Report to:
Fenland District Council

for
Wind Turbine Development Policy Guidance
Incorporating Revisions Following Public Consultation

by
The Landscape Partnership

date
June 2009

thelandscapepartnership
landscape architecture urban design environmental planning

Contents

Appendices

Drawings

07044/09B	Theoretical Visibility – Existing and proposed turbines (Prominent and Conspicuous zones only)
07044/10B	Theoretical Visibility – Turbines within 30km of Fenland District Council Boundary
07044/11C	Sequential Visual Impact
07044/12C	Nature Conservation and Heritage Designations
07044/13B	Settlement, rights of way, airfield, view and power line constraints
07044/14A	Main Landscape and Visual Constraints

0 Executive Summary

0.1 This report was commissioned by Fenland District Council in November 2007. It will be used by Planning Officers at the authority to enable them to make informed judgements on the suitability of wind turbine developments. It will also be available to landowners, developers, applicants and local interest groups to provide guidance on what is expected from planning applications and to identify areas and circumstances where turbine development is unlikely to be acceptable. The report was subject to public consultation between November 2008 and January 2009. Over 100 comments were received from 50 different consultees. All the comments received were evaluated and a number of changes were made to the report in order to reflect these comments.

0.2 The report has been produced in the light of the guidance provided by the Government in their White Paper 'Meeting the Energy Challenge: A White Paper on Energy' and PPS22: Renewable Energy. It also considers best practice guidance on wind farm development, the emerging East of England Plan and the approaches to wind energy being applied by local authorities adjacent to Fenland. The report provides detailed criteria to assess proposed wind farm development in the authority in support of the emerging policies in the LDF (currently N5 and N6).

0.3 The report considers a number of impacts that commercial turbine developments of different groupings, with a typical height of 100-125m, are likely to have. The typology of turbine development considered is:

- **Single Turbine**
- **Small Scale Group** – a linear or clustered arrangement of 2-5 turbines
- **Small to Medium Scale Group**– a linear or clustered arrangement of 6-11 turbines
- **Medium Scale Group** – a linear or clustered arrangement of 12-16 turbines
- **Large Scale Group** – a large development of 17 or more turbines

0.4 The capacity of the different landscapes types within Fenland to accommodate wind turbine development is assessed. This is done by firstly identifying the landscape character types and then evaluating the sensitivity of each type.

0.5 Five Landscape Character Areas were identified as follows.

Landscape Character Type	Landscape Character Area
Drained Fenland	The Fens
Settled Fen	Wisbech Settled Fen
Clay Fen Island	Chatteris Clay Island
Clay Fen Island	March Clay Island
Extracted Clay Fen Island	Whittlesey Island

0.6 The sensitivity of each of the Landscape Character Types to each of the wind turbine typologies was assessed by completing a detailed matrix considering the following factors: Scale and sense of enclosure, Impact of landform, Impact of landcover and landcover change, Settlement pattern and density, Skyline, Landmarks and impact of built development, Visibility from outside and connections with adjacent landscapes, Remoteness and Tranquillity. This was then used to determine the capacity of each of the Landscape Character Types to accommodate the different scales of turbine development. The results are as summarised below.

Summary of Landscape Capacity

	Capacity				
Landscape Type	**Single Turbine**	**Small Scale Group**	**Small to Medium Scale Group**	**Medium Scale Group**	**Large Scale Group**
The Fens	High	High	High	Medium-high	Medium-high
Settled Fen	High	Medium-high	Medium-high	Medium-low	Medium-low
Clay Fen Island	High	Medium-high	Medium-low	Medium-low	Medium-low
Extracted Clay Fen Island	High	High	Medium-high	Medium-low	Medium-low

0.7 The visual impact of turbine development is evaluated at different distances from the turbine development and summarised as follows.

Categories of Magnitude for Visual Impact of Turbines

Distance from turbines	**Magnitude of impact**	**Description**
Within 400m	Dominant	Turbines form the principle element of the view and may overpower the viewer
400m-2km	Prominent	Turbines form a very large element of the view, commanding and controlling the view
2-5km	Conspicuous	Turbines form a large element of the view, standing out from the surroundings and forming an unmistakable feature within the panorama.
5-15km	Apparent	Turbines form a medium element of the view, noticeable in panoramas, clearly visible and catching the eye.
15-30km	Inconspicuous	Turbines form a small element of the view, that is visible but not distinct or obvious on first glance or in overcast conditions
Over 30km	Negligible	Turbines form a very small element of the view, barely visible in clear conditions

0.8 The potential visual impact of existing and proposed turbines from the prominent and conspicuous categories within and adjacent to Fenland are illustrated.

0.9 The cumulative impact of existing wind turbines on the landscape, i.e. the combined impact of separate wind turbine developments is considered. The existing proportion of the Landscape Character Types within the different categories of magnitude for visual impact was assessed. An upper threshold is recommended to define the capacity of each landscape character type to ensure that the key characteristics of each landscape type are not overall adversely affected. The findings are summarised below.

Thresholds of Capacity for each Landscape Character Type

Landscape Character Type	Area (Ha)	Capacity Threshold 'Prominent'		Capacity Threshold 'Conspicuous'		Capacity Threshold 'Apparent'	
		Existing	Max.	Existing	Max.	Existing	Max.
Drained Fenland	44,363	16.4%	25%	57%	75%	99%	100%
Settled Fen	5,772	0%	20%	7%	60%	90%	100%
Clay Fen Islands	2,883	13%	15%	68%	45%	100%	100%
Extracted Clay Fen Island	1,697	31%	25%	74%	75%	100%	100%

0.10 Cumulative visual impact is assessed in three categories: combined/simultaneous, successive/repetitive and sequential. The first two types of impact are illustrated within a 5km range of existing and proposed turbines. The successive impact is assessed along A and B roads through Fenland identifying the existing impacts within prominent and conspicuous categories of visual impact and recommending an upper capacity threshold along a journey across or within the authority.

0.11 A number of further environmental constraints to wind turbine development are considered including nature conservation, heritage, airfields, grid connections and noise.

0.12 Visual impact and noise issues generally preclude larger turbine developments within urban areas. In order for wind energy to contribute to renewable energy production in urban extensions, smaller scale turbines may be required. This is likely to take the form of microgeneration and advice is provided on suitable types of development and factors to consider when assessing if a site will be suitable.

0.13 The report concludes by setting out detailed landscape and environmental criteria and thresholds to assist with the future assessment of wind turbine applications. These criteria should initially be applied at the Scoping Opinion stage and then if a scheme progresses further more fully through a Planning Application and supporting Environmental Statement. Non-compliance with an individual criterion should not necessarily preclude turbine development. However all the environmental factors should be carefully evaluated and then balanced by the planning authority against the requirements to contribute to regional and national targets for renewable energy generation. The guidelines should also always be considered in conjunction with a detailed study of the site and its surroundings, particularly in terms of existing trees, hedges, buildings and structures that may provide visual mitigation of a wind turbine development.

0.14 Criteria and thresholds are provided under the following headings:

- Landscape Character
- Landscape Capacity
- Visual Impacts
- Cumulative Landscape Impacts
- Cumulative Visual Impacts
- Biodiversity Considerations
- Heritage Considerations
- Recreation and Transport Routes
- Mitigation
- Guidance on form and siting in relation to landscape character types

1 Introduction

Purpose of the report

1.1 The Landscape Partnership was commissioned by Fenland District Council in November 2007 to undertake a study that would assess both the impact of existing turbine development within the District and also assist in the formulation of appropriate policies to inform consideration of future proposals. In order to do this the landscape and visual impacts of existing and proposed turbines have been assessed, both within Fenland District and within adjacent Authorities, (where they have a bearing on the situation within Fenland District). Other factors including nature conservation and heritage designations, wind speed, operational airfields and national grid connections have also been considered. Factors including noise, access, construction, electromagnetic production and interference and economic viability did not form part of the brief.

1.2 The study also looks as the possibility of incorporating wind turbine development within existing or future development, such as urban extensions. Guidance is provided on the types of turbine development that may be appropriate in urban areas, distances from properties that should be observed and mitigation measures that can be employed where turbines are deemed to be acceptable.

1.3 The findings of this study have been used to produce a set of guidelines to inform potential applicants and the planning authority. These reflect both the suitability of different wind turbine development groupings and a range of locations and landscapes within Fenland District. The guidelines are intended to allow a consistent and considered judgement to be made, as well as provide developers with the level of information they are expected to provide as part of a planning application. However it should be noted that the planning authority may identify other considerations that are relevant for individual applications in addition to the topics covered in this report.

1.4 The report was subject to public consultation between November 2008 and January 2009. Over 100 comments were received from 50 different consultees. All the comments received were evaluated and a number of changes were made to the report in order to reflect these comments.

Use of the Report

1.5 This document is intended to be used by Planning Officers at Fenland District Council, to enable them to make an informed judgement on the suitability of wind turbine development proposals within the Authority and when responding to applications within adjacent Authorities. Key elements of the report should also be made available to landowners, developers, applicants and local interest groups to provide guidance on what is expected from planning applications and identify areas and circumstances where turbine development is unlikely to be acceptable.

1.6 The document is not intended to replace the requirements of an Environmental Impact Assessment (EIA) under The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (as amended). Fenland District Council is likely to require a full EIA for all wind turbine developments, which fall under Schedule 2 of the Regulations. Detailed consideration of a site may identify factors specific to a site that counteract issues identified in this document.

Existing Situation in Fenland

1.7 Wind power has the potential to be a significant renewable energy source within Fenland District (see drawing 07044/01 for location plan). To date eight separate

schemes have been built with a total of 35 turbines in them. This has led to a relatively high concentration of turbines within Fenland District, when compared to neighbouring authorities. This has been at least partially due to the active encouragement by Council officers and members of wind turbine development within Fenland to support government targets for renewable energy generation. As a result Fenland District could be considered to have more than met their share of onshore renewable energy targets set by the East of England Regional Authority to 2010. However there is now a need to carefully consider the impacts that additional new developments or the extension of existing wind turbine sites within the district could have. Wind turbines are the single largest development in terms of vertical scale within a landscape and the rate of change within the District over the last 10 years has been considerable. There is a need to ensure that future development is in balance with the local landscape and the population that lives within it.

1.8 Two further turbine applications have also been granted planning permission, a further expansion of the Coldham grouping and a single turbine at an Anglian Water sewage treatment plant, with a number of other planning applications and requests for scoping opinions having been submitted to Fenland District Council. The area has attracted increasing interest for wind turbine development and there is now a need to develop criteria for deciding the appropriateness of future applications.

Existing Fenland District Council Guidance

1.9 Fenland District Council's 'Fenland District-wide Local Plan' was adopted in 1993. This document did not provide any specific guidance on wind turbine development. Policy PU2 of the adopted Local Plan related to energy supply and indicates that Fenland District Council are keen to encourage infrastructure related to energy supply to be sensitively located, particularly in relation to 'the countryside and wildlife'. However, this policy was not 'saved' under the 2004 Planning Act and is therefore not being carried forward during the preparation of the Local Development Framework (LDF) for Fenland District Council.

1.10 As part of the preparation of their LDF, the Council consulted on their 'Core Strategy and Development Policies – Preferred Options 2' between September and November 2007. The results of this consultation are currently being compiled, prior to a draft Core Strategy being submitted to the Secretary of State. Within the Preferred Options 2 document there are Preferred Options relating to Renewable Energy (N5), but also more specifically to Wind Turbine Development (N6). The Preferred Policy Option in relation to Wind Turbine Development is as follows:

Policies in the Plan will indicate that:

- *Proposals for wind turbines, together with any ancillary buildings and additional infrastructure, will be permitted, except where:*
- *the proposal would adversely affect international, national and local nature sites of conservation importance.*
- *the scale, siting or cumulative effect of the proposal would have an adverse impact on the visual quality of the open landscape.*

And subject to:

- *the proposal making provision for appropriate habitat creation within the site where appropriate, and*
- *adequate provision being made for the protection and retention of features of archaeological or historic interest, including scheduled ancient monuments, listed buildings and the settings of these features, where appropriate, and*
- *there being no adverse effect upon the amenities of neighbouring occupiers due to noise emission, visual intrusion, shadow flicker, rejected light or electronic disturbance, and*

- *the design, colour, layout and scale of turbines and ancillary structures (including electrical connections to the national grid) being sympathetic with the surroundings so as to minimise any adverse impact, and*
- *measures being included to limit the degree of disturbance and potential danger caused by the construction and decommissioning stages and the inclusion in the proposal of an acceptable restoration scheme for the after use of the site.*

1.11 Fenland District Council consider that, given current Government and strategic guidance, it will be appropriate to include a specific policy within the LDF relating to wind turbine development and in line with the factors considered above.

2 Methodology

Existing Guidance

2.1 'Meeting The Energy Challenge: A White Paper on Energy' sets out the Government's international and domestic energy strategy, in response to the Kyoto Protocol. It responds to changing circumstances, addresses the long-term energy challenges of reducing global warming and ensuring secure, clean and affordable energy, and tackles the Government's four energy policy goals. These energy policy goals are:

- *to put ourselves on a path to cutting the UK's carbon dioxide emissions - the main contributor to global warming - by some 60% by about 2050, with real progress by 2020;*
- *to maintain the reliability of energy supplies;*
- *to promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and*
- *to ensure that every home is adequately and affordably heated.*

2.2 The document outlines a target that aims to see renewables grow as a proportion of our electricity supplies to 10% by 2010, with an aspiration for this level to double by 2020. The White Paper outlines key economic and financial proposals to encourage increased development of renewable energy supplies, as well as ways to lower practical barriers to renewables development. These targets and a strategy to help deliver them are outlined further in the Department for Business, Enterprise and Regulator Reform's consultation draft Renewable Energy Strategy, with a target of 15% of electricity from renewable energy by 2020.

2.3 In Planning Policy Statement: Planning and Climate Change (Supplement to Planning Policy Statement 1) the need for renewable energy is reinforced. This Supplement to PPS 1 requires Core Strategies and supporting Local Development Documents to develop a framework that promotes and encourages renewable energy generation. It also suggests that Local Authorities should consider identifying suitable locations for renewable energy sources and that applicants should not be required to demonstrate the overall need for energy generation.

2.4 PPS22: Renewable Energy, and its Companion Guide 'Planning for Renewable Energy', provide National Policy and technical guidance on renewable energies from energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of the oceans, from the sun and also biomass. The PPS calls for planning policies at the local and regional level to encourage and promote the use of the full range of renewable energy sources, as reiterated in the Town and Country Planning Association's document 'Planning for Wind Energy', and contribute to meeting regional renewable energy targets. At the local level, local authorities are required to set out the criteria by which planning applications for renewable energy projects will be assessed, which can be supported by Supplementary Planning Documents if considered necessary.

2.5 The Key Principles set out in PPS22, which should be adhered to by Regional planning bodies and local planning authorities in their approach to planning for renewable energy, are:

i. *Renewable energy developments should be capable of being accommodated throughout England in locations where the technology is viable and environmental, economic, and social impacts can be addressed satisfactorily.*
ii. *Regional spatial strategies and local development documents should contain policies designed to promote and encourage, rather than restrict, the development of renewable energy resources. Regional planning bodies and local planning authorities should recognise the full range of renewable energy sources, their differing characteristics, locational requirements and the potential for exploiting them subject to appropriate environmental safeguards.*

iii. *At the local level, planning authorities should set out the criteria that will be applied in assessing applications for planning permission for renewable energy projects. Planning policies that rule out or place constraints on the development of all, or specific types of, renewable energy technologies should not be included in regional spatial strategies or local development documents without sufficient reasoned justification. The Government may intervene in the plan making process where it considers that the constraints being proposed by local authorities are too great or have been poorly justified.*

iv. *The wider environmental and economic benefits of all proposals for renewable energy projects, whatever their scale, are material considerations that should be given significant weight in determining whether proposals should be granted planning permission.*

v. *Regional planning bodies and local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g. identifying generalised locations for development based on mean wind speeds). Technological change can mean that sites currently excluded as locations for particular types of renewable energy development may in future be suitable.*

vi. *Small-scale projects can provide a limited but valuable contribution to overall outputs of renewable energy and to meeting energy needs both locally and nationally. Planning authorities should not therefore reject planning applications simply because the level of output is small.*

vii. *Local planning authorities, regional stakeholders and Local Strategic Partnerships should foster community involvement in renewable energy projects and seek to promote knowledge of and greater acceptance by the public of prospective renewable energy developments that are appropriately located. Developers of renewable energy projects should engage in active consultation and discussion with local communities at an early stage in the planning process, and before any planning application is formally submitted.*

viii. *Development proposals should demonstrate any environmental, economic and social benefits as well as how any environmental and social impacts have been minimized through careful consideration of location, scale, design and other measures.*

2.6 The Companion Guide to PPS22 addresses considerations for addressing planning applications for different types of renewable energy production. This includes onshore wind turbine development and provides detail as to the factors that should be considered in relation to wind turbine development. These include noise, low frequency noise (infrasound), landscape and visual impact, listed buildings and conservation areas, safety, proximity to roads and infrastructure, ecology and ornithology, electromagnetic production and interference, interference with electromagnetic transmissions, shadow flicker and reflected light, icing and archaeology. It does not, however, provide detailed guidance on assessing the impacts of a wind turbine development. This report will attempt to provide this guidance for Fenland District Council, with reference to guidance documents produced by other organisations.

2.7 TCPA's 'Planning for Wind Energy' also highlights the practicalities of wind energy development and the effects that should be considered in relation to it. The effects that are particularly highlighted within the document are:

- Landscape and visual effects
- Effects on wildlife and nature conservation
- Heritage
- Cumulative Effects
- Noise

2.8 The East of England Plan is the Regional Spatial Strategy for the East of England and was adopted in May 2008. Policies contained within the RSS include Policy SS1,

which advocates sustainable development in line with Government and best practice guidance. Policy ENV2 states the need to protect and enhance the diversity and local distinctiveness of the countryside character by amongst other things, developing criteria-based policies, informed by area-wide strategies and landscape character assessments to ensure that all development respects and enhances local landscape character and providing appropriate mitigation measures where avoidance of damage to local landscape. Policy ENV 3 relates to Biodiversity and Earth Heritage and seeks to ensure particularly the protection of nationally and internationally designated sites, whereas Policy ENV 6 relates to protection of the historic environment including buried landscapes. The most specific policy in terms of wind turbine development, however, is Policy ENG 2, which sets renewable energy targets for the region. These include the aim that by 2010 10% of the region's energy and by 2020 17% of the region's energy should come from renewable sources, excluding offshore wind. These targets are "subject to meeting European and international obligations to protect wildlife, including migratory birds, and to revision and development through the review of this RSS".

Surrounding Authorities Approaches

2.9 Of the five local authorities adjacent to Fenland District, three have produced Supplementary Planning Guidance/Documents to date. South Holland District Council, located to the north of Fenland District, Adopted Supplementary Planning Guidance entitled 'Wind Energy' in 2004. This SPG sets out 'policies for the consideration of proposals for wind turbines within South Holland District' and covers Wind Potential, Ministry of Defence and Civil Aviation Authority Requirements, Landscape and Visual Impact, Connection to the Electricity Distribution Network, Effect on Local Amenity and Quality of Life, Impact of Wind Turbines on Nature Conservation and the Built Environment, Traffic Generation and Vehicular Access, Cumulative Impact of Wind Turbines and Environmental Impact Assessment Requirements. The document sets out what will be required from developers and how South Holland District Council will determine wind turbine applications, but does not provide a large amount of detail as to how they have arrived at some of the criteria they have developed.

2.10 King's Lynn and West Norfolk Borough Council, located to the east of Fenland District, commissioned a joint report with Breckland Council in 2003 entitled Wind Turbine Development: Landscape Assessment, Evaluation and Guidance. The objectives of this study were to provide strategic guidance on the capacity of the landscape to accommodate wind turbine development, to provide information on the potential location of wind turbine developments to help in the preparation of Supplementary Planning guidance and to help both Local Authorities to develop criteria for assessing the impact of proposals for wind turbine development. This was based on landscape character assessment work and identified areas of focus for different scales of turbine development, from a landscape capacity point of view.

2.11 Huntingdonshire District Council, located to the west and south west of Fenland District, Adopted their Supplementary Planning Document: Wind Power in February 2006. The SPD was developed from a similar study to that undertaken for King's Lynn and West Norfolk and Breckland, and identifies the landscape capacity for wind turbine development of each landscape character area in Huntingdonshire. The document also provides guidance on the design and locating of wind turbines, as well as the consideration that should be afforded to their potential cumulative impacts.

2.12 The studies for Kings Lynn and West Norfolk Borough Council and Huntingdonshire District Council were used as a basis for developing the guidance in this document. This allowed a comparability of approach in relation to landscape character and sensitivity with adjoining authorities. The approach taken in South Holland was considered less relevant in the context Fenland District.

Wind Turbine Typologies

2.13 Existing turbines within Fenland District generally range in height from between 100-125m to the tip of the blades. It has therefore been assumed that future turbines will be at least within this height range, unless there is an advance in turbine technology that alters the heights of turbines available within the market place. Generic wind turbine typologies have been developed for this study in order to help understand the effects of different scales of turbine development. These typologies vary to some degree from those used by surrounding Local Authorities in their wind turbine guidance, which was developed prior to a number of sites being built. The typology applied in Fenland District has been specifically devised to reflect the existing turbine development that has taken place within Fenland District over recent years and the particular characteristics of the Fenland situation. Turbine developments have been grouped into five categories, although these do not include small domestic installations. The five categories of turbine development used for this study are:

- **Single Turbine** – a single turbine
- **Small Scale Group** – a linear or clustered arrangement of 2-5 turbines
- **Small to Medium Scale Group**– a linear or clustered arrangement of 6-11 turbines
- **Medium Scale Group** – a linear or clustered arrangement of 12-16 turbines
- **Large Scale Group** – a large development of 17+ turbines

2.14 These typologies were developed from those previously devised by surrounding Local Authorities, and adjusted based on field observations of the existing turbine developments within Fenland District. As a result, the two existing turbine developments at Coldham, which read together, would be classified as a large scale group, the group at Glassmoor a small to medium scale group, the groups at McCain's Factory in Whittlesey and Ransonmoor small scale groups and the Foundry Way turbine a single turbine.

2.15 In the regional renewable energy study 'Placing Renewables in the East of England' a slightly different wind turbine typology is used. The regional study does identify, however, that The Fens would be suitable for medium to large turbine groups. This indicates that at a regional scale the maximum number of turbines that is considered to be appropriate in a grouping located in The Fens is 24 turbines.

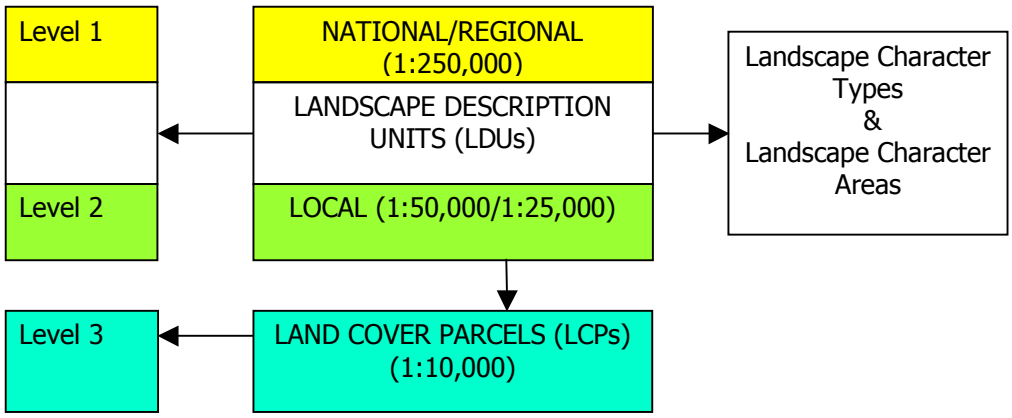
Assessing Landscape Capacity

2.16 The established national guidance on Landscape Character Assessment is found within the Countryside Agency and Scottish Natural Heritage document "Landscape Character Assessment: Guidance for England and Wales", 2002. This sets out the process methodology that needs to be followed in producing a Landscape Character Assessment. The main stages of the process are set out in Fig 2.4 of the guidance (see Appendix 1). The guidance is also supported by Topic Papers, including Topic Paper 6 – Techniques and criteria for judging capacity and sensitivity. Topic Paper 6 suggests approaches to evaluating landscape capacity and sensitivity in relation to different types of development. The three main aspects identified as determining landscape capacity are Landscape Sensitivity, Landscape Quality and Landscape Value (see paragraphs 2.20-2.26 below). Areas with less capacity would therefore in theory be less likely to be able to accommodate wind turbine development:

Landscape Sensitivity	+	**Visual Sensitivity**	**+**	**Landscape Value**	**=**	**Landscape capacity**

Landscape Character

2.17 The initial stage of defining landscape capacity for wind turbines within Fenland District was to undertake a preliminary assessment of the landscape character. The whole district falls within Countryside Character Area 46 The Fens as defined by Natural England. This relative uniformity in landscape character at a national scale has meant Fenland District Council have not to date undertaken a more detailed Landscape Character Assessment of the District. However, in order to assess the capacity of the landscape to accommodate wind turbine development the district needed to be broken down into smaller units. The approach taken in this study involved the division of the district into a number of Landscape Description Units or LDUs at a Level 1 scale. This is subdivision of the landscape at a national/regional scale building on the Joint Character Map of England, (combining both Landscape Character Regions and Natural Areas) and was provided as a desk based analysis by the Countryside Agency (now part of Natural England) as their National Typology. LDUs are the fundamental building blocks used in the landscape character assessment. They are distinct and relatively homogenous units of land, each defined by a series of definitive attributes, so called because they define the extent of each spatial unit. The units can operate at a number of spatial scales or 'Levels,' dependent on the purpose of the study and are summarised below.



Spatial Framework for landscape character assessment

2.18 Fieldwork was carried out during January 2008 to test the desk based Level 1 LDUs on the ground. The survey team consisted of a team of two, both landscape architects, who were responsible for drafting the text. The boundaries of the LDUs were considered in the field but not analysed in detail (to the nearest field boundary) as they were considered to be of appropriate scale for an assessment involving large structures such as wind turbines in the Fenland landscape. The survey team, who considered each LDU in turn, systematically appraised the study area. Field survey record sheets were used to record data. A sample of the two-page pro forma used is included as Appendix 2. Additional notes and photographic records supplemented the use of forms. Both notes and photographs informed the process of drafting a description of each character area in this report (see Appendix 5).

2.19 The boundaries of the landscape character areas have been retained as the boundaries of the LDUs. These were originally defined primarily on the basis of geology, soils or landform and the boundaries, although real based on the preceding factors, rarely accord with fixed features on the ground, such as the edge of woodland or a road or track. It should be understood that although the drawing of boundary lines on a plan is an inevitable part of the process, this does not always mean that landscape character is dramatically different either side of each and every

line. Landscape character can suddenly change, e.g. at the interface of an historic parkland, at the foot of a steep scarp slope or at a settlement edge, but more often there is often a more gradual transition e.g. from the drained fens to the islands. As a result, the boundaries of the Landscape Character Areas have not been adjusted in this study to accord with fixed features.

Landscape Sensitivity

2.20 The key characteristics of the landscape character areas identified using the above methodology have been used to group the landscape character areas into 'landscape character types' which are landscape character areas that share a common pattern of characteristics, with similar patterns of geology, landform, soils, vegetation, land use, settlement and field pattern. The key characteristics were then grouped into specific categories under which the sensitivity of these characteristics could be assessed for wind turbine development using each of the turbine typologies outlined above. The categories have been evolved from the advise provided by Topic Paper 6, previous studies in neighbouring authorities and the information collected during the field survey work, and are as follows:

- Scale and sense of enclosure
- Impact of landform
- Impact of landcover and landcover change
- Settlement pattern and density
- Skyline
- Landmarks and impact of built development
- Visibility from outside and connections with adjacent landscapes
- Remoteness and Tranquillity

2.21 More detail on the key characteristics and how they relate to sensitivity can be found in Appendix 3. Appendix 3 also demonstrates which of the key characteristics can be considered to relate to landscape sensitivity and which relate to visual sensitivity, which are considered to be two separate aspects in Topic Paper 6. The consideration of visual sensitivity should also address the impact of proposals on population, i.e. the impact on numbers and types of people, and how mitigation has been used to reduce impacts. Proximity to population, in the form of advisory distances from settlement and impacts on fields of view, and mitigation are addressed later in Section 6.

2.22 For each landscape type, a matrix has been completed to assess the sensitivity of the key characteristics to wind turbine development. The sensitivity assessment is based on the following 3 point scale:

- **Low sensitivity** – areas where the key characteristics will not be adversely affected by wind turbine development. The landscape would be able to accommodate some windfarm development without a significant impact on its character.
- **Moderate sensitivity** – areas where wind turbine development may cause some adverse affect on the key characteristics. There may be some potential to accommodate windfarm development without a significant impact on its character but attention to design, siting and cumulative impact will be required.
- **High sensitivity** - areas where the key characteristics are likely to be adversely affected by wind turbine development. The landscape will not be able to accommodate windfarm development without a significant impact on its character.

2.23 In order to assess the overall sensitivity of each landscape character type to each turbine typology, a 'score' has been assigned to each level of sensitivity, 3 points for high sensitivity, 2 points for moderate sensitivity and 1 point for low sensitivity. The score under the different categories of sensitivity has then been totalled to give an overall sensitivity for each turbine grouping. No weighting has been given to any of the individual key characteristics. The possible scores that could be achieved for

each typology vary from 8 to 24 and these scores have been divided into 4 bands to provide an indication of overall sensitivity, as follows:

High Overall Sensitivity	= 21-24 points
Medium-high Overall Sensitivity	= 17-20 points
Medium-low Overall Sensitivity	= 13-16 points
Low Overall Sensitivity	= 8-12 points

2.24 An example of how the sensitivity matrix and overall sensitivity scores work is provided below in Table 1.

Table 1: Example Sensitivity Matrix

Key Characteristics of the landscape Type	**Single Turbine**	**Small Scale Group**	**Small to Medium Scale Group**	**Medium Scale Group**	**Large Scale Group**
Scale and sense of enclosure	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Impact of landform	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Impact of landcover and landcover change	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Settlement pattern and density	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Skyline	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Landmarks and impact of built development	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)
Visibility from outside and connections with adjacent landscapes	Moderate (2)	Moderate (2)	Moderate (2)	High (3)	High (3)
Remoteness and Tranquillity	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Total	**10**	**10**	**10**	**14**	**14**
Overall Sensitivity	**Low**	**Low**	**Low**	**Medium-low**	**Medium-low**

Landscape Value

2.25 Topic Paper 6 (see paragraph 2.16) recommends a consideration of the value of a landscape, including its aesthetic and perceptual qualities, when defining landscape capacity. The 2002 Guidance also provides some criteria for testing landscape value, including Landscape Quality, Scenic quality, Rarity, Representativeness, Conservation Interests, Wildness, Cultural Associations, Tranquillity and Recreational Opportunities. It is suggested within Topic Paper 6 that this aspect is informed by stakeholders by means of a questionnaire. However, there are no plans for this type of survey to be undertaken for Fenland District. As a proxy for landscape value this report considers landscape designations at the national, regional or local scale to represent the value placed on a landscape in its local and wider context. There are no existing designations within Fenland District and as a result all the landscape character areas and types have a relatively low landscape value.

Landscape Capacity

2.26 Although the best practice approach advocated in Topic Paper 6 recommends consideration of landscape sensitivity and landscape value, in Fenland District the lack of data on landscape value does not offer assistance in determining landscape capacity. As a result, it has been decided to disregard this aspect from the 'scoring' system used to measure relative landscape capacity.

2.27 A similar approach to deriving landscape capacity to that previously utilised in the studies produced for Huntingdonshire District Council and King's Lynn and West Norfolk District Council has been used. This approach involves basing the relative capacity on the reverse of the overall sensitivity of the landscape character types to wind turbine development, as follows:

A High Sensitivity character type	= Low Capacity character type
A Medium-high Sensitivity character type	= Medium-low Capacity character type
A Medium-low Sensitivity character type	= Medium-high Capacity character type
A Low Sensitivity character type	= High Capacity character type

Assessing Turbine Visibility

2.28 There have been a number studies undertaken that consider the visual impacts of wind turbine development. PPS22 and its companion guide highlight the importance of undertaking visual assessments of all renewable energy developments but provide limited guidance on how this should be undertaken. These documents also refer to the importance of assessing the cumulative visual impact of successive renewable energy developments. The Scottish Government, however, provides more prescriptive guidance, which is widely used when undertaking wind turbine studies in England. Appendix 4 provides detail on the range of guidance provided in relation to visual impact by some of the current wind turbine literature, as well as some more historic references.

2.29 PPS22 and much of the other literature identified in Appendix 4 highlight the importance of identifying the Zone of Theoretical Visibility (ZTV) for a turbine development. A Zone of Theoretical Visibility is the extent from which a turbine of a given height could be seen on a very clear day, based on the landform of the area. Dependent on the approach taken the ZTV can also allow for major intervening features such as settlement, built forms and major woodland. However localised screening is not typically included. The latest guidance on ZTV's is presented in the 2006 document 'Visual Representation of Windfarms: Good Practice Guidance', as prepared for Scottish Natural Heritage. This recommends the following Zones of Theoretical Visibility extents for different sizes of turbines:

- Turbine up to 50m – ZTV 15km
- Turbine 51-70m – ZTV 20km
- Turbine 71-85m – ZTV 25km
- Turbine 86-100m – ZTV 30km
- Turbine 101-130m – ZTV 35km

2.30 Although turbines are theoretically visible over these distances, their visual impact is likely to decrease with distance from the turbine location. The Scottish Executive's document PAN45: Renewable Energy Technologies indicates a range of distances from turbine development and descriptions of the diminishing magnitude of the visual impact (see Appendix 4). This guidance is not specific about the heights of turbines that this applies to, which can be significant given the variation in ZTV's illustrated above. Through use of the guidance in PAN45 and our own field evaluation work, an assessment has been made of the magnitude of visual impact of existing turbines within Fenland District. This has resulted in an additional category of impact being

incorporated when compared to PAN45, which reflects the current situation in Fenland whereby there are locations where it is possible to be in very close proximity to a turbine e.g. on a public road, public right of way or from residential locations. These existing turbines generally fall into the 101-130m high category of turbines. The following table, Table 2, indicates the likely visual impacts used in this study for the 101-130m turbine height band at different distances from the turbine development.

Table 2: Categories of Magnitude for Visual Impact of Turbines

Distance from turbines	**Magnitude of impact**	**Description**
Within 400m	Dominant	Turbines form the principle element of the view and may overpower the viewer
400m-2km	Prominent	Turbines form a very large element of the view, commanding and controlling the view
2-5km	Conspicuous	Turbines form a large element of the view, standing out from the surroundings and forming an unmistakable feature within the panorama.
5-15km	Apparent	Turbines form a medium element of the view, noticeable in panoramas, clearly visible and catching the eye.
15-30km	Inconspicuous	Turbines form a small element of the view, that is visible but not distinct or obvious on first glance or in overcast conditions
Over 30km	Negligible	Turbines form a very small element of the view, barely visible in clear conditions

2.31 These distances have been calibrated in the field. Each of the existing turbine groups within Fenland District have been examined from a number of viewpoints at varying distances from the developments and their impacts assessed against the descriptions identified above. It should also be noted that these definitions apply where there are open or partial views of a wind turbine development. Within Fenland District the topography is unlikely to provide any significant screening of turbines as it is predominantly flat, however buildings or planting can provide localised screening and reduce visual impacts within the above ranges. These bandings are intended to indicate the approximate point at which the visual effect of a turbine moves from one category to the next. They should therefore not be interpreted too rigidly. Factors such as weather conditions will also influence this transition and a level of professional judgement will be required to reflect the individual circumstances of each site.

2.32 In order to allow for future developments in wind turbine technology, the proportional increases in the ZTV have been applied pro rata to the distances and magnitudes above to indicate the distances and relating magnitudes of visual impact that would apply to different sizes of turbine. The results of this are shown over the page in Table 3, but have not been tested with fieldwork.

Table 3: Visual Impacts of Turbines Extrapolated for Different Turbine Heights

Magnitude of impact	**Distance from turbines**					
Height of turbine	Up to 50m	51-70m	71-85m	86-100m	101-130m	131-c.150m
Dominant	Within 170m	Within 230m	Within 295m	Within 350m	Within 400m	Within 460m
Prominent	170-800m	230m-1.2km	295m-1.4km	350m-1.7km	400m-2km	460m-2.3km
Conspicuous	800m-2km	1.2-2.8km	1.4-3.6km	1.7-4.3km	2-5km	2.3-5.7km
Apparent	2-6.5km	2.8-8.6km	3.6-10.7km	4.3-12.9km	5-15km	5.7-17.1km
Inconspicuous	6.5-12.8km	8.6-17.1km	10.7-21.4km	12.9-25.7km	15-30km	17.1-34.3km
Negligible	Over 12.8km	Over 17.1km	Over 21.4km	Over 25.7km	Over 30km	Over 34.3km

3 Landscape Capacity and Cumulative Impact

Landscape character

3.1 During the fieldwork, five Landscape Character Areas were identified, as follows:

- Chatteris Clay Island
- March Clay Island
- Wisbech Settled Fen
- Whittlesey Island
- The Fens

Appendix 5 contains a summary of the key characteristics for each of these landscape character areas, which are also illustrated on drawing 07044/02A. Although each of these character areas fits within Natural England's Countryside Character 46: The Fens at the national scale and within Area 8: Fenlands in the Cambridgeshire Landscape Guidelines, and therefore share many similarities, they have a number of distinct differences in character and condition at a local level to distinguish them as separate landscape character areas at the District scale.

3.2 Of the five Landscape Character Areas, two share more features in common than the others. These are Chatteris Clay Island and March Clay Island, which are geographically distinct but otherwise very similar in character. As such they can be considered to be of the same Landscape Character Type. Full definitions of Landscape Character Areas and Landscape Character Types are provided in Appendix 9.

Landscape Character Type	Landscape Character Area
Drained Fenland	The Fens
Settled Fen	Wisbech Settled Fen
Clay Fen Island	Chatteris Clay Island
Clay Fen Island	March Clay Island
Extracted Clay Fen Island	Whittlesey Island

Landscape sensitivity

3.3 Following the methodology highlighted in Section 2, paragraphs 2.20-2.23, matrices have been completed for the four different landscape character types. The five different Landscape Character Areas were not assessed separately in order to minimise repetition. The detailed analysis of landscape sensitivity is located in Appendix 6. A summary of the landscape sensitivity for each turbine typology within the four landscape character types is provided below, in Tables 4-7.

Table 4: Landscape Character Type – Drained Fenland

Key Characteristics of the landscape Type	**Single Turbine**	**Small Scale Group (2-5 turbines)**	**Small to Medium Scale Group (6-11 turbines)**	**Medium Scale Group (12-16 turbines)**	**Large Scale Group (17+ turbines)**
Scale and sense of enclosure	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Impact of landform	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Impact of landcover and landcover change	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Settlement pattern and density	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Skyline	Low (1)	Low (1)	Low (1)	Medium (2)	Medium (2)
Landmarks and impact of built development	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)
Visibility from outside and connections with adjacent landscapes	Moderate (2)	Moderate (2)	Moderate (2)	High (3)	High (3)
Remoteness and Tranquillity	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Total	**10**	**10**	**10**	**14**	**14**
Overall Sensitivity	**Low**	**Low**	**Low**	**Medium-low**	**Medium-low**

Table 5: Landscape Character Type – Settled Fen

Key Characteristics of the landscape Type	**Single Turbine**	**Small Scale Group (2-5 turbines)**	**Small to Medium Scale Group (6-11 turbines)**	**Medium Scale Group (12-16 turbines)**	**Large Scale Group (17+ turbines)**
Scale and sense of enclosure	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Impact of landform	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Impact of landcover and landcover change	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Settlement pattern and density	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Skyline	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)
Landmarks and impact of built development	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Visibility from outside and connections with adjacent landscapes	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Remoteness and Tranquillity	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Total	**9**	**13**	**13**	**18**	**18**
Overall Sensitivity	**Low**	**Medium-low**	**Medium-low**	**Medium-high**	**Medium-high**

Table 6: Landscape Character Type – Clay Fen Island

Key Characteristics of the landscape Type	**Single Turbine**	**Small Scale Group (2-5 turbines)**	**Small to Medium Scale Group (6-11 turbines)**	**Medium Scale Group (12-16 turbines)**	**Large Scale Group (17+ turbines)**
Scale and sense of enclosure	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Impact of landform	Low (1)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)
Impact of landcover and landcover change	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
Settlement pattern and density	Moderate (2)	Moderate (2)	High (3)	High (3)	High (3)
Skyline	Moderate (2)	Moderate (2)	High (3)	High (3)	High (3)
Landmarks and impact of built development	Moderate (2)	Moderate (2)	High (3)	High (3)	High (3)
Visibility from outside and connections with adjacent landscapes	Low (1)	Low (1)	Moderate (2)	Moderate (2)	High (3)
Remoteness and Tranquillity	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Total	**11**	**13**	**17**	**19**	**20**
Overall Sensitivity	**Low**	**Medium-low**	**Medium-high**	**Medium-high**	**Medium-high**

Table 7: Landscape Character Type – Extracted Clay Fen Island

Key Characteristics of the landscape Type	**Single Turbine**	**Small Scale Group (2-5 turbines)**	**Small to Medium Scale Group (6-11 turbines)**	**Medium Scale Group (12-16 turbines)**	**Large Scale Group (17+ turbines)**
Scale and sense of enclosure	Low (1)	Moderate (2)	Moderate (2)	High (3)	High (3)
Impact of landform	Low (1)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)
Impact of landcover and landcover change	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Settlement pattern and density	Low (1)	Low (1)	Moderate (2)	High (3)	High (3)
Skyline	Moderate (2)	Moderate (2)	High (3)	High (3)	High (3)
Landmarks and impact of built development	Moderate (2)	Moderate (2)	High (3)	High (3)	High (3)
Visibility from outside and connections with adjacent landscapes	Low (1)	Low (1)	Moderate (2)	Moderate (2)	High (3)
Remoteness and Tranquillity	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Total	**10**	**12**	**16**	**18**	**19**
Overall Sensitivity	**Low**	**Low**	**Medium-low**	**Medium-high**	**Medium-high**

Landscape capacity

3.4 Following the methodology highlighted in Section 2, paragraphs 2.27-2.28, the landscape capacity for each landscape type has been calculated and is summarised below, in Table 8, under each of the turbine typologies. These results are also illustrated on drawings 07044/03B-07C. This capacity is the inherent capacity of the

landscape to accommodate the change that results from the introduction of wind turbines. It does not take into account the presence of existing turbines, which is covered below under cumulative landscape impacts.

Table 8: Summary of Landscape Capacity

	Capacity				
Landscape Type	**Single Turbine**	**Small Scale Group (2-5 turbines)**	**Small to Medium Scale Group (6-11 turbines)**	**Medium Scale Group (12-16 turbines)**	**Large Scale Group (17+ turbines)**
The Fens	High	High	High	Medium-high	Medium-high
Settled Fen	High	Medium-high	Medium-high	Medium-low	Medium-low
Clay Fen Island	High	Medium-high	Medium-low	Medium-low	Medium-low
Extracted Clay Fen Island	High	High	Medium-high	Medium-low	Medium-low

Cumulative landscape impacts

3.5 The Scottish Natural Heritage Document 'Cumulative Effect of Windfarms' identifies a number of factors that should be considered in relation to the cumulative effect of wind turbine developments. The cumulative effect relates to the combined impact of separate wind turbine developments on a landscape. Factors to be considered in relation to Fenland District include the effects on the following: landscape character, sense of scale, sense of distance, existing focal points in the landscape, skyline, sense of remoteness and wildness, and other special landscape interests.

3.6 The character of the landscape within Fenland District is generally very flat and typically open, although there are some areas of localized enclosure e.g. in the settled fen. Agricultural cropping dominates the landuse and landcover with large scale open fields. There are no landscape designations. As a landscape the Fens have been identified in this study and previous studies as being relatively suitable for wind turbine development, particularly for the small and medium groups. It is however important to look at the characteristics and objectives of the landscape character types within Fenland and identify objectives in line with these, so that the character of the landscape is at least maintained and where possible enhanced . Within Fenland District, as identified in Appendix 5, the strategy suggested for most landscapes is to 'conserve' the most important features and 'restore' or 'enhance' the parts that weaken the strength of character or the condition of the landscape. This suggests that there is not a need to create a new landscape character within Fenland and that a suitable objective for Fenland, in landscape character terms, would be to maintain the historic openness of the landscape without the presence of excessive major vertical elements. This is particularly important for areas that are currently relatively free from turbine development.

3.7 Fenland already has wind turbine developments that impact on the character of its landscapes. In order to assess the current situation, the proportion of each character type within the various zones of visual impact has been calculated, as shown below in Table 9. These percentages have been calculated using a GIS system. Buffers demonstrating the zones of visual impact derived from Table 3 were applied to each turbine, based on the approved turbine heights outlined in Table 11. The area covered by each zone within each Landscape Character Type was then calculated by

the GIS system and compared to the total area of the Landscape Character Types to calculate the overall proportion cover.

Table 9: Proportion of Character Type covered by different zones of visual impact

Landscape Character Type	Area (Ha)	Proportion 'Prominent'	Proportion 'Conspicuous'	Proportion 'Apparent'
Drained Fenland	44,363	16.4% (7,272Ha)	57% (25,386Ha)	99% (43,950Ha)
Settled Fen	5,772	0% (-)	7% (377Ha)	90% (5,179Ha)
Clay Fen Islands	2,883	13% (365Ha)	68% (1,966Ha)	100% (2,883Ha)
Extracted Clay Fen Island	1,697	31% (518Ha)	74% (1,258Ha)	100% (1,697Ha)

3.8 Landscapes that are identified to be more sensitive to the changes brought about by wind turbine development, and therefore with less capacity to accept new wind turbine development, should have less of there area affected by each of the categories of visual impact. Thresholds of capacity have been identified below in Table 10, to allow for suitable wind turbine development but also to protect the key characteristics of the landscape character types. This shows that both the Clay Fen Islands and Extracted Clay Fen Island Landscape Character Types have already surpassed thresholds for some of the zones of visual impact. This would suggest that the only way that new turbine development could be accommodated within these character types, subject to other material constraints, would be locating new turbines close to existing turbine locations where the character has already been impacted upon.

Table 10: Thresholds of Capacity for each Landscape Character Type

Landscape Character Type	Area (Ha)	Capacity Threshold 'Prominent'	Capacity Threshold 'Conspicuous'	Capacity Threshold 'Apparent'
Drained Fenland	44,363	25%	75%	100%
Settled Fen	5,772	20%	60%	100%
Clay Fen Islands	2,883	15%	45%	100%
Extracted Clay Fen Island	1,697	25%	75%	100%

Visual impacts

3.9 The visual impacts of existing wind turbine developments, within and close to Fenland District, are illustrated on drawing 07044/08B. Visual impacts can be wide ranging and can have a significant amenity impact on a wide range of groups including: residents, recreational uses of open space and rights of way, workers, travellers and visitors. As the landscape is flat and open, it is frequently possible to see over long distances and as such Zones of Theoretical Visibility can result in some extensive impacts at the limits up to the limits of the ZTV. However due to the general suitability of the landscape to accommodate at least some measure of windfarms the visual impact of turbines over these greater distances, typically over 5km from the site does not seem out of context or scale. A summary of the heights and the relevant ZTV for each turbine group is provided below in Table 11.

Table 11: Existing Commissioned Turbines

Site Name	Planning applic'n ref	No. turbines	Approved Tip Ht (m)	Recommended ZTV distance (km)
Foundry Way	F/YR01/1212/F (Fenland)	1	107	35
Coldham	F/YR01/1269/F (Fenland)	9	107	35
Coldham	F/YR02/0143/F (Fenland)	8	107	35
Glassmoor	F/YR02/1327/F (Fenland)	8	107	35
Ransonmoor	F/YR03/0990/F (Fenland)	3	107	35
McCains	F/YR07/0413/F (Fenland)	3	125	35
Ransonmoor II	F/YR06/0594/F (Fenland)	2	107	35
Abbey Produce	F/YR05/1451/F (Fenland)	1	125	35
Red Tile Farm	0302827FUL (Hunts DC)	12	107	35
Fivestone, Ramsey	040031FUL (Hunts DC)	1	125	35

3.10 The visual impacts of proposed wind turbine developments, within and close to Fenland District, are illustrated on drawing 07044/09B. This drawing shows the zones of 'Prominent' (i.e. <2km) and 'Conspicuous' (i.e. 2-5km) visual impact for each existing and proposed turbine development, along with an indication of the extent of the Zone of Theoretical Visibility. A summary of the heights and the relevant ZTV for each turbine group is provided below in Table 12.

Table 12: Turbines in the Planning System (Approved, Submitted or with Scoping Opinions issued)

Site Name	Planning application reference	No. turbines	Assumed Tip Height (m)	Recommended ZTV distance (km)
Franks Farm	F/YR07/0602/F (Fenland)	1	100	30
Anglian Water	F/YR07/0742/F (Fenland) (approved 20.02.09)	1	100	30
Coldham	F/YR07/1184/F (Fenland) (approved 25.11.08)	7	100	30
Tesco	F/YR07/0603/SCOP (Fenland)	1	89-91	30
Knights End Road	F/YR07/1050/SCOP (Fenland)	5	110	35
South of Foundry Way	F/YR09/0020/F (Fenland) (refused 16.4.09)	1	107	35
Flood's Ferry Wind Farm	F/YR09/0272/F (Fenland)	9	120	35
Burnt House Farm	F/YR08/0264/SCOP (Fenland)	5	125	35
Australia farm	F/YR09/0221/SCOP (Fenland)	4	120	35
Nutsgrove	06/01051/FUL (Peterborough CC)	7	100	30
Wryde Croft	(Peterborough CC)	6	100	30
Anglian Water, Peterborough	07/01813/FUL (Peterborough CC)	4	123	35
Marshland Windfarm	- (Kings Lynn and West Norfolk)	19	139	35+
Cotton Wind Farm	0802296FUL (Hunts DC)	8	127	35

3.11 However the impact on views in the landscape is more significant where the wind turbines are within 5km of the viewer. Drawing 07044/08B shows instead the zones of 'Prominent' (i.e. <2km) and 'Conspicuous' (i.e. 2-5km) visual impact for each existing turbine development. Despite this general approach it is also important to consider the impact that turbines can have on established views within Fenland. There are important views within the District that should be retained without the visual intrusion of wind turbine development. Some of these are identified within Conservation Area appraisals for the Market Towns of March, Chatteris, Wisbech and

Whittlesey, and include views along the River Nene through March and along the main historic routes through the towns. Other important views to preserve include those towards church spires and towers, which form landmarks in the landscape e.g. St Wendredas, and views towards both Ely and Peterborough Cathedrals e.g. from the A142 travelling northwards towards Ely. Views along the corridor of the Ouse and Nene Washes are also important in landscape terms and should be safeguarded from adverse impacts.

3.12 There are also many features that can potentially screen views of turbine developments and that could potentially mitigate their visual impacts. Table 13 below identifies some of these features and the distance from a viewer that they would have to be in order to screen or be more in scale with views of a wind turbine.

Table 13: Comparative Heights of Landscape Features

Feature	Height (m)	Dominant zone (400m)	Prominent zone (2km)	Conspicuous zone (5km)	Apparent zone (15km)
		Angle of view to top of turbine			
Wind turbine	100-125	17°	4°	1.4°	0.5°
		Distance from viewer at edge of visibility zone to screen or appear same height as wind turbine development			
Brickworks chimney	70	223m	1.12km	2.79km	8.37km
Pylon	45	143m	713m	1.78km	5.35km
Mature tree	15	46m	230m	575m	1.73km
Large agricultural building	10-15	30m	150m	374m	1.12km
House	7.5	22m	110m	274m	821m

Cumulative visual impacts

3.13 The Scottish Natural Heritage Document 'Cumulative Effect of Windfarms' identifies 3 types of cumulative visual impact. These are:

- Combined/simultaneous impact - occurs where the observer is able to see two or more developments from one viewpoint, without moving his or her head, which is considered to be equal to a 90 degree arc of view. This includes for the main focus of view (central 50 degree arc) and peripheral vision in the same view.
- Successive/repetitive impact - occurs where the observer is able to see two or more windfarms from one viewpoint but has to move his or her head to do so, considered to be a 180-360 degree arc of view
- Sequential impact - occurs when the observer has to move to another viewpoint to see other developments or a different view of the same development e.g. traveling along a road.

3.14 Drawings 07044/08B-09B illustrate the current situation in Fenland in terms of cumulative impact. The coloured circles illustrate where the different zones of visibility occur for existing and proposed turbine developments. Where these circles begin to overlap there is a cumulative visual impact. Drawing 07044/10B also illustrates where existing turbine developments are located within a 30km distance of the boundary with Fenland District Council, with Appendix 7 identifying these turbine developments. As previously discussed, over these distances visual impacts are likely to be relatively insignificant but there may be some intervisibility on very clear days.

3.15 Turbines within 4km of each other i.e. where the Prominent zones of visibility overlap, can be read easily in the same view from many locations. As such they are

likely to demonstrate a significant cumulative impact from a number of locations and less likely to be considered acceptable in visual/landscape terms, unless they form a relatively modest extension to an existing turbine development. Turbines within 10km of each other, i.e. where the 'Conspicuous' zones of visibility overlap, will also have a noticeable cumulative visual impact. These impacts may be in terms of combined impact or successive impact. For March in particular there are already significant combined and successive impacts from some viewpoints.

3.16 In order to minimise Combined/simultaneous impacts and Successive/repetitive impacts it is considered desirable to limit the extent of turbine visibility within a given field of view. This will help to prevent residential properties becoming entirely surrounded by turbines and avoid the feeling of living within a windfarm landscape. This is considered to be appropriate within Fenland where landform offers little opportunity for effectively screening wind turbine developments. As a result, professional judgement has been used to identify that settlements of more than 10 dwellings should not have wind turbines in more than 90° of their field of view from public or residential view points within or around the settlement for a distance of 5km from the viewpoint. Also individual dwellings should not have wind turbines in more than 180° of their field of view for a distance of 10km from the property.

3.17 In terms of sequential cumulative visual impact, the roads that run north-south through the centre of Fenland in particular already experience an impact from a number of sites. Drawing 07044/11C and Table 14 below identifies the proportion of each route within the various zones of visual impact.

Table 14: Proportion of Routes covered by different zones of visual impact

Road name	Length within Fenland (km)	Proportion 'Prominent'	Proportion 'Conspicuous'	Proportion 'Apparent'
A1101	10.57	0%	0%	100%
A141	20.9	8%	99%	100%
A142	5.55	0%	2%	100%
A47	14.84	0%	24%	100%
A605	18.58	17%	58%	100%
B1040	7.40	0%	100%	100%
B1050	8.36	0%	100%	100%
B1093	11.04	0%	19%	100%
B1094	1.20	0%	100%	100%
B1095	0.90	0%	100%	100%
B1096	1.97	0%	100%	100%
B1098	17.98	0%	38%	100%
B1099	6.22	0%	100%	100%
B1100	2.44	0%	66%	100%
B1101	14.52	31%	59%	100%
B1165	5.03	0%	0%	100%
B1166	6.77	0%	0%	100%
B1169	4.09	0%	0%	100%
B1187	7.02	0%	13%	100%
B198	6.84	0%	0%	100%
Railway – Peterborough to Stansted	30.78	8%	40%	100%

3.18 Routes that pass through landscapes that are identified to be more sensitive to the changes brought about by wind turbine development should have less of their length

affected by each of the prominent and conspicuous zones of visual impact. Thresholds of capacity are identified below in Table 15. The B1101 between March and Elm currently exceeds the threshold for 'Prominent' successive impact. However, many of the more minor roads, particularly those that are quite short such as the B1096, B1099 and B1040, surpