Making space for renewable energy: assessing on-shore wind energy development

NATURAL ENGLAND

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Making Space for Renewable Energy

Natural England's Approach to Assessing On-Shore Wind Energy Development

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Foreword

Climate change is widely accepted as the most significant long-term threat facing the natural environment. Increasing our use of renewable energy is one of the key steps to help reduce that threat. At the same time, all forms of renewable energy can have negative as well as positive impacts on wildlife, landscapes and people's enjoyment of the environment. Natural England is therefore committed to helping deliver more renewable energy in a sustainable manner.

As a society, we need to move to an informed consensus about how to identify the places where new energy infrastructure and technologies are best accommodated, most sustainable, and should be encouraged, and those places where the character or features of the natural environment make them less suitable.

In our view, the first step in identifying those places should be a review of the potential renewable and low-carbon energy resource and technically viable options at the regional and sub-regional scale, which seeks to integrate environmental, economic and social considerations. Instead of looking at individual renewable energy opportunities in isolation, a much wider strategic assessment needs to be made of where the production of renewable and low carbon energy can best be located.

We want to do all we can to help identify these areas, so that the right sort of development is located in the right places. For on-shore wind energy we have developed an approach that can be used to assess where development might be sustainably and successfully accommodated in our landscapes. The approach forms the basis of on-shore wind energy guidance for Natural England staff when engaging with planning authorities and developers at the strategic planning and individual project levels and will help ensure that our statutory advice is clear, consistent and timely. This will in turn assist both the wind energy industry and environmental and energy planners, as well as increasing the public's understanding. The guidance will thus make an important contribution to the sustainable implementation of the Renewable Energy Strategy and the Low Carbon Transition Plan.

By creating a more transparent approach, we hope to offer greater certainty over the sustainable deployment of on-shore wind energy. We also believe that our approach will highlight how environmental concerns can be successfully integrated with the needs of the growing wind energy sector to help combat climate change.

We will produce Natural England Approaches to other key energy infrastructure and technologies so that both our staff and stakeholders have a clear understanding of how Natural England will engage with the decision-making processes required over the coming years to deliver a low carbon, secure energy supply in ways which avoid adverse impacts on the natural environment.

Andrew Wood
Executive Director, Evidence and Analysis

Glossary of Terms

Cumulative – increasing by successive additions (Oxford Dictionary). The summation of incremental effects that result from changes caused by one or more developments in conjunction with other past, present or reasonably foreseeable actions (GLVIA[1]).

Inter-visibility - term used to illustrate the mutual visibility between areas.

Landform – combinations of slope and elevation that produce the shape and form of the land (GLVIA). Landform is often one of the main influences on landscape character.

Landscape - an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors[2].

Landscape character - a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse[3].

Landscape pattern – the arrangement of elements in the landscape, often produced by field boundaries and other elements of land use and land cover.

Landscape scale – relative size or extent (Oxford Dictionary). In the context of a landscape, this refers to the relative size of a landscape which can be influenced by its extent and the features within it.

Natural environment factors – the variables that Natural England staff will consider when assessing where on-shore wind energy development can be successfully accommodated in the natural environment. Two sets of factors are included: First, ecological and geological factors; and second, landscape, visual and access factors.

Perceptual factors – factors that influence the way people respond to and/or experience landscapes, such as a sense of tranquillity or movement. Also known as experiential factors.

Residual effects/impacts - those effects or impacts of a development that remain after the effects of mitigation measures have been taken into account.

Skyline – a description of the outline of land, vegetation or buildings seen against the sky.

[1] Landscape Institute and the Institute of Environmental Management and Assessment. (Second Edition 2002). Guidelines for Landscape and Visual Impact Assessment

[2] European Landscape Convention: view at http://www.landscapecharacter.org.uk/elc

[3] Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment for England and Scotland

Part A – Context

1. The Drive for a Low Carbon Future

We are entering a period of marked change in the way we need to generate and use energy. Without significant infrastructure development and improved energy efficiency, peak demand for electricity in the UK will soon be greater than peak supply as a result of the retirement of the majority of existing nuclear power stations and a significant number of old coal-fired power stations. The decline of available fossil fuels will mean that gas imports will continue to rise in the medium term and fossil fuel prices are projected to remain high. Ensuring the continued supply of affordable and sustainable energy will be a key political, economic and social challenge, requiring the whole of society to make difficult choices in the next few years.

Climate change is, in Natural England's view, the most serious long term threat to our natural environment. Rising temperatures, changing precipitation patterns, sea-level rise and extreme weather events all affect environmental systems, and the indirect impacts of some of society's responses to climate change, such as increasing artificial flood defences for example, can further exacerbate those impacts. A healthy natural environment plays a vital role in both mitigating climate change and adapting to inevitable climate impacts.

With widespread recognition of the threat posed by climate change, policymakers are setting out plans to decarbonise the energy system as a key part of the transition to a low carbon future. The Government has clearly stated its twin policy objectives for energy: maintaining secure, affordable energy supplies; and meeting the Climate Change Act (2008) statutory target of reducing greenhouse gas emissions by 80% by 2050. The need to achieve both these objectives within the same time frame only adds to the challenge.

The shift to a low carbon economy will require urgent and radical changes to the way society uses and consumes energy. At the forefront of this change will be the need to reduce demand and improve energy efficiency. It will also require substantial investment in the development of new low carbon and renewable energy infrastructure for electricity and other forms of energy, including transmission. According to the Committee on Climate Change[4] (CCC), electricity generation will need to be almost completely de-carbonised by the 2030s in order to meet the Climate Change Act's target.
The CCC's forecasts, however, suggest that without a significant increase in renewable and low carbon technologies by the early 2020s, new fossil fuel generation will replace ageing coal and nuclear plants and, in doing so, will effectively 'lock-in' decades of continuing greenhouse gas emissions. Such a scenario would make the 80% target virtually unobtainable.

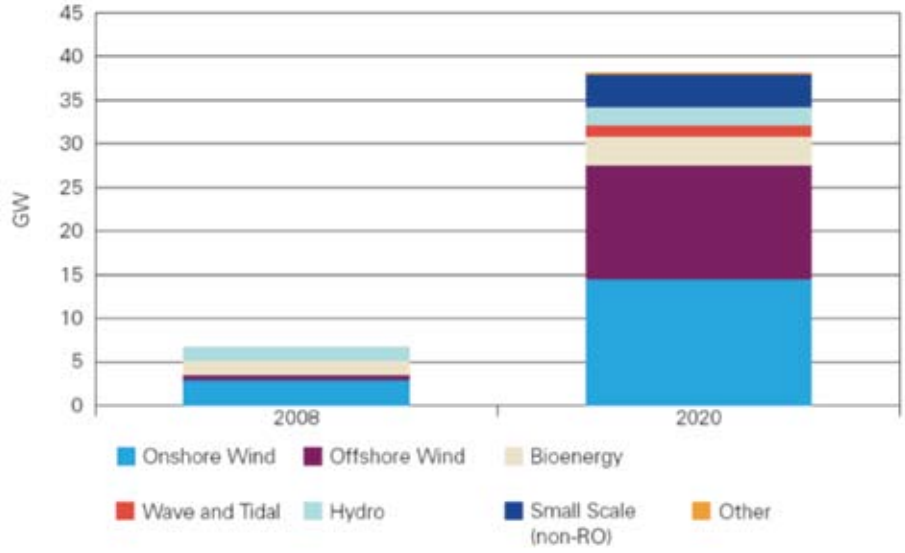
The need for a rapid uptake in renewable energy is reflected in the EU Renewable Energy Directive (EU RED) which has set the UK a legally binding target of achieving 15% of all energy from renewable sources by 2020, from a baseline of 2.25% in 2008. In the Government's analysis, meeting this target will specifically require more than 30% of electricity generation to be from renewable sources, from the 2008 level of 5.5%.

The Government published its Renewable Energy Strategy (RES) in July 2009[5]. This sets out a scenario for the renewable energy mix required for electricity generation to meet the EU RED target (Figure 1). The majority (around two-thirds) of new renewable deployment is expected to be from wind energy. Across the UK, on-shore wind energy is projected to expand from around 2 GW to 14 GW, a seven-fold increase.

[4] http://theccc.org.uk/reports

[5] http://decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx

Figure 1: Renewable electricity technologies – comparison between 2008 and projected to 2020 (from RES, 2009).



Source: Energy Trends (June 2009) and DECC analysis based on Redpoint/Trilemma (2009) and Element/Pöyry (2009)

Government planning policy on renewable energy development is laid down in the suite of national Planning Policy Statements (PPS). PPS1 (Delivering Sustainable Development), PPS1 (Supplement Planning for Climate Change) and PPS 22 (Renewable Energy) are particularly relevant[6]. PPS22 sets out how the planning system should make positive provision for renewable energy while at the same time meeting international and national statutory obligations to protect designated areas, species and habitats from inappropriate forms of development. Additionally, planning authorities are required to make positive provision for renewable energy within their development plans, having regard to environmental and amenity considerations.

