of blades, or the nacelle and blades, above the horizon.

5.18 Potential dominance and intrusion are also influenced by the nature/attractiveness of an existing view and the apparent size as modified by the setting. Sensitivity to this is dependent on the proximity and relationship of a scheme and key views (those enjoyed from the home, popular view points or local visual amenity received

by the most sensitive important settings or ‘gateways’).

5.19 Due to the UK’s prevailing south west winds viewpoints in the south to west and north to east quadrants are most likely to experience the greatest visual effects with regard to visibility and movement. Sites with key views in these quadrants could be problematic but with larger sites it may be possible to mitigate effects by distancing turbines or avoiding these fields of view.

5.20 Turbines framed by other features such as built development or trees can give a greater apparent size. On the other hand elements such as ridges or woodland within the development setting may offer screening potential.

G12 **Investigate alternative designs in order to find compositions of turbine groups to present best aspects and reduce dominance and visual intrusion relative to key views. In particular seek to:**

- **site turbines with an adequate separation from smaller settlements and key views to avoid dominance and ensure visual separation**
- **reduce the apparent size of developments**
- **avoid turbine heights or locations that make developments feel overbearing**
- **avoid partial views of blades or the nacelle and blades above the horizon**
- **avoid effects on key views in south to west and north to east quadrants**
- **avoid framing effects**
- **maximise the benefits of existing screening elements by careful placement and height adjustments**

Turbine Design: Towers and Blades

5.21 Turbine design has now largely matured and some of latest designs are not unattractive as individual design elements. The commonest types of 'standard' turbine used in Britain are three bladed and attached to a solid tower via nacelle housing. The towers may be polygonal or circular in section, and may be tapered or cylindrical. These are the preferred design for Cumbria.

5.22 The proportional relationship between the tower and the blade diameter is significant. If blade diameter is slightly less than the hub-height of the tower the turbine looks reasonably well proportioned. In lower wind speed areas, tower height may need to be increased without necessarily an equivalent increase in blade size. If blade diameter is increased without a similar increase in hub height, then the turbines may appear squat.

G13 **The choice of tower structure, blade configuration, and relative proportions of tower height and blade diameter should be carefully weighed so as to avoid a squat appearance.**

Turbine Design: Colour

5.23 Experience and studies in Europe have shown that a range of colours can be used to minimise the visual impacts of wind energy developments, depending on the background of land viewed from the majority of viewpoints.

5.24 It is important that the choice of colour for wind turbines takes account of the backgrounds against which the machines will be seen from key views. It may be appropriate to use a palette of pale colours to suit the majority of sites in elevated locations or on the coast where they are mostly seen against sky or sea, and a

palette of darker grey colours for developments that will be mainly seen against a muted landscape background or against buildings.

5.25 There is some Scandinavian experience of grading the colour of turbine towers from a darker shade near the base, to a lighter one near the top. This might be appropriate say where the bases of turbines are seen against land and the tops against sky or sea.

G14 Investigate a range of colour options for turbines taking into account the predominant background relative to key views of the development.

Turbine design: Movement

5.26 Blade movement is rotary and very regular. This is not a common type of 'natural' movement in the landscape, and especially not at the scale of a wind turbine. This kind of movement is highly noticeable, and enhances the visibility of wind energy development in the landscape up to distances of about 10km. The actual blades of turbines are rarely visible beyond this distance, though a slight 'pulse' in the intensity of the light can sometimes be seen as the blade passes across the tower. The slower rotation speeds of current turbines (approx. 13-19 rpm) compared to older turbines for example at Great Orton and Winscales (appropx 28 rpm) can be more comfortably followed with the human eye and are less disturbing.

5.27 All turbines on a site should rotate in the same direction. (e.g. all clockwise, or all anti-clockwise). Sometimes slight variations in wind conditions and hence turbine orientation may nevertheless give the impression of contrary rotations from some viewpoints.

G15 Take account of the visual effects of rotary blade movement as part of the overall design of the scheme. Ensure that the blades of all wind turbines in a single development rotate in the same direction and up to the same speed. Keep the maximum speed of blade rotation as slow as possible.

Infrastructure and Ancillary Development

5.28 Infrastructure and ancillary developments can have significant local landscape impacts in their own right particularly in open undeveloped landscapes, where a site's profile is raised on the side of a hill or where there are key views looking down on it. Sensitive vegetation and soil types such as heather, semi-natural grassland or peat do not readily recover from construction disturbance and will be particularly vulnerable in both landscape and ecological terms. On sensitive soils such as peat ongoing consequences may arise from erosion or disruption to the integrity of natural drainage patterns.

G16 The effects of infrastructure need to be assessed as part of the landscape and visual impact assessment.

Road access

5.29 Road access to a site needs to be able to accommodate trailers carrying the longest loads (blades are up to 45m long) as well as the heaviest and widest loads (generally cranes of 30 tonnes plus). In some rural locations these requirements can lead to significant 'indirect' visual impacts through the need to widen lanes (typically to 6m) or ease bends, necessitating in some cases the removal of boundary features such as stone walls or hedges. These alterations may have to be left in place for the life span of the development or temporarily remedied since there will inevitably be a requirement to reach the site, for decommissioning and possibly for repairs in the case of major component failure, with loads potentially as large as

those initially used. This aspect should be considered at the start of the project.

G17 Take account of the needs for access throughout the lifetime of the development (construction, operation and decommissioning). Detail the nature and lifespan of any modifications to existing roads in the planning application and Environmental Statement.

5.30 On-site access tracks need to be constructed carefully, but need to meet the same weight and dimensional requirements as above. They are typically 5-6m wide. It may be possible to reduce some in width after construction (typically to 3-4m) sufficient to facilitate light maintenance vehicles however full width will inevitably be required as described above. Impacts will be heightened where they have to negotiate steep slopes requiring zig zag routes, cut and fill and drainage channels above the track; on cross wet marshy ground where more extensive foundations will be required. They are also likely to be more visible in open featureless landscapes such as moorland. Access points to sites require large bell mouth entrances and appropriate visibility splays which will often involve the realignment of hedges or walls. Hence access provisions can potentially scar the landscape, draw the eye towards the development and increase visual confusion.

5.31 Consideration of hydrology, ecology and archaeology impacts must also be taken into account as part of the design, during construction and the decommissioning phases of any development. Issues such as surface water run-off, negative impacts on sensitive soils and vegetation all have an intrinsic effect on landscape character.

Bases

5.32 All wind turbines need to be mounted on reinforced concrete bases. These are likely to be left in situ once the development is decommissioned. As turbines become larger, these bases have increased in size and are now typically around 16-17m in diameter by 2-3m deep. Temporary features include a construction compound and hard standings next to each turbine which act as bases during turbine erection and component lay down areas (typically 50 x 50m). Although temporary they still have implications on sensitive soils and vegetation.

Transformers/Substations

5.33 A profusion and confusion of ancillary elements may compromise the sculptural image of a development. Transformers required to change the generating voltage to the common site voltage can increase visual clutter unless housed within the turbines. It is generally preferable for on-site cables to be buried underground as pole-mounted links are visually unsatisfactory. Sometimes the appearance of an electrical sub-station and control building can appear irrational or incongruous particularly in high or exposed areas or increase visual complexity and emphasise the large scale of the wind turbines if sited amongst them. Care needs to be taken when siting these.

Fencing

5.34 Fencing, lights and hard surfacing around sub-stations can exacerbate these problems. New fences over a wider area of the development say to enhance habitats or where a landowner desires greater control over grazing can create lines that conflict with the form and layout of the development and differences in vegetation that highlight its presence.

Electrical connection

5.35 Responsibility for the routing and design of the electrical connection from the site sub-station to the local electricity distribution network lies with the electricity Distribution Network Operator (DNO). This will be achieved by overhead power lines mounted on single or double poles or by lines laid underground. Since the latter are 6-20 times more expensive[21] they may only be used for limited lengths or in special circumstances. Power lines may have considerable impact by creating visual confusion or appearing incongruous in exposed upland settings. If taken right up to the site they may create an industrial image for the development and compromise the designed composition. The implications of connections should therefore be regarded as material to the overall scheme design and under grounding such power lines is preferable in landscape and visual impact terms. However, other environmental impacts must also be considered. Exceptionally, overhead power lines may have such a negative impact that the scheme would be unacceptable on these grounds alone.

G18 Infrastructure and ancillary developments should be carefully considered as part of the overall design of a scheme, adopting the following principles:

- **avoid sensitive soils and vegetation, eg peat bogs, heathers, grassland**
- **avoid changes with a negative impact on local hydrology**
- **provide construction and reinstatement method statements on sensitive sites**
- **integrate the layout with the grain of the topography/land patterns**
- **utilise existing tracks and access points**
- **minimise the length of tracks**
- **protect features such as trees or archaeological remains**
- **reinstate track verges with appropriate vegetation**
- **finish surface tracks to blend in with surroundings**
- **reduce extent and width of tracks after the construction phase**
- **remove tracks on decommissioning and reinstate appropriate vegetation**
- **locate and design ancillary elements in a way that minimises visual clutter**
- **utilise existing landform and vegetative cover to screen ancillary structures**
- **site and design the sub-station to appear as a simple element separated from the main development and characteristic of the receiving landscape**
- **enter into planning obligations to minimise the impact of consequential off-site electricity connections which could otherwise be severe**

Mitigation

5.36 Mitigation will primarily be achieved through careful siting and an iterative design process following the guidance above. Traditional landscape measures such as screen planting to ancillary elements, protecting trees or hedge planting and management may make a useful contribution to reducing on site impacts, although this will be relatively minor given the scale of wind energy developments. Aspects such as the composition of the turbine group as a whole will be more crucial.

5.37 Secondary mitigations measures may be employed to address residual impacts, for example off-site planting to screen specific receptors or provide compensation. Experience has shown that wind energy developments present opportunities for

[21] Planning for Renewable Energy: A Companion Guide to PPS22, OPDM 2004

enhancing both the development site and the wider landscape, for example through restoration of hedgerows and stone walls or restoration of heather moorland. This may also provide improvements to the ecology of the site. This aspect is discussed in further detail in Part 3.

G19 Consider landscape enhancement and compensation measures with reference to land management guidance set out in the Cumbria Landscape Strategy.[22]

Compatibility

5.38 Chapter 4 identified enlargement as a particular form of cumulative effect. In addition when two or more schemes are visible simultaneously, differences in design may create a jarring effect. The closer the developments are, the greater the potential number of differences that may be evident. However compatibility issues may also arise when developments are distinctly separated. For instance, a single wind turbine within one or two kilometres of an extensive site may look as though it has become lost or detached from the group. Differences in design can still be important for separations of up to 6km.

5.39 Proposals for extensions, adjacent developments and developments in close proximity can raise specific issues of design compatibility with an existing scheme(s); issues to consider include:

- *Turbine Size and Density:* Are the turbines a larger size and more widely spaced, if so, will this produce obvious visual discontinuity?
- *Turbine design:* Are there any awkward differences in turbine shape, blade/tower proportions, direction and speed of blade rotation, colour?
- *Layout:* Is the arrangement of turbines (eg linear, formal grid, organic cluster) consistent with the existing scheme (s)?
- *Cohesion:* Will the proposed development be seen as a disconnected part of the same visual entity?

G20 In addition to general considerations of cumulative effect, where proposals are within 6km of any other existing or consented wind turbine, particular attention should be given to the compatibility of turbine size, density, design, layout and overall cohesion.

Where proposals are extensions or adjacent they should be designed as a single entity with the existing development.

6 Guidelines for Environmental and Other Issues

6.1 Landscape and visual effects are not the only ones that need to be addressed when developing wind energy proposals. A range of other effects and their potential impacts must be considered. Some of these are required to be considered through Policy R44. These include:

[22] Cumbria Landscape Strategy, Cumbria County Council 1998

- Nature Conservation
- Cultural Heritage
- Local Amenity
- Local Economy
- Aircraft and Telecommunications

6.2 In addition to this, PPS22 calls for consideration to be given to early community engagement and the potential for community benefits. Guidance on this is set out in Chapter 2.

6.3 Although the above issues are not the main focus of this Guidance, they are equally important and need to be fully addressed by any developer through the Environmental Impact Assessment. The following section highlights the key issues to consider and signposts to further advice.

Nature Conservation

6.4 Wind energy schemes have the potential to adversely affect biodiversity and nature conservation interests. Cumbria is noted for a wealth of nature conservation interests. Some of these may be particularly rare or form part of wider biodiversity networks important on more than a local scale. It is crucial for any development to take these interests into account.

6.5 In the case of wind energy development the effects to biodiversity could take place during the construction, operation or decommissioning phases and could arise from any element of the development including the foundations, access roads, moving turbines and ancillary buildings. Cumulative effects may also impact on biodiversity across a wide area arising from both wind energy and other development/activities. Such effects could cause negative impacts to habitats and species found within or outside a development site. Mitigation of such effects may be required but in some circumstances a scheme might be so damaging that neither mitigation nor compensation would be acceptable. In other circumstances new development may provide the opportunity to enhance and create habitats to support a range of species.

6.6 The experience of past wind energy development both in the UK and Europe has shown the main nature conservation effects to be:

- Direct habitat loss (eg for feeding, roosting, breeding etc)
- Habitat damage (eg on site and off site due to hydrology impacts)
- Interference with geological processes (eg slope profile)
- Interference with hydrological processes (eg increased runoff, erosion)
- Disturbance to, displacement of and collision with mobile species (eg for migration, feeding, nesting)

6.7 The full range of Cumbria's biodiversity should be taken into account when developing a wind energy scheme. There are many international and national statutory designations, and regional and local designations both for habitats and species. Policies in the Cumbria and Lake District Joint Structure Plan 2001 – 2016 and the emerging Local Development Frameworks provide protection from development for areas and features of international and national importance. Additional policies provide protection for other areas and features of nature conservation interest and for enhancement. In addition policies for renewable energy should ensure there are no adverse effects on biodiversity or Cumbria's wider natural heritage.

6.8 The key international and national statutory site designations in Cumbria are:

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Ramsar (wetlands) sites
- Sites of Special Scientific Interest (SSSIs)
- National Nature Reserves

New schemes should avoid these sites and should not cause any detriment to the characteristics of protected habitats or protected species. Scheme should not cause harm to habitats and species outside a designated site that may adversely affect the integrity of a site, or cause a significant decline in the size, distribution, structure or function of a population of a species for which a site was designated.

6.9 In addition there are Regionally Important Geological/Geomorphological sites, County Wildlife Sites, and Local Nature Reserves. Sites owned by the National Trust are afforded protection under the National Trusts Act. Development sited on or off such sites should not cause any harm to these nature conservation interests.

6.10 Government policy seeks to protect priority habitats and species identified in the UK Biodiversity Action Plan and any additionally identified in the local Cumbria Biodiversity Action Plan. Many of these habitats and species extend outside protected sites, and consideration must be given to potential impacts when developing any scheme. Habitats which might most likely be affected are coastal habitats, upland habitats (acid grassland, heather moorland, blanket bog, flushes and mires), purple moor-grass and rush pastures, general open farmland, and connecting habitats such as hedgerows and small woods. A key species list is being developed for the county which will include protected, priority and Cumbria BAP species. It will be available from, and maintained by, the Cumbria Biological Records Centre (currently the Cumbria Biological Data Network).

6.11 Information on these interests should inform the early stages when selecting the location and designing a scheme. There is a need to collaborate and use information from English Nature, the Cumbria Biological Data Network through Tullie House Museum, Cumbria Wildlife Trust, RSPB, and local nature conservation groups.

Bats and Birds

6.12 The impact on bats and birds is of particular interest for wind energy development. Bats and some birds are protected species that need to be considered when developing a wind energy scheme. They are potentially at risk from wind turbines in the ways identified in paragraph 6.6 above.

6.13 For bats, work will need to be carried out to establish roosts, flight lines, feeding areas, hibernation or swarming sites in the vicinity of a proposal. An assessment for bat flight activity should be carried out as part of the EIA. The results of such surveys should assist in identifying the appropriateness of the scheme, its design and layout. If a foraging habitat is likely to be affected by a scheme, then mitigation measures would be expected to ensure additional habitat is provided for within the locality and to remove the potential for harm, however it might take time to establish new habitat.

6.14 The issue of birds and windfarms has been debated for more than a decade. Scottish National Heritage produced detailed guidance in 2005 on survey methods for assessing the potential impacts on birds from onshore wind farms. This provides guidance on how to determine the potential loss of habitat as a result of infrastructure, displacement of birds due to disturbance to feeding and breeding

grounds, and the potential mortality due to collision with turbine blades. Such risks need to be determined for any wind energy development. Developers are expected to consider this guidance when drawing up schemes in Cumbria.

6.15 For birds an assessment will need to be carried out to establish any protected, priority or rare species in or within the vicinity of a site and any migratory routes and any habitats related to such species. Careful consideration needs to be given to SPA, SAC, and RAMSAR sites which are often associated with coastal and moorland/upland areas. These areas have had the greatest pressure from wind energy development in the past and steps need to be taken to ensure there is no harm to these interests. In coastal locations attention also needs to be paid to issues of collision with migratory birds, as many fly along the coastal areas to reach feeding/breeding grounds in protected habitats around the Duddon Estuary, Walney and Morecambe Bay areas. An assessment of potential impacts will need to be carried out and any mitigation measures determined to remove the potential for harm. These may relate to micro siting and design or the creation of supporting habitat within the locality. This information should be part of the EIA.

6.16 The cumulative impacts on bats and birds must also be assessed in relation to other proposed, approved or operational wind energy schemes.

Design and Mitigation

6.17 Existing habitat features should be incorporated into site design and protected from adverse change. Opportunities should be explored to create new habitats to compensate losses and improve the landscape and ecological potential of the site. When considering decommissioning good practice would include the improvement of ecological value on the site. Any wind energy scheme could provide the opportunity to enhance nature conservation interests on a site. Discussions with the local planning officer on the opportunities should be discussed early on in the process [23].

The role of the EIA

6.18 The Environmental Impact Assessment is the main tool used to look in detail at nature conservation interests both on and off site. The methodology used; analysis of data and assessment of impacts should be clearly expressed in the Environmental Statement. Areas to address include:

- Identification of habitats and species on site and within locality.
- Identification of protected and priority habitats and species.
- A habitat survey that describes in detail the plant communities present on the site highlighting areas of habitats with potentially high nature conservation value[24].
- Migratory routes of any protected or priority bird/bat species.

6.19 When carrying out assessment and evaluation collaboration with local nature conservation bodies and Cumbria Biological Records Centre will help with data collection and interpretation.

6.20 More detailed advice can be found in the following resources:

- PPS9 Biodiversity and Geological Conservation and Companion Guide

[23] (taken from EA guidance 2002).

[24] Use of a Phase 2 Habitat Survey methodology and National Vegetation Classification survey

- PPS22 Renewable Energy and Companion Guide
- Survey methods for use in assessing the impacts of onshore windfarms on bird communities, Scottish National Heritage Guidance November 2005.
- Wind farm development and Nature Conservation, English Nature, RSPB, WWF and BWEA, 2001
- Scoping the environmental impacts of windfarms (onshore and offshore), Environment Agency, 2002.

Developers are encouraged to follow such good practice advice when developing proposals in Cumbria.

Soils and Hydrology

6.21 Care is also needed in assessing the impact of a development on the soils and hydrology, water quality of a site and its surrounding watercourses. Soils such as peat can be easily harmed and take a long time to regenerate. Peat has high water content and disturbance can lead to a reduction in soil stability. In addition peat disturbance can releases CO_2 into the atmosphere which may counter some of the CO_2 savings expected through wind energy development[25]. Wind energy proposals should avoid areas with such soil. It is important not to harm the integrity of local watercourses as this may create harm to nature conservation interests in the vicinity of a proposal. Care needs to be taken when assessing such issues and should be included as part of the EIA.

Cultural Heritage

6.22 Wind energy developments like any development have the potential to cause harm to features of historic interest or underlying archaeological remains. However, experience suggests there is often greater flexibility in the design and siting of wind energy schemes which provides the opportunity to avoid damage. Other environmental and social considerations will also need to be taken into account. Any development should consider the effects it may have on the following as part of the design and environmental assessment processes:

- Archaeological remains
- Historic structures and buildings
- Designed landscapes
- Historic character and associations with the wider landscape
- Designated and undesignated sites and areas and their settings.

6.23 Designations of international and national importance currently include Hadrian's Wall World Heritage Site, St Bees Heritage Coast, North Pennines GeoPark, Grade I, II and II* listed buildings, registered historic parks or gardens, scheduled ancient monuments, and registered historic battlefields. The Lake District is currently under consideration for nomination as a World Heritage site.

6.24 Due to the nature of wind energy developments they are often sited in open countryside, in high or exposed locations. Such areas may well be valued for their wildness, remoteness, tranquillity or for well preserved historic remains. These issues and others, including the setting of historic buildings, form part of the Landscape Capacity Assessment (LCA) set out in Part 2. This should be taken into account when designing a scheme.

[25] New Scientist Issue 2559 July 2006.

6.25 Developers are encouraged to contact the County Council's Historic Environment Records Section at an early stage of design to determine the extent of archaeological value of a site, and any potential impacts on the settings of historic buildings/remains/gardens and the wider landscape. The design and siting of a scheme should avoid nationally important historic sites and where practical undesignated sites. If this is not possible mitigation measures will need to be explored. Conditions are likely to be attached to wind energy developments to ensure investigations are carried out during construction to record any archaeological value found on a site.

6.26 More detailed advice can be found in the following resources:

- PPG15 Planning and the Historic Environment
- PPG16 Planning and Archaeology
- Wind Energy and the Historic Environment, English Heritage 2005, www.helm.org.uk.

Local Amenity

6.27 Noise and visual impacts are widely agreed to be the main issues that affect local amenity. As visual impacts are dealt with at length earlier in this guidance this section will only consider the effects of noise. Noise is produced from wind turbines in two ways:

- mechanically from the internal gearbox and generator, and
- aerodynamically from the passage of the blades through the air.

6.28 Wind energy developments may cause some noise when operating however, improvements in technology have reduced the level of mechanical noise produced. The table below indicates the level of noise produced by turbines (both mechanically and aerodynamically) against a range of other noises. It is widely agreed that there will always be some background noise, even in rural areas, from farm machinery, local traffic, animals, the wind interacting with trees, and buildings etc.

6.29 The nature of noise from turbines is low level and has been likened to the noise of wind in trees[26]. When considering a proposal developers should identify noise sensitive development, such as residences, and determine the potential impacts on them. Turbines should be sited at a suitable distance from such development so as not to cause undue harm.

6.30 A noise assessment should be carried out against any existing background noise, in accordance both PPS22 Technical Annex and ETSU's work on 'The Assessment and Rating of Noise from Wind Farm' 1997. This suggests that noise arising from a wind energy development should be restricted to 5dB(A) above background noise for both day and night time levels. This could be in the region of 25 - 45dB(A).

6.31 The table below suggests that a minimum distance of 350m might be acceptable during the day in a rural area, but distances may need to increase to take account of the blades turning at night.

[26] PPS22 Technical Annex P168, ODPM 2004

Table * Noise generated by wind turbines compared with other everyday activities	
Source/Activity	**Indicative Noise Level dB(A)**
Threshold of pain	140
Jet aircraft at 250m	105
Pneumatic drill at 7m	95
Truck at 30 mph at 100m	65
Busy general office	60
Car at 40 mph at 100m	55
Wind farm at 350 m	35-45
Quiet bedroom	20
Rural night-time background	20-40
Threshold of hearing	0

PPS22 Technical Annex Section 8 Wind table 1

6.32 Developers should consider design alterations to mitigate any potential noise impacts. If this is a significant concern for a local community, developers could consider taking community members to visit one of the operational schemes in Cumbria. The local planning authority may attach conditions to the consent for a scheme to ensure noise limits are not exceeded.

More detailed advice can be found in the following resources:

- PPG24 Planning and Noise
- The assessment and rating of noise from windfarms, DTI: http://www.dti.gov.uk/energy/page21743.html
- Guidelines for Community Noise World Health Authority: www.who.int/docstore/peh/noise/guidelines2.html
- Health and Safety Executive Noise information: www.hse.gov.uk/noise

Local Economy

6.33 Consideration needs to be given to the local economy when developing a wind energy scheme and the positive and negative impacts that may arise. There is a diverse economy across Cumbria. Traditionally it has been characterised by manufacturing, agriculture, food processing, energy production, tourism, mining and quarrying. Some of these sectors, such as agriculture and manufacturing are in decline, but still make a significant contribution to the economy, whilst the service industries continue to grow.

6.34 Within Cumbria, there may be concerns that wind energy development could have an adverse impact on the local economy, and in particular the tourist economy. This accounted for 18% of total employment in 2005 and reflects Cumbria's high quality environment, landscapes and natural beauty. Concerns are often cited that

any adverse impact to landscape character and visual quality could result in less people visiting Cumbria. There is no evidence currently available to support or counter such claims. Due to the subjective nature of the perception of wind turbines it is often contended that they could equally discourage or encourage people to visit Cumbria.

6.35 Wind energy development could provide opportunities to support the local economy during the construction, manufacturing and decommissioning phases. There could also be an opportunity for a wind turbine manufacturing base to be developed in Cumbria. This has happened in at least one case in Scotland.

6.36 When drawing up a scheme developers should consider both potential negative and positive benefits for the local economy. Particular notice should be taken when considering the role an area has to play in the local tourist economy. An evaluation of the value of landscape character to residents and visitors should form part of a landscape character assessment.

6.37 Consideration should also be given to employing local labour and using local materials, particularly for the construction of bases, access roads and other ancillary features. Investment could also be made in training the local workforce to help maintain developments over time. It is accepted that the interpretation of EU rules when tendering a scheme prevent a local preference, but steps should be taken to ensure local businesses are invited to tender for relevant aspects of a scheme.

Telecommunications

6.38 Wind energy development can cause interference with radio signals and effect local TV reception and telecommunication systems. This includes those used by the police and emergency services.

6.39 Disturbance to TV reception may arise, particularly if wind turbines are sited between buildings and the local transmitter. Developers need to establish if this is likely to be the case and provide mitigation measures to reduce any negative impact. These might include the provision of satellite, cable or a more sensitive antenna to householders affected, repositioning of antennae to receive from a difference source emitter, or the installation of a community re-broadcast facility. As technology advances and transmissions switch to digital TV then this issue may reduce further.

6.40 Many telephone and other communications systems rely on microwave radio links. These can be affected by wind turbines. The Office of Communications (OfCom) has information on licensed telecommunication systems and protects radio systems against interference. At the start of a scheme, developers are expected to contact OfCom (windfarmenquiries@ofcom.org.uk) to establish what systems might be affected by their proposal. Developers are also expected to contact all operators including the emergency services, such as police, ambulance, coastguard, fire and mountain rescue services, in an area to determine potential impacts and provide evidence of this to the local planning authority. Operators may impose a clearance zone around their systems or require re-routing to prevent interference. Generally careful micro-siting can mitigate against such impacts. Often the repositioning of a turbine by a few hundred metres can remove the interference. If this is not feasible, developers may be able to pay for the re-routing of a signal around a development. Conditions are likely to be attached to any consent to ensure the above issues are addressed during the construction phase. However, if negative impacts cannot be mitigated against it is unlikely approval will be given for a scheme.

6.41 There is often scope for the design and layout of a scheme to be amended to mitigate any adverse effects that might be identified from a technical evaluation of a site. However, care needs to be taken to ensure that other environmental impacts, and particularly landscape and visual impacts, are considered in tandem to this. Past experience has shown that technical constraints such as this often dictate the overall design and layout without equal regard being given to landscape and visual impacts, biodiversity and cultural heritage.

Aircraft and Radar

6.42 Wind energy developments may cause adverse impacts on aircraft flight safety and radar use for air traffic control and aircraft instruments. Early consultation between developers and statutory authorities can help with siting and mitigation measures.

6.43 The movement of a wind turbine can interfere with radar as it may be interpreted as a moving object. This could cause it to be mistaken for an aircraft or reduce the ability to track aircraft by radar in the vicinity of a wind energy development. Developers will need to consult with radar operators if a proposal falls within a 15km consultation zone, or the 30-32km advisory zone around both civil and military air traffic radar, respectively. The British Wind Energy Association (BWEA) website combines a proforma to aid consultation with stakeholders. Developers should use this (www.bwea.com/aviation). If, as a result of the above consultation, a negative impact is likely a developer will need to prove whether or not there will be an adverse effect on aviation interests. Currently such issues may prevent development from taking place around the north, east and some coastal locations within Cumbria due to MoD sites and Carlisle Airport.

6.44 In Cumbria consideration will need to be given to local airports, and Ministry of Defence (MoD) sites, such as Spadeadam in the north and Warcop in the east, to determine flight paths and mitigate against collision risks. Developers must consult with the Civil Aviation Authority and MoD to determine such issues and liaise with airfield management at civilian airfields.

6.45 More detailed advice can be found in the following resources:

- DTI AMS Feasibility Study, June 2005. www.dti.gov.uk/renewables/publications/pdf/windenergyaviation.pdf.
- Wind farm impact on aviation radar interests DTI http://www.dti.gov.uk/energy/page18050.html
- Wind energy and aviation interests: an interim guide, DTI http://www.dti.gov.uk/files/file17828.pdf?pubpdfdload=02%2F1287

MAPS

Wind Energy Supplementary Planning Document

Cumbria County Council

Key

- Lake District National Park
- Yorkshire Dales National Park
- Solway Coast AONB
- North Pennines AONB
- Arnside and Silverdale AONB
- Cumbria County Council Boundary
- Wind Speeds >6.5m/second

0 2 4 6 8 10 20 km

N

Map 1
Wind Speeds > 6.5m/Second

Wind Energy Supplementary Planning Document

Cumbria County Council

Key

- Lake District National Park
- Yorkshire Dales National Park
- Solway Coast AONB
- North Pennines AONB
- Arnside and Silverdale AONB
- Cumbria County Council Boundary
- Wind Energy Development - Operational
- Wind Energy Development - Approved
- Wind Energy Development - Appeal
- Wind Energy Development - Refused
- Wind Energy Development - Application

Wind Energy Development - Operational

1 Oldside
2 Siddick
3 Winscales
4 Great Orton
5 Swineside*
6 Newlands Mill
7 Haverigg
8 Lowca
9 Harlock Hill
10 Kirkby Moor
11 Lambrigg Fell
12 Far Old Park
13 Black Sail Hut*

Wind Energy Development - Approved

14 Wharrels Hill
15 Voridian
16 Pirelli
17 Barnscar Fold*
18 High Pow
19 Laverock Howe*

Wind Energy Development - Refused

20 Hilltop
21 Whinash Wind Farm
22 Drigg
23 Fairfield
24 Gunson Height
25 Lowick Beacon
26 Lowick Common
27 Barkin House
28 Firbank Fell

Wind Energy Development - Application

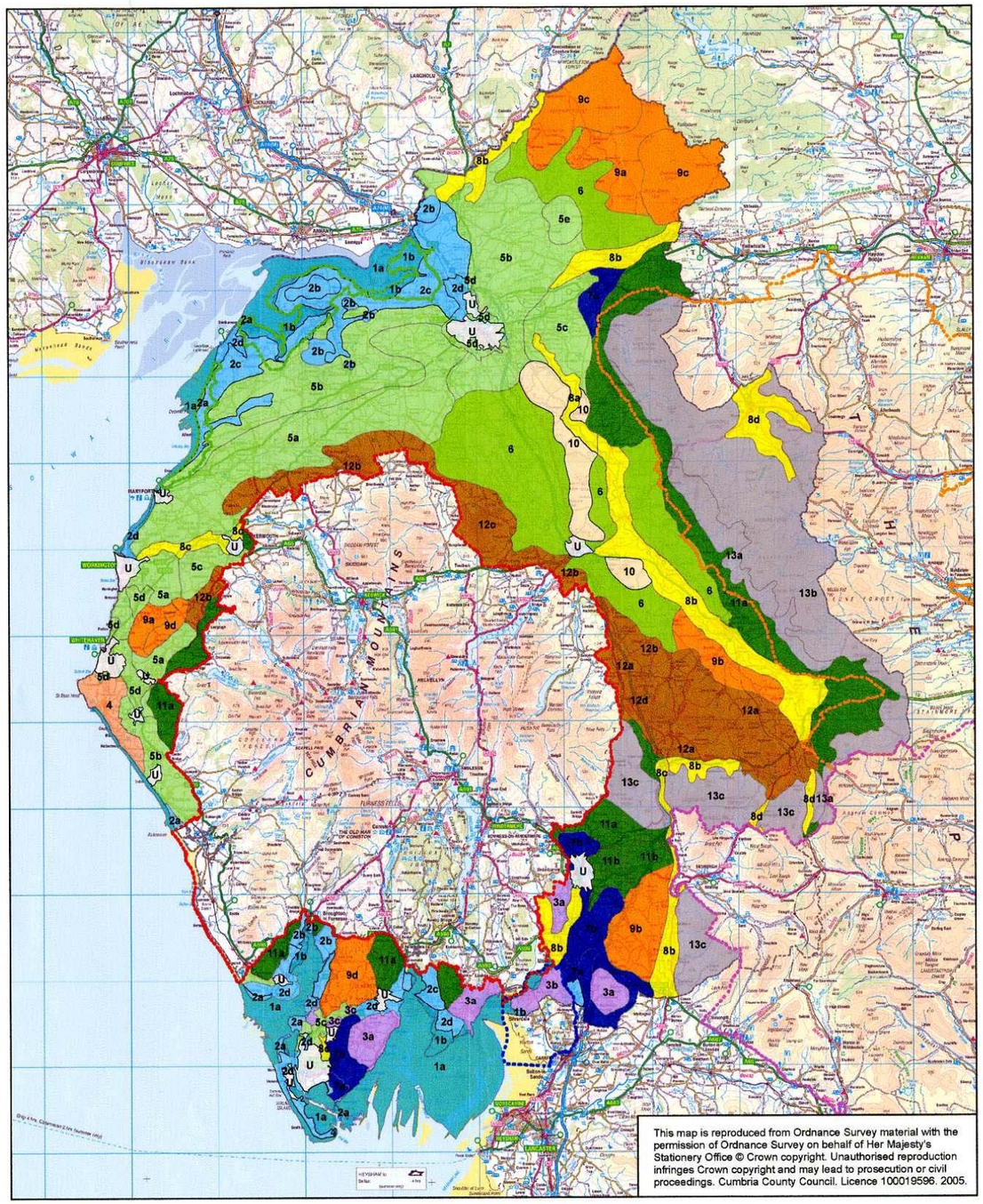
29 Hoff Moor
30 Lamonby
31 Grise

Schemes within the Lake District National Park are small scale providing power to individual buildings only.

0 2 4 6 8 10 20 km

N

Map 2 **June 2006**
Wind Energy Development Sites



Landscape Character Type

1 Estuary and Marsh
- 1a Intertidal Flats
- 1b Coastal Marsh

2 Coastal Margins
- 2a Dunes and Beaches
- 2b Coastal Mosses
- 2c Coastal Plain
- 2d Coastal Urban Fringe

3 Coastal Limestone
- 3a Open farmland and Pavements
- 3b Wooded Hills and Pavements
- 3c Disturbed Areas

4 Coastal Sandstone

5 Lowland
- 5a Ridge and Valley
- 5b Low Farmland
- 5c Rolling Lowland
- 5d Urban Fridge
- 5e Drained Mosses

6 Intermediate Land

7 Drumlins
- 7a Low Drumlins
- 7b Drumlin Field
- 7c Sandy Knolls and Ridges

8 Main valleys
- 8a Gorges
- 8b Broad Valleys
- 8c Valley Corridors
- 8d Dales

9 Intermediate Moorland and Plateau
- 9a Open Moorlands
- 9b Rolling Farmland and Heath
- 9c Forests
- 9d Ridges

10 Sandstone Ridge

11 Upland fringes
- 11a Foothills
- 11b Low Fells

12 Higher Limestone
- 12a Limestone Farmland
- 12b Rolling Fringe
- 12c Limestone Foothills
- 12d Moorland and Commons

13 Fells and Scarps
- 13a Scarps
- 13b Moorland, High Plateau
- 13c Fells

14 (U) Urban Areas and Fringes

Wind Energy Supplementary Planning Document

Cumbria County Council

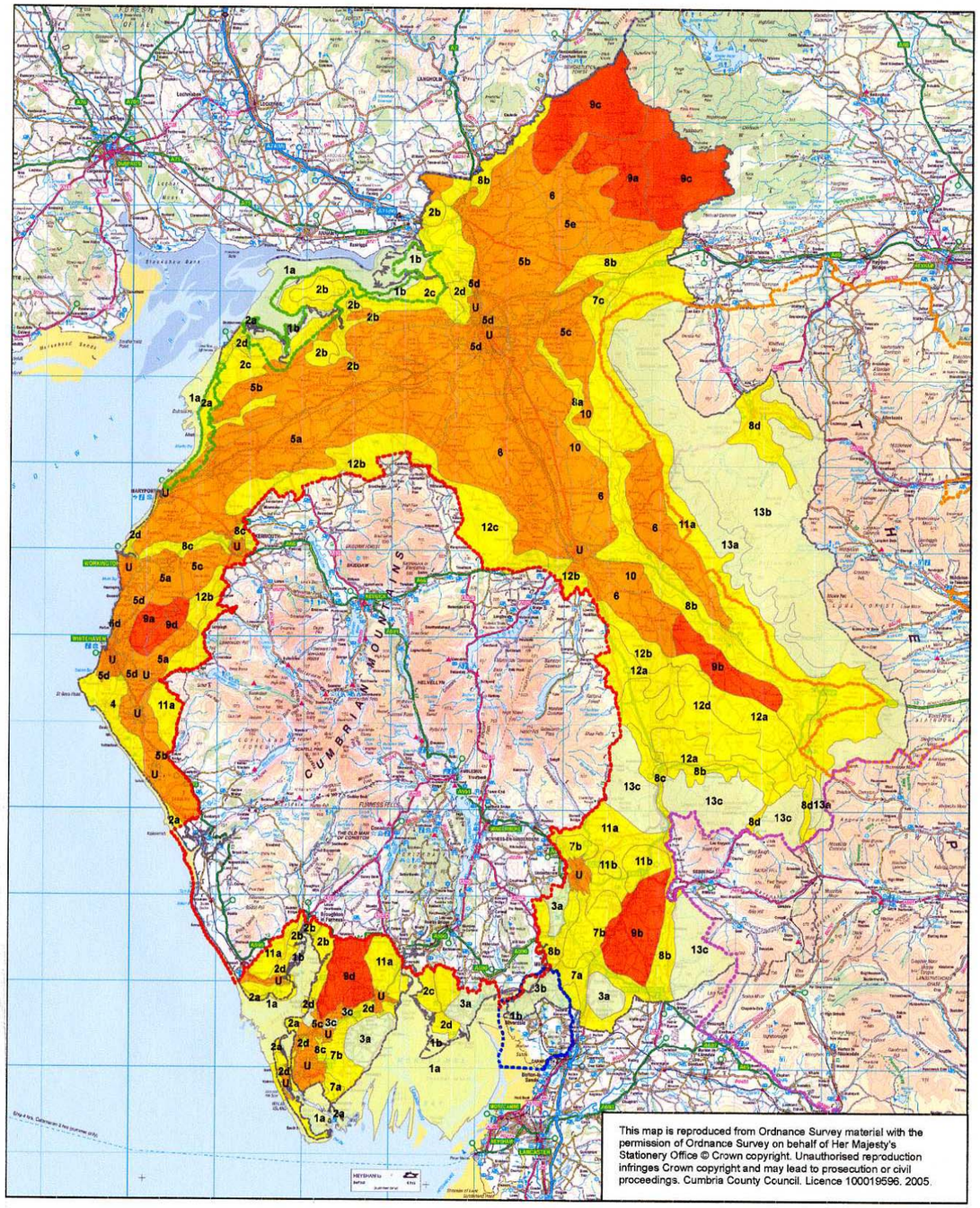
Key
- Lake District National Park
- Yorkshire Dales National Park
- Arnside and Silverdale AONB
- Solway Coast AONB
- North Pennines AONB

Cumbria Landscape Classification
- Type 1 Estuary and Marsh
- Type 2 Coastal Margins
- Type 3 Coastal Limestone
- Type 4 Coastal Sandstone
- Type 5 Lowland
- Type 6 Intermediate Land
- Type 7 Drumlins
- Type 8 Main Valleys
- Type 9 Intermediate Moorland Plateau
- Type 10 Sandstone Ridge
- Type 11 Upland Fringes
- Type 12 Higher Limestone
- Type 13 Fells and Scarp
- Type 14(U) Urban Area
- Cumbria County Council Boundary

0 2 4 6 8 10 20 km

N

Map 3
Landscape Character



This map should be read in conjunction with the Landscape Capacity Assessment in Part 2.

Wind Energy Supplementary Planning Document

Cumbria County Council

Key

- Lake District National Park
- Yorkshire Dales National Park
- Solway Coast AONB
- North Pennines AONB
- Arnside and Silverdale AONB
- Cumbria County Council Boundary
- 9a — Landscape Classification Subtype
- Moderate / High Landscape Capacity
- Moderate Landscape Capacity
- Low / Moderate Landscape Capacity
- Low Landscape Capacity

	Landscape Character Type	Landscape Capacity	Appropriate Scale of Development *(small group = 3-5 turbines, large group = 6 - 9 turbines, small wind farm = 10-15 turbines, medium wind farm = 16-25 turbines)*
1	Estuary and Marsh	Low	All scales generally inappropriate
2	Coastal Margins	Low/moderate	Up to a small group, exceptionally a large group in most extensive parts and where unconstrained by settlement
3	Coastal Limestone	Low	All scales generally inappropriate
4	Coastal Sandstone	Low/moderate	Up to a small group beyond St Bees Head Heritage Coast
5	Lowland	Moderate	Up to a small group, exceptionally large group
6	Intermediate Land	Moderate	Up to a small group, exceptionally large group
7	Drumlins	Low/moderate	Single turbines or a small group
8	Main valleys	Low/moderate	Up to a small group, exceptionally large group, in broader valleys
9	Intermediate Moorland and Plateau	Moderate/high	Up to a large group, exceptionally up to a medium wind farm on a broad moorland plateau
10	Sandstone Ridge	Moderate	Up to a small group, exceptionally large
11	Upland fringes	Low/moderate	Up to a small group, exceptionally large group on broader topographic sweeps
12	Higher Limestone	Low/moderate	Up to a small group, exceptionally large group, in blander parts
13	Fells and Scarps	Low	All scales generally inappropriate
14(U)	Urban Areas and Fringes	Moderate	Up to a small group, exceptionally large group in coastal contexts

0 2 4 6 8 10 20 km

N

Map 4
Landscape Capacity

June 2006

Glossary

Climate Change
A process of changes to weather patterns and temperatures largely caused by the emission of certain 'greenhouse gases' from earth, principally associated with the burning of fossil fuels.

CO_2 Carbon Dioxide
The main, greenhouse gas, formed by the combustion of all fossil fuels.

Cumulative Effects
This is the result of more than one scheme being constructed and is the combined effect of all the developments, taken together. This may be in terms of their effect on landscape and visual amenity, bird populations, other wildlife, the local economy, tourism etc.

Energy Conservation
The reduction of energy consumed usually achieved by changing habits or patterns of use and not requiring significant investment.

Environmental Impact Assessment
The process used for describing, analysing and evaluating the range of environmental effects that are caused by a wind energy proposal.

Environmental Statement
The document supporting a planning application that sets out the findings of the Environmental Impact Assessment.

Greenhouse Gases
The six main gases contributing to climate change found in the upper atmosphere. They prevent some energy being re-transmitted into space. The gases include carbon dioxide CO_2, methane CH_4, nitrous oxide N_20, hydroflourocarbons, perfluorocarbons and sulphur hexafluoride SF_6.

Micro-generation
Very small scale power generation schemes, typically providing energy to a single household/office.

Mitigation
The act of amending a wind energy development to reduce/remove harmful impacts.

Enhancement
To improve the quality of an area affected by a wind energy development.

Landscape Capacity
The extent to which a landscape is able to accommodate wind energy development without key characteristics being adversely affected and the values attached to it being compromised.

Landscape Capacity Assessment
The process of describing, analysing and evaluating the extent to which the landscape can accommodate wind energy development without compromising its landscape character.

Landscape Character
A distinct pattern or combination of elements that occurs consistently in a particular landscape.

Landscape Character Classification
An assessment that classifies the Cumbrian landscape character into 13 distinct types

reflecting the distinct pattern or combination of elements that occurs consistently in a particular landscape.

Landscape Sensitivity
The extent to which the character and visual amenity of a landscape is susceptible to change brought about by the introduction of wind energy development.

Landscape Value
The relative importance that stakeholders attach to a landscape for a verity of reasons including scenic quality, perceptual aspects such as wildness, remoteness or tranquillity that contribute to a sense of place, rarity, presence and influence of other conservation interests and special cultural associations.

Mega Watt
A watt is an electrical unit of power. A mega watt is a million watts.

Offshore
Location on the sea bed, below the mean low tide level, for a number of prospective renewable energy sources including wind, tidal and wave.

Ramsar Sites
Wetlands of international importance designated under the Ramsar convention 1971, which requires signatory countries to protect international important wetlands, especially those used by migratory water birds, and to use wetlands wisely.

Renewable Energy
Collective term for energy flows that occur naturally and repeatedly in the environment. It includes energy derived by the sun, such as wind, solar hot water, solar electric (photo-voltaics), hydro power, wave, tidal, biomass, biofuels, and from geothermal sources, such as ground source heat pumps. Energy from waste is not regarded as a renewable energy as it is not capable of being renewed by the natural ecological cycle.

Wind Energy Development
Development consisting of one or more wind turbines, access tracks, ancillary buildings, substation, anemometer masts and supporting infrastructure.

Zone of Visual Influence
The area for which a development is potentially visible as determined by topography and other intervening features on the ground.

Abbreviations

AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
EIA	Environmental Impact Assessment
CO_2	Carbon Dioxide
LCA	Landscape Capacity Assessment
LDD	Local Development Documents
MW	Mega Watt
PPS	Planning Policy Statement
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SPG	Supplementary Planning Guidance
SPD	Supplementary Planning Document
ZVI	Zone of Visual Influence