From 2010, on-shore wind energy proposals in England in excess of 50MW will be guided by the relevant National Policy Statements (NPS) and determined by the Infrastructure Planning Commission (IPC). Local planning authorities will still determine applications under 50MW and as such will continue to be guided by Planning Policy Statements, but they will also have to take account of the relevant NPSs as a material consideration.

2. Natural England's Statutory Purposes and Responsibilities

Natural England was formally established on 1st October 2006 following the passage of the Natural Environment and Rural Communities (NERC) Act 2006 through Parliament.

The NERC Act sets out Natural England's purpose - to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development. The Act states that this purpose includes:

- Promoting nature conservation and protecting biodiversity;
- Conserving and enhancing the landscape;
- Securing the provision and improvement of facilities for the study, understanding and enjoyment of the natural environment;
- Promoting access to the countryside, open spaces and encouraging open air recreation; and
- Contributing in other ways to social and economic wellbeing through management of the natural environment.

[6] PPS1 supplement on climate change, PPS22, PPS7 and PPS9 are currently under review

'Nature conservation' is defined in the Act as the conservation of flora, fauna or geological or physiographical features. The NERC Act's Explanatory Notes state that the purpose of conserving and enhancing the landscape *"includes, but goes wider than, conserving the natural beauty of the landscape. It could for example cover conserving field boundaries (such as hedgerows and dry stone walls), and monuments, buildings and sub-surface archaeological features which contribute to the landscape. Natural England will be able to conserve and enhance the English landscape for aesthetic, cultural and historic purposes as well as those carried out for habitat protection purposes".*

Natural England is a consultation body on development plans (regional spatial strategies and local development frameworks - referred to as spatial plans in this document) and is a statutory consultee for all planning applications which are likely to have an impact on protected sites, habitats and species and on all development proposals that require an Environmental Impact Assessment. This includes major energy infrastructure proposals that will be determined by the IPC.

We have a number of statutory duties in relation to legally protected wildlife and geological sites under national legislation (Sites of Special Scientific Interest - SSSIs) and from the Habitats Regulations as derived from the EU Birds and Habitats Directives (Special Protection Areas - SPAs and Special Areas of Conservation - SACs). We also have consenting powers to grant Wildlife Species Licences to permit activities affecting protected species which would otherwise be illegal under various domestic and EU wildlife legislation.

We are the designating body for National Parks and Areas of Outstanding Natural Beauty (AONBs) and have duties to advise on any development proposals affecting these landscapes.

When considering wind energy and the natural environment, national PPS7 and PPS9 are particularly relevant and should be read alongside PPS22. These PPSs set out clear policies to protect and enhance landscapes, biodiversity and geodiversity. In particular, PPS7 states that the conservation of the natural beauty within National Parks, the Broads and AONBs should be given great weight in planning policies and development control decisions and that major development within these areas should not take place, except in exceptional circumstances. A major developments test is set out in paragraph 22 of PPS7 to assess proposals in these areas. PPS22 states that planning permission for renewable energy projects should only be granted in sites with nationally recognised designations where it can be demonstrated that the objectives of the designation will not be compromised by the development.

As the government's statutory advisor on the natural environment, Natural England's engagement can have a significant bearing on the decision-making process for on-shore wind energy development. To fulfil our statutory duties, we will ensure that the environmental impacts of wind energy proposals are properly addressed and we will only lodge a sustained objection where, in our judgement, there are likely to be unacceptable residual impacts on the natural environment.

In our experience, planning authorities generally rely heavily on Natural England's statutory advice as a contribution to their decision-making, whether we are objecting or not, and our view is often a material consideration for other parties making representations on individual proposals or on draft spatial plans.

The projected expansion of on-shore wind energy development has significant implications for Natural England's statutory interests and will inevitably increase demand for our statutory advice.

It is important therefore that our engagement is timely and that our staff can adopt a consistent, clear and transparent approach to assessing and commenting on draft spatial plans and individual proposals for on-shore wind energy development.

3. Natural England's Positions on Aspects of the Natural Environment

The approach contained in this document fits within Natural England's position on energy and our associated position on wind energy. It demonstrates how we will apply our position through our day to day operations. The guidance also compliments other relevant Natural England positions – including our agreed positions on Landscape, particularly All Landscapes Matter, Protected Landscapes and Historic Landscapes[7].

[7] Natural England's positions can be seen by following this link: http://www.naturalengland.org.uk/ourwork/policy/policies/default.aspx

Part B – Natural England's Approach

1. Purpose and Scope

The primary purpose of this document is to assist Natural England staff to deliver a consistent and clear approach to the discharge of our statutory responsibilities in relation to the deployment of on-shore wind energy development.

The approach is a systematic and transparent way of assessing the key factors that influence the degree to which the natural environment can accommodate wind energy development. This approach can be used to identify, at both a strategic level and for individual proposals, where and how on-shore wind energy might be successfully accommodated within the natural environment.

The approach forms the basis of guidance that will be used by Natural England staff to inform their statutory comments and advice on draft spatial plan policies and other relevant strategies at regional, sub-regional and local level. It also underpins guidance to assist staff in their engagement in development control casework, chiefly through informing discussions and advice at the pre-application stage but also in guiding formal responses to consultations. Annex 1 illustrates how this guidance fits with Natural England's agreed positions (particularly on energy and landscape) and other related guidance material from both Natural England and other sources.

Although developed to guide Natural England's engagement, the approach is publically available so that stakeholders and the public can see how we develop our statutory advice. We believe that wider application of our approach will add value to the deployment process and result in a greater number of proposals coming forward in locations that, from a natural environment perspective, are more able to accommodate wind energy development. We hope that it will be a step on the way to showing how society can integrate its concerns for the natural environment with appropriate and effective responses to combat climate change.

The approach takes account of the wide range of natural, cultural and recreational factors that contribute to our landscapes and geodiversity, our wildlife and cultural heritage, reflecting Natural England's statutory purpose and expertise.

The approach does not obviate the need for specialist, detailed assessment and advice, for example on landscape character, ecological, recreational or historic environment issues associated with specific wind energy proposals. Nor does this approach obviate the need to consult with other bodies with a statutory duty in respect of the environment, such as English Heritage which is the lead body on the historic environment. Rather it sets out an approach that works with and supports existing good practice and assessment techniques at both strategic and project level.

Natural England recognises that developers and planning authorities will need to have regard to other factors such as wind speed, grid connections, low flying areas, radar interference, proximity to residential development and other interests. These areas are outside our statutory remit and we consider they are therefore more properly issues for others to address. We would be interested in contributing to efforts to combine our approach with that of organisations whose remit covers such non-natural environmental factors.

The approach is for Natural England staff and so does not have statutory status. Insofar as it is relevant to planning authorities, it helps to explain our approach to discharging our statutory duties. Natural England is aware that local and regional planning bodies may wish to draw upon the approach when preparing spatial plans and undertaking regional and sub-regional assessments of available renewable energy resource. In this way the approach should help planning authorities deliver Government planning policy to plan positively for wind energy development in a manner consistent with the protection and enhancement of the natural environment.

2. Approach to Assessing On-Shore Wind Energy Development

Strategic level
Natural England supports the plan-led system and recognises the benefits of evidence-based spatial planning in setting the framework for delivering sustainable outcomes. We are committed to engaging with the development of spatial plans and in doing so will use the approach set out in this document as the starting point for our advice on policies relevant to the deployment of wind energy. Where appropriate we will also recommend use of the approach in studies which contribute to the evidence-base for spatial plans and other regional or sub-regional assessments of available renewable energy resources.

Individual Proposals
Wind energy developments, both on and offshore, together with their ancillary infrastructure such as grid connections and access tracks, will have impacts upon the natural environment. These impacts may affect sites, habitats, species and/or whole landscapes and the way people perceive and use them. There may also be changes to landscape character. These impacts may be positive or adverse, temporary or permanent, direct or indirect. The significance of impacts will vary from place to place depending on the magnitude of potential impacts and the sensitivity of the receiving environment.

It is important to appreciate that there are almost always opportunities to avoid, reduce or minimise potential impacts through good site selection, responsive design and other mitigation measures. In engaging with wind energy proposals, Natural England's primary aim will be to advise on ways to avoid and mitigate adverse impacts and we encourage developers to talk to us as early as possible, preferably during the process of site selection. Mitigation measures, and the likely success of those measures, should be identified and assessed through the Environmental Impact Assessment process where appropriate, so that the likely residual impacts of proposals can be considered by decision-makers.

In order to fulfil our role as statutory advisers, Natural England staff need to make an informed, professional judgement on the degree to which the natural environment can accommodate wind energy development. As well as being informed by our approach, this judgement will also take account of relevant Environmental Statements (if applicable), national, regional and local policy and other relevant evidence and information such as robust regional or sub-regional studies or assessments.

If, in our judgement, the residual impacts of a wind energy proposal on the natural environment are likely to be unacceptable, we may object.

If we believe there is insufficient or inadequate information on which to make an informed judgement about the impacts on the natural environment we will inform the planning authority and advise on the additional information that is required.

How to judge the degree to which the natural environment can accommodate wind energy development?

In any given location or area, the natural environment has a wide range of characteristics made up of a number of different factors. Over extensive areas, these factors are present in a multitude of combinations. The natural environment is rarely uniform and more often extremely complex. The different factors that make up the natural environment in a given region, area or specific location need to be identified, considered and assessed as systematically as possible before reaching a judgement.

It is important to separate the identification of relevant factors from the process of making judgements about them, either individually or in the context of the natural environment as a whole. There are three broad categories of natural environment factors that need to be considered in coming to a judgement on the degree to which the natural environment can accommodate wind energy development:

ecological and geological factors; landscape and visual factors; and factors relating to the enjoyment of the natural environment. Tables 1, 2 and 3 show the range of factors in each broad category.

Natural England is committed to a holistic approach to landscape, having adopted the definition used in the European Landscape Convention, which states that landscape means *'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'.* This definition of landscape covers everything that is included in the term 'natural environment' in the NERC Act, including the ecological and geological factors that are considered separately in this approach. For clarity's sake, and because the ELC's inclusive approach to landscape is not yet widely known and appreciated, our approach separates ecological and geological factors from those relating to landscape and visual factors.

Using the information provided by the planning authority (for draft spatial plans) or by the developer (for proposed development schemes) Natural England staff will need to assess the likely impacts of wind energy development on each of the factors that are relevant to the given location or area. This is not a simple scoring exercise but rather a matter of informed professional judgement, as any one single factor may be more or less significant depending on the site or area in question.

A judgement is required on the significance of the impacts of wind energy development on the individual factors, and also on the overall impact on the landscape as a whole. These judgements will take into account the extent to which society values the specific factors and the site, area or landscape as a whole.

This approach will be used to inform a judgement on the degree to which the natural environment can accommodate wind energy development when commenting/advising on draft spatial plans or renewable energy resource assessments, and in the consideration of discrete proposals (casework).

Landscape Character and Landscape Character Assessment

Understanding landscape character and the process of landscape character assessment will often be a key factor in the process of determining Natural England's judgement on wind energy developments. Landscape character is the result of the unique combination of elements that makes one place different from another. These elements include geology, landform, ecology, the historic environment, cultural heritage and recent development, and aesthetic and perceptual factors: They include all the elements implied in the ELC definition of landscape quoted above.

The process of landscape character assessment addresses both the **characterisation** process – that is, identifying, mapping, classifying and describing landscape character - and the process of **making judgements**, based on the analysis of landscape character, to inform a range of different decisions. Our staff need to be familiar with both the methods and language used. They need this familiarity so that they can play a full part in discussions at the strategic scale, and so that they can fully understand the assessments prepared by others, related to specific proposals. The approach to landscape character assessment that Natural England supports is set out in the publication Landscape Character Assessment: Guidance for England and Scotland.

Much of the data used to inform landscape character assessments are from existing sources, such as topographical maps and surveys of different aspects of the natural environment such as geology and biodiversity. Some of these sources are referred to in Table 6. The maps and other sources listed in that table require further interpretation, need studying in association with other datasets, and are often reinforced with field work, before judgements about such factors as landscape scale, pattern, landform and complexity are made. Similarly, although an Ordnance Survey map will provide excellent information about the size and pattern of settlements, and provides good evidence to underpin

Table 1: Ecological and Geological Factors	
Factor	**Comments**
Statutory protected sites	Wind energy turbine and track construction can result in habitat and species disturbance and loss. Wind turbine operation and maintenance may disturb sensitive species, and there is a risk of bird and bat collision with moving blades and any additional overhead wires. Geological impacts can include loss of geological exposures, damage or obscuring of geomorphological features, disruption to geomorphological processes and a range of impacts on soils For these reasons, the presence of Sites of Special Scientific Interest, National Nature Reserves, and sites designated under Natura 2000 (i.e. SAC and SPA) will substantially reduce the degree to which wind energy development can be accommodated.
Non-statutory wildlife and geo-diversity sites	Statutory protected sites comprise only around 7% of England's land area and there are many important habitats and sites outside these designated areas. The presence of such habitats, such as Priority Biodiversity Action Plan (BAP) habitats, Local Wildlife Sites and Local Geological Sites, especially those which are part of extensive ecological and geological networks (for example ancient semi-natural woodlands and coastal and floodplain grazing marsh), may generally reduce the degree to which wind energy development can be accommodated for the same reasons given above.
Presence of protected and priority BAP species	Some species (particularly bats and birds) that are protected under EU and UK law are particularly sensitive to wind energy development. Collision risk is greater where wind turbines straddle regular flight lines, such as between roosting and feeding grounds or where birds such as raptors make use of a site for hunting. The presence of these species may generally reduce the degree to which wind energy development can be accommodated.
Areas of deep peat	Peatlands are particularly sensitive to wind energy development at the construction, operational and de-commissioning stages. Impacts result from the construction of access roads, the casting of turbine bases, the installation of turbines, drainage works associated with the construction process and operation of the site, ongoing maintenance, and then removal of turbines at decommissioning. The types of impact are common to all stages, and involve changes in water levels and flow, and dissection of the peat mass. Drainage measures have the potential to lower the water level in the blanket bog, resulting in degradation and oxidation of peat. At sites which have a risk of peat slide, there is the additional risk of catastrophic peat failure and landslide. The presence of deep peat will generally reduce the degree to which wind energy development can be accommodated.

Table 2: Landscape and Visual Factors	
Factor	**Comments**
Statutory protected sites	England's National Parks and Areas of Outstanding Natural Beauty are designated because of the desirability to conserve and enhance their natural beauty and, in the case of National Parks, their opportunities for outdoor recreation. Wind energy developments can result in changes to their special qualities and compromise the purposes of designation. The extent to which wind energy development can be accommodated will depend on the extent to which the area's special qualities and characteristics, and the objectives for which the area is designated, are likely to be compromised. For these reasons, the presence of statutory protected landscapes will substantially reduce the degree to which wind energy development can be accommodated.
Landscape character	Landscape character is the result of the unique combination of elements that makes one place different from another. These elements include factors such as geology, landform, ecology, the historic environment, cultural heritage and recent developments, as well as aesthetic factors and people's perceptions. The extent to which wind energy development can be accommodated in a place will be influenced by the development's potential impact on landscape character.
Historic environment and cultural heritage	English Heritage is the national lead agency on the Historic Environment and will therefore take the lead on commenting on impacts on the historic environment. However, where wind energy development impacts on historic landscape character, Natural England will need to take it into account when coming to a judgement. In such cases we would expect to work closely with English Heritage and refer to their guidance on wind energy and the historic environment.

Table 3: Enjoyment of the Natural Environment Factors	
Factor	**Comments**
Enjoyment of the natural environment	Along National Trails there is an expectation that visitors can experience a high quality recreational experience. In National Parks, one of the purposes of designation is to promote public understanding and enjoyment of these areas' special qualities. The Countryside & Rights of Way Act 2000 has led to an expansion of open access opportunities. The presence of wind turbines may adversely affect the recreational experience and enjoyment of the natural environment from National Trails, National Parks and Open Access land. The presence of these recreational and access features may reduce the degree to which wind energy development can be accommodated.

assumptions about human influence on a place, other sources such as oblique and aerial photographs and field survey are needed too. Techniques that model theoretical inter-visibility (such as Zones of Theoretical Visibility) are often used by developers in their Environmental Statements, but again results of these exercises these need refining and confirming through fieldwork.

Landscape character is also influenced by aesthetic and perceptual aspects. Aesthetic aspects can be recorded in a broadly systematic way, although they are not wholly objective and value free. Text Box 1 provides a brief description of some of the aesthetic factors that contribute to landscape character. Perceptual aspects (also referred to as experiential aspects) are distinct from aesthetic aspects and include a sense of relative remoteness, tranquillity, associations (such as artistic, literary and historic) and openness.

Aesthetic and perceptual aspects are typically assessed during the field survey stage of landscape character assessment and during public consultation: they are not usually available as mapped datasets in their own right. The CPRE's National Tranquillity Maps are an exception to this. They are the product of an exercise that combines quantitative spatial data with extrapolated, qualitative social survey data about the kind of places where people expect to experience tranquillity. Thus they show the broad locations where the conditions that support tranquil experience may exist. The maps are available at national, regional and county scales, but they are not factual in the same way as a boundary map, or a map of land cover, is[8].

Identifying ecological and geological factors

Table 1 above set out the key ecological and geological factors that need to be assessed when forming a judgement on the degree to which the natural environment can accommodate wind energy.

To help inform the assessment, a number of national GIS datasets are available to Natural England staff[9]. These are listed in Table 4 and some are illustrated as national maps in Annex 2. The majority of these datasets are also publically available on-line, or can be shared externally by Natural England staff. Some datasets cannot be made available externally, usually due to copyright issues.

The datasets can be viewed at a regional and sub-regional scale. Staff will also be encouraged to make use of local and regional datasets and other available records to help inform the assessment. These datasets are generally ones which simply reflect the presence or absence of a feature or designation on the ground. The exception is the bird sensitivity map which has been derived from an analysis of representative bird distribution data.

The GIS maps of ecological and geological factors should not be interpreted literally to mean that Natural England will automatically object to any proposals within or in close proximity to a feature. Judgements on whether to object to individual proposals can only be made following an assessment of the impact of that particular proposal, and will depend on scale and design. The GIS maps should be used to help form a more strategic judgement on the degree to which an area is likely to be able to accommodate wind energy.

Identifying ecological and geological factors

The landscape, visual and access factors that need to be assessed when forming a judgement on the degree to which the natural environment can accommodate wind energy are set out in Tables 2 and 3. Natural England has prepared a range of GIS datasets to support and inform the application of some of these landscape, visual and access factors. As with the ecological and geological datasets, the majority of these datasets are also publically available on-line, or can be shared externally by Natural England staff. Tables 5 and 6 set out the different GIS datasets available. Note that due to licence restrictions we cannot pass on externally the OS data (or derived data such as slope, hill shade and

[8] http://www.cpre.org.uk/campaigns/landscape/tranquillity/national-and-regional-tranquillity-maps

[9] All datasets will be made available via Webmap and regional GI teams unless otherwise stated

contours) or aerial photography that Natural England staff are licensed to use. However these data, or equivalents, are readily available under licence from suppliers.

As with the ecological and geological datasets, these GIS maps do not in themselves necessarily identify the degree a landscape can accommodate wind energy. It should be noted that many landscape and visual factors do not lend themselves to be easily quantified and mapped, and their consideration will need to be based on qualitative information gained through on the ground inspection.

Table 4: Ecological and Geological GIS Datasets

Factor	Dataset	Justification and Availability
Statutory protected landscapes	SSSI National Nature Reserve Natura 2000 sites (SPA, SAC) RAMSAR sites	These consist of the national designations which identify the best sites for natural features (i.e. wildlife, geology & geomorphology) in England that have been selected through the Nature Conservation and Geological Conservation Reviews.
Non-statutory wildlife and geo-diversity sites	Habitat Inventories Ancient Woodland Inventory Local Wildlife Sites Local Geological Sites	Priority UKBAP habitats which also have national reliable data coverage. Local Geological Sites and Local Wildlife Sites are recognised and protected through the local planning system as advocated in PPS9.
Presence of protected and priority BAP species	RSPB/Natural England Bird Sensitivity Map	This dataset is based on distributional data for twelve sensitive bird species, plus statutory SPAs, and sites containing important populations of breeding waders and seabirds, or wintering waders or wildfowl. Ten of the 12 species included are listed on Annex I of the EU Birds Directive, with two additional species of conservation concern being included, due to concern about impacts on their rapidly declining or highly localised populations. All species included have known or suspected (based on information on the species' behaviour or ecology) susceptibility to the effects of wind turbines on birds, notably collision mortality and/or disturbance displacement.
	Wildfowl and Wetland Trust reserves	Support significant wildfowl populations.
Areas of deep peat	Location of Deep Peat – England	National dataset complied by Natural England which includes non-SSSI peatlands.

Considering size, scale and design of development

The scale of wind energy development (height and number of turbines) is an important consideration in evaluating the degree to which it can be accommodated by the natural environment. As such it can be a critical factor in Natural England's judgement on the suitability of an area or site for wind energy development. The starting point should be recognition that the scale of development that the natural environment might accommodate will vary from place to place.

All potential scales of development should be considered when assessing the degree to which the natural environment can accommodate wind energy development.

The wind energy industry widely regards 120-130m as the standard turbine height for commercial wind energy development, and average heights of turbines in production are likely to continue to increase. Strategic plans should therefore firstly consider if and where development at this scale might be accommodated by the natural environment. They should also consider the potential for smaller scale development, so that appropriately scaled proposals can also be encouraged.

Table 5: Landscape, Visual & Access GIS Datasets

Factor	Dataset and other sources of information	Justification and Availability
Statutory protected landscapes	National Park and AONB boundaries Protected Landscape Management Plans Heritage Coast boundaries	These are the statutorily designated landscapes of national importance. Available from relevant NPA or AONB team. Will identify the special qualities for which the National Park or AONB was designated. Heritage Coasts have different planning provisions than National Park and AONBs. Most are coincident with National Park and AONB boundaries and covered by their management plans. Some have separate Heritage Coast management plans or Integrated Coastal Zone Management plans.
Landscape Character	Landscape Character Assessments (See **Table 6** for datasets for factors that comprise landscape character)	A dataset of current LCAs is available on the Landscape Character Network website: http://www.landscapecharacter.org.uk/database This is not a link to the LCAs themselves, but to a national map, with links to specific LCAs.
Historic Environment and cultural heritage	Historic environment designations maps Historic Landscape Characterisation county studies	English Heritage is the national lead for the Historic Environment. Datasets are not held by Natural England but available from MAGIC or from English Heritage. Available from local planning authority Historic Environment Records.
Recreation and Access	National Trails Open Access Land (GIS) National Park Management Plans	Designated National Trails and registered Open Access Land. Available from relevant NPA. Will include reference to the opportunities for open-air recreation for which the National Park was designated.

Table 6: Landscape Character GIS Datasets		
Factor	**Dataset and other sources of information**	**Justification and Availability**
Landscape scale	Landscape type/ character area descriptions Hill shade (GIS) Rural land register (GIS) Contours (GIS) 1:25,000 OS map Aerial photographs Photographs and field survey	Database of location of LCAs available on the Landscape Character Network website: http://www.landscapecharacter.org.uk/database The various datatsets may help indicate the scale of the landscape.
Landform	Hill shade (GIS) Contours (GIS) Slope (GIS) Photographs and field survey	Datasets may indicate general lie of the land, including presence of strong topographical variety or distinctive landform features. This would need to be confirmed by photographs and/or field survey.
Landscape pattern and complexity	Landcover (GIS) Rural land register (GIS) Various scales of OS maps Aerial photographs	Datasets may indicate whether landscape patterns are complex or simple; or whether landform is rugged and irregular or regular and uniform.
Settlement and human influence	Various scales of OS maps Infrastructure (GIS) Aerial photographs Photographs and field survey	Datasets may reveal whether the settlement pattern is concentrated or dispersed; whether there are contemporary structures already in the area; or whether there is small scale, historic or vernacular settlement. This could be confirmed by photographs and/or field survey as needs be.
Inter-visibility	Zone of Theoretical Visibility Field survey	ZTVs may indicate the inter-visibility of a proposal with other sensitive landscapes. This would need to be confirmed by photographs and/or field survey. Developers often commission ZTVs when developing proposals for wind turbine developments. Natural England staff frequently have access to these.
Skylines	Hill shade (GIS) Contours (GIS) Slope (GIS)	Datasets may indicate whether skylines are prominent and whether there are any important landmarks. However, fieldwork would be required to confirm character of skylines.
Tranquillity	CPRE National Tranquillity Maps	National, regional and county maps available on: http://www.cpre.org.uk/campaigns/landscape/tranquillity/national-and-regional-tranquillity-maps Spatial data is mapped on a 500m2 grid. These maps show locations where tranquil experiences are regarded as likely.

When assessing specific proposals, consideration should be given to whether smaller scale development could be accommodated if it is found that large-scale development would be likely to cause unacceptable residual impacts on the natural environment.

For specific wind schemes, scale should be considered early in development process as part of site selection and scheme design. Natural England will use the factors set out in this document to inform discussions about appropriate scale and design. We will produce further information on design issues during 2010.

Considering spacing and cumulative impacts

The number, distribution and design of existing wind energy schemes is likely to affect the degree that an area can accommodate further development, as there could be cumulative impacts on ecological, geological and landscape features and on the way people perceive and use landscapes.

As wind energy deployment in England expands, the potential for cumulative impacts will increase. At the strategic level Natural England welcomes efforts to consider cumulative impacts as part of regional and sub-regional capacity and sensitivity studies and will advocate use of the factors set out in this document. We will also seek to work with partners developing the evidence base for the cumulative impacts on Natura 2000 sites.

Ultimately, judgements on cumulative impacts on the natural environment should be made through project-level assessment. Cumulative impacts must be considered early in and throughout the development proposal process so that findings can inform the siting and design of schemes. Equally important is the need for assessment to focus on the likelihood of significant cumulative effects, rather than detailed assessment of all possibilities within a large study area. The factors set out in this document can help identify the focus for assessment.

Cumulative impacts assessment should always include existing and consented schemes. It may also be sensible to consider other proposals that are within the formal planning process, particularly where it is clear that significant cumulative impacts may arise. These assessments, and related judgements, should reflect the variable degree of certainty in each situation.

This strategic approach does not attempt to address the detailed requirements for the assessment of cumulative impacts on the natural environment. There are other documents that provide greater detail, such as Scottish Natural Heritage's guidance *'Cumulative Effects of Wind Farms'*. During 2010, Natural England will review options for producing detailed guidance for assessing cumulative impacts on England's natural environment.

Assessing wind energy development within and close to Protected Landscapes

The presence of protected landscapes (National Parks, The Broads and Areas of Outstanding Natural Beauty) is a key factor to be considered when assessing the degree to which the natural environment can accommodate wind energy. The *process* of assessment and judgement is the same as for non-designated areas: the difference arises from taking into account the value society places on the special qualities of these areas and the additional determinative test of assessing whether major development is likely to compromise the objectives of designation. As a consequence, the standard that a development needs to meet to be accommodated within a protected landscape is higher than that for non-designated landscapes.

Protected Landscapes are designated for their special qualities in terms of their natural beauty and (for National Parks) the opportunities they provide for open-air recreation. Planning policy guidance states clearly that major development should only be approved if it does not compromise the special qualities and purposes of designation. The special qualities of a protected landscape and the objectives of designation are usually described in statutory management plans. Many of the bodies responsible for protected landscapes have undertaken Landscape Character Assessments which analyse in more detail the special qualities for which their landscapes were designated.

Planning policy does not prohibit major development within protected landscapes, but PPS7 clearly states that the conservation of the natural beauty within National Parks, the Broads and AONBs should be given great weight in planning policies and development control decisions and that major development within these areas should not take place, except in exceptional circumstances. PPS22 states that planning permission for renewable energy projects should only be granted in sites with nationally recognised designations where it can be demonstrated that the objectives of the designation will not be compromised by the development. In this, no distinction is made between the natural beauty of an AONB and a National Park: both are afforded equivalent importance.

The scale of development is a key factor when assessing the degree that wind energy can be accommodated within a protected landscape. Small-scale wind energy developments are generally less likely to compromise the objectives of designation, but this is not always the case, especially if there are cumulative impacts caused by several small-scale developments in the same area.

The approach to assessing the degree that wind energy development can be accommodated in areas adjacent to protected landscapes, that are part of their setting, merits particular attention. Natural England regards the settings of protected landscapes as being potentially influential on the conservation of the special qualities of the National Park or AONB concerned.

National planning policy has a strong presumption against local planning authorities creating 'buffers' around designated areas or applying policies to these zones which prevent development of renewable energy projects (as set out in paragraph 14 of PPS22). The potential impact of a wind energy development situated in setting of a protected landscape on the protected area itself is, however, a material consideration in determining applications. The critical test is, as before, to demonstrate that the development will not compromise the objectives of designation.

Spatial plans should include policies that take into account the sensitivity of the setting of protected landscapes. Judgements can, however, be difficult. This is especially so where there is continuity of landscape character and scenic quality extending outside the designated area, particularly if the designated boundary does not follow a clear change in landscape character.

Natural England therefore considers that, as with sites within protected landscapes, the bar is also higher in the areas outside them which form their setting. In some circumstances wind turbine developments outside statutory designated landscapes may compromise the objectives of designation. The often great variation in landscape character in and around our protected landscapes, and the equally great variation in intervisibility, means that very careful assessment must be undertaken of the impacts in each case.

For the same reasons cumulative impacts are important considerations in respect of the setting of protected landscapes. The potential for developments to dominate the setting of protected landscapes requires careful consideration. Cumulative impacts will normally be assessed in the EIA for each proposal, but there may be other relevant, local guidance that will contribute to a full understanding of the issues in each case.

Making a judgement – the landscape as a whole

As stated earlier, in any one place the natural environment will have a wide range of characteristics made up of a number of different factors. The natural environment is rarely uniform and more often is extremely complex.

For these reasons it is important to separate out as far as possible the assessment of specific factors, whether ecological, geological, landscape, visual or access related, being careful to record which factors are in contention in a particular place, and why. It is also important to be clear where professional judgement is being applied.

It is also important, before advising planning authorities or developers on Natural England's view (whether dealing with a wide ranging strategy or a proposal for a specific site), to step back and look at

the strategy or proposal and the area potentially affected, as a whole. At this stage in the assessment process, it is useful to refer to the two-stage approach advocated in national guidance on landscape character assessment[10]. The first stage is characterisation or the process of identifying what it is that makes one landscape different from another. The second stage is making judgements - using knowledge and understanding about landscape character in order to inform a range of decisions affecting the places concerned.

Adapting that approach to the consideration of wind energy in the natural environment produces these three clear stages:

1. Assessment of natural environment factors – identifying and analysing the range of factors that contribute to a full understanding of the case in hand;

2. Making a judgement against each of the natural environment factors (i, ecological and geological, ii, landscape and visual, iii, access and recreation);

3. Making an overall judgement – based on the whole natural environment (or, in European Landscape Convention terms, the whole landscape), remembering that this includes ecological, geological and access considerations as well as issues of landscape character and visual and perceptual analysis.

3. Concluding statement

It is vital that Natural England makes a positive contribution to the transition to a low carbon economy. Our approach to doing so is firmly based in our statutory responsibilities for the natural environment, including our powers and duties for sites, areas and landscapes that have statutory protection because of their national importance for wildlife, geology or landscape.

Our approach has three component stages: the first is to identify and assess the range of factors that need to be taken into account. The second is to make a judgement against each of those factors and the third to make an overall professional judgement about the impact that wind energy developments is likely to have on the areas concerned. In doing this we will always be mindful of our statutory responsibilities, but also of the wider context of climate change, and the urgent need to take steps to help reduce its potential impacts.

[10] Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment: Guidance for England and Scotland.

Annex 1 – Related Guidance

It is vital that Natural England makes a positive contribution to the transition to a low carbon economy. Our approach to doing so is firmly based in our statutory responsibilities for the natural environment, including our powers and duties for sites, areas and landscapes that have statutory protection because of their national importance for wildlife, geology or landscape.

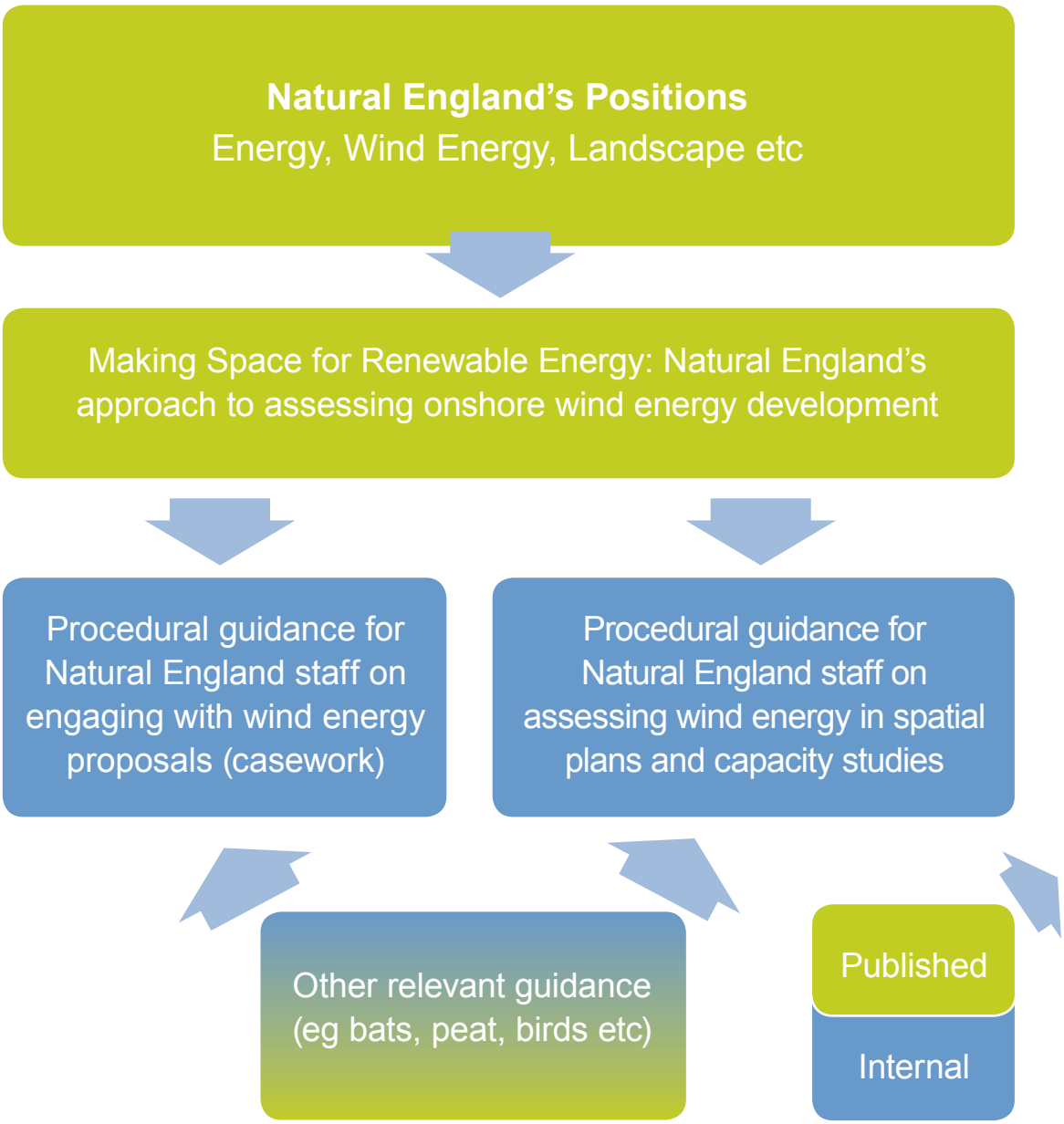
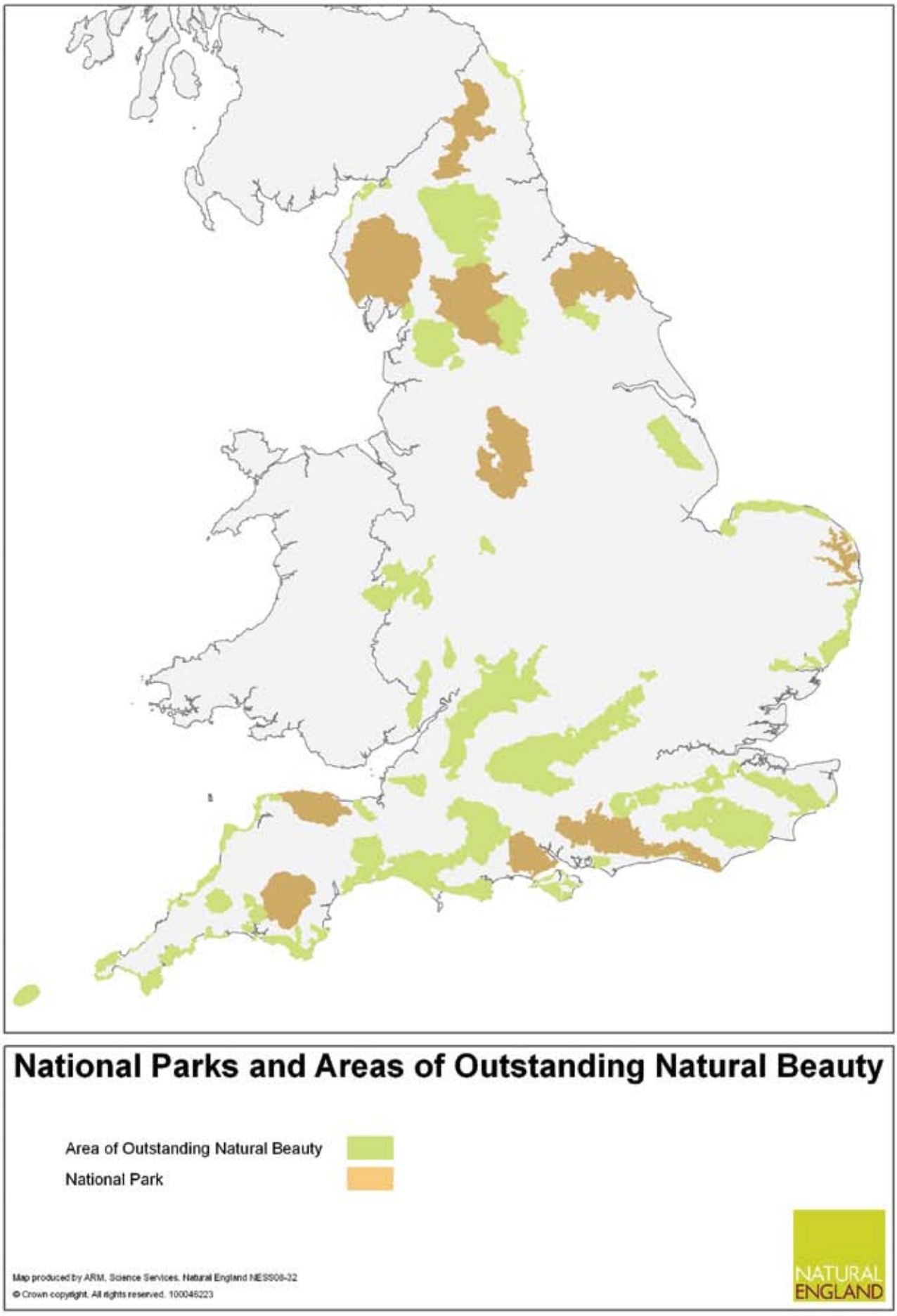
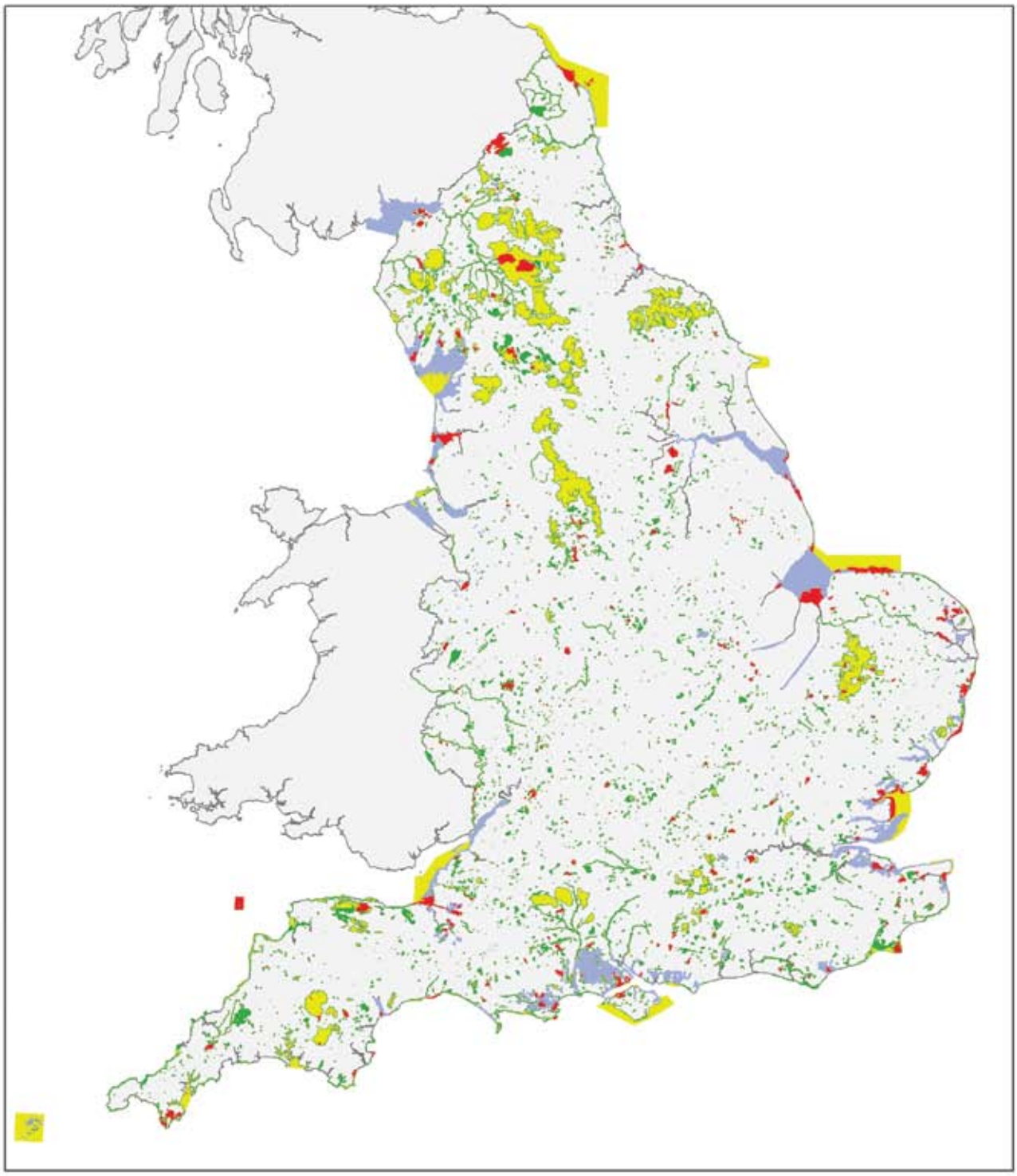


Table 7: Relevant Supporting Information		
Topic	**Title**	**Lanscape Institute**
Landscape	*Guidelines on Landscape and Visual Impact Assessment (this is not available for download)*	Landscape Institute
	Landscape Character Assessment Guidance (2002)	Countryside Agency (now Natural England)/SNH
	SNH's guidance on visual representation	SNH
	Siting and Designing Wind Farms in the Landscape	SNH
Cumulative assessment	*Cumulative Effects of Wind farms*	SNH
Birds	*Mapped and written guidance in relation to birds and onshore wind energy development in England*	RSPB/NE
	Assessing the effects of onshore wind farms on birds	Natural England
Bats	*Natural England interim guidance - bats and onshore wind turbines*	Natural England (published)
Historic environment	*Wind energy and the historic environment*	English Heritage

Annex 2 – Examples of GIS Datasets





Designations

- NNR
- RAMSAR
- N2K (SPA & SAC)
- SSSI

Map produced by ARM, Science Services, Natural England NESS08-32

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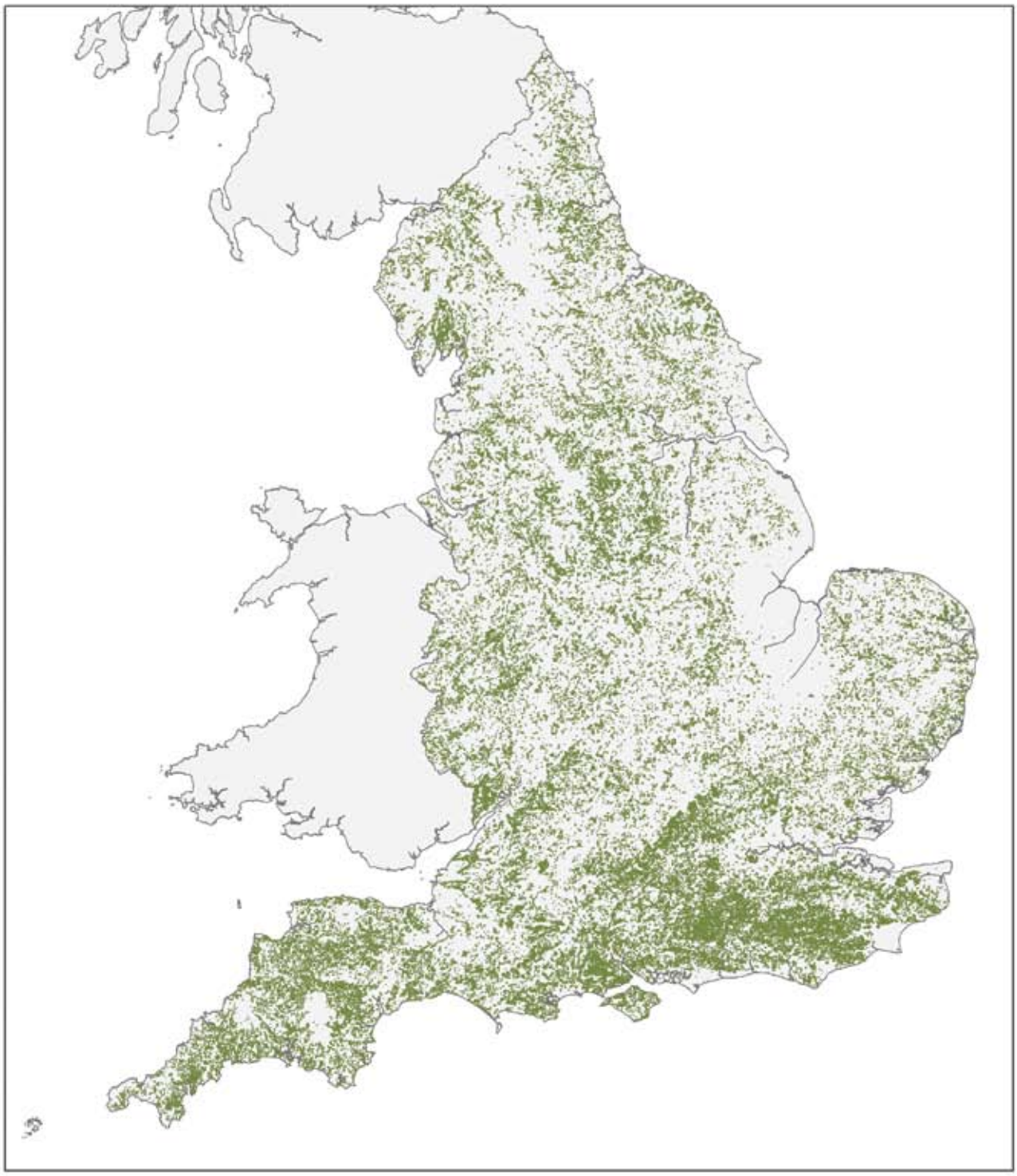

Habitat Inventory

Deciduous Woodland

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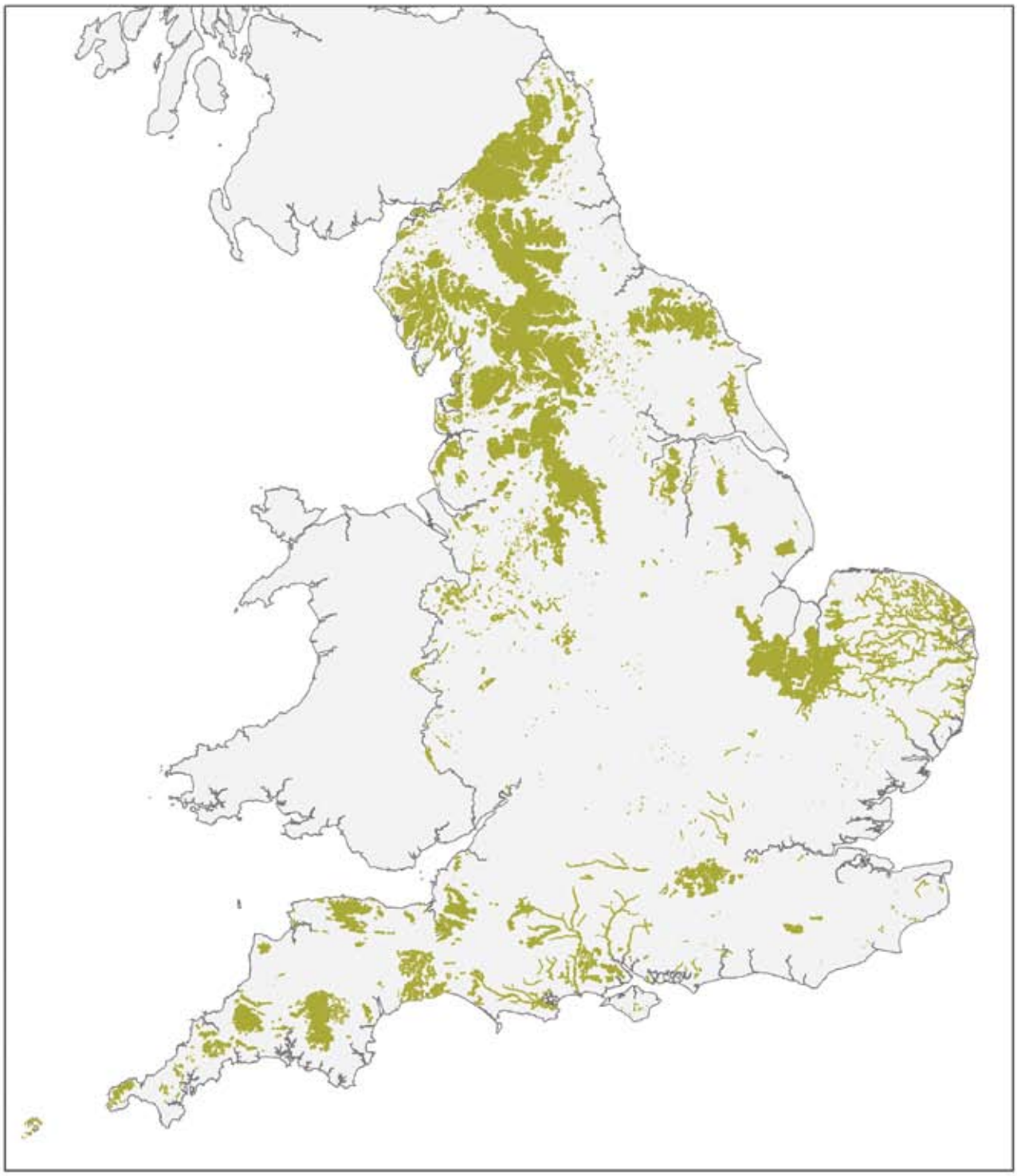

Deep Peat

Deep Peat

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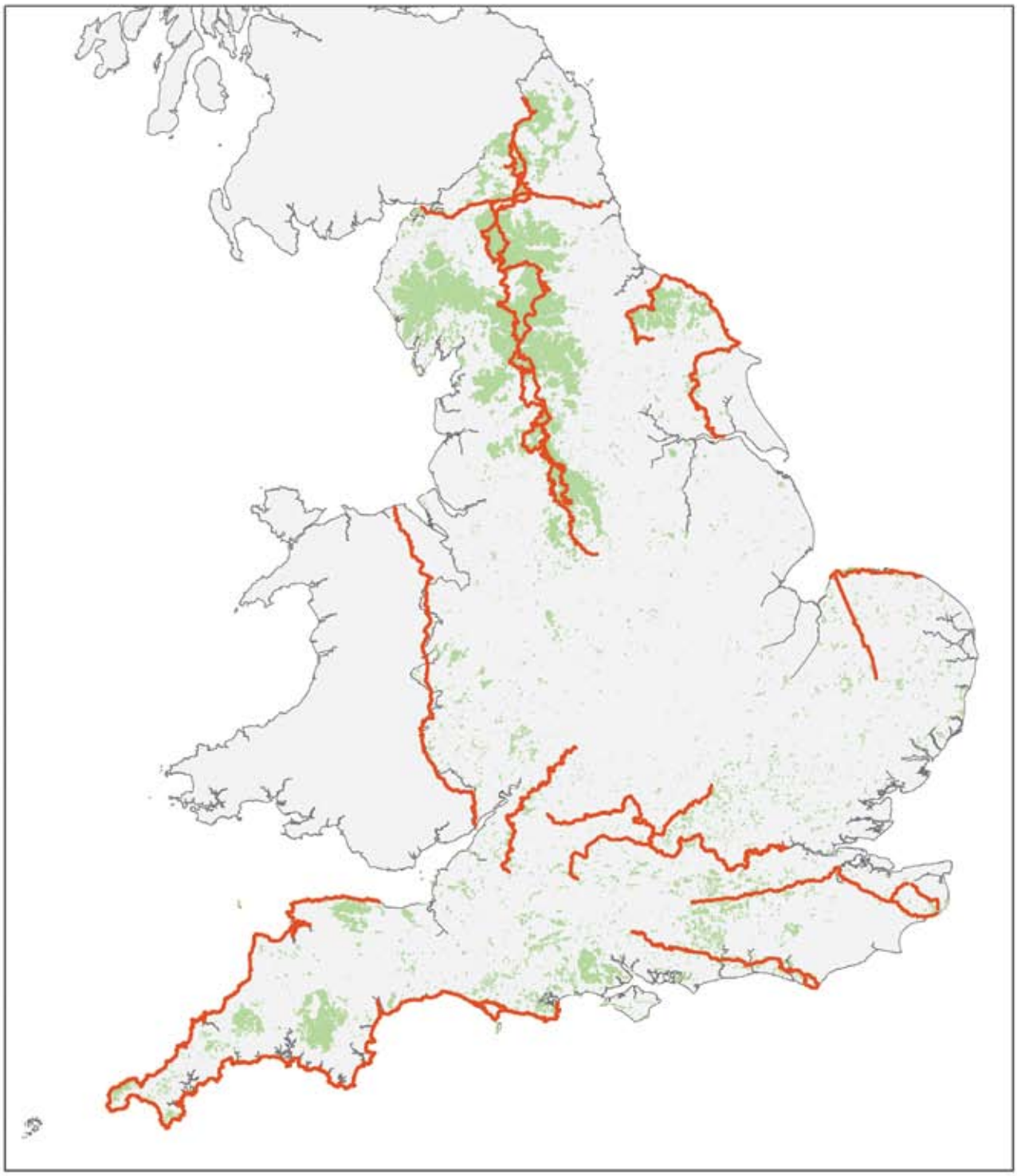

Access

National Trail

Open Access

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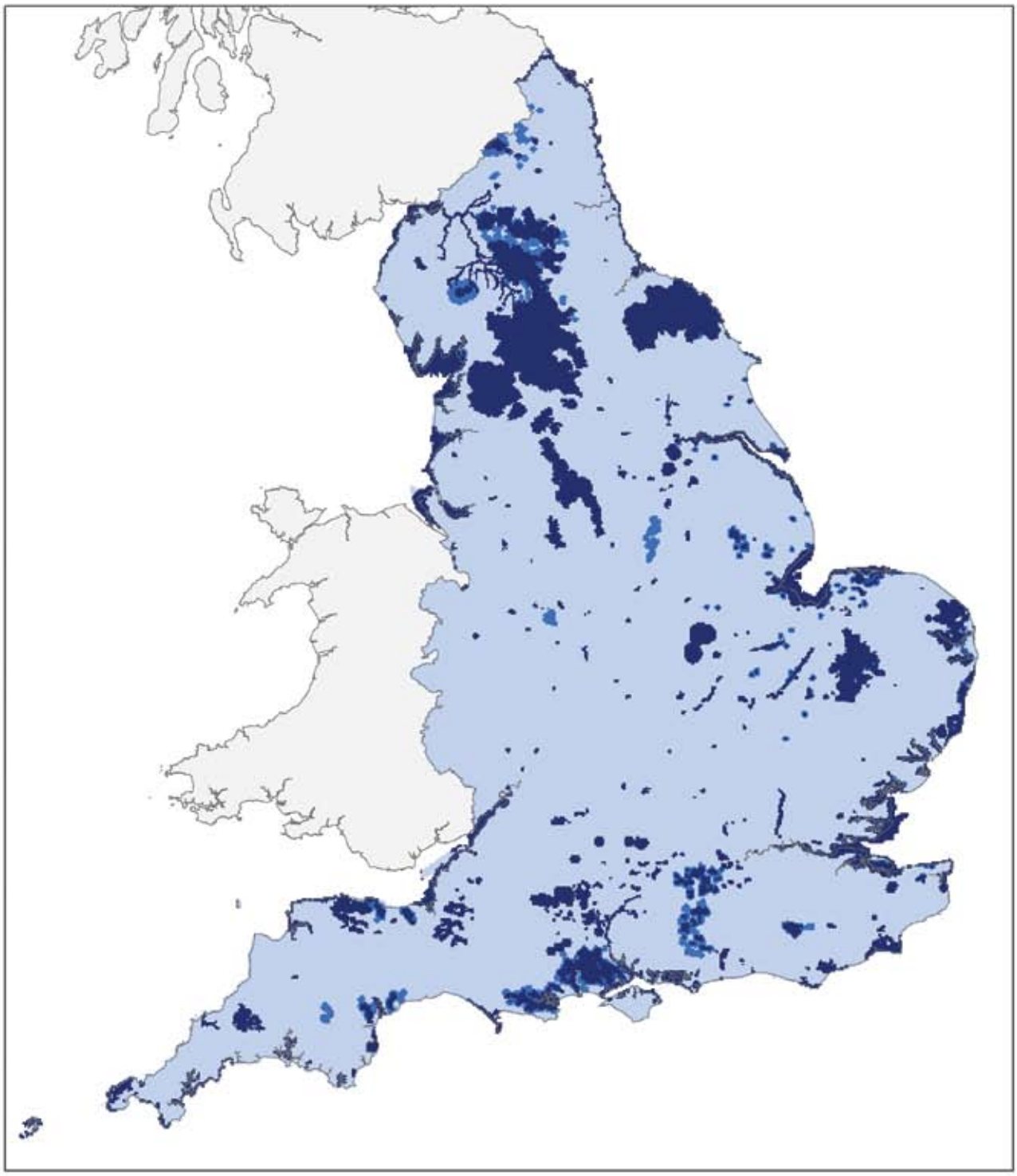

Bird Sensitivity

Highest Sensitivity

Lowest Sensitivity

Data supplied by RSPB

Map produced by ARM, Science Services, Natural England NESS08-32

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Cover photograph: Wind Farm, Lizard

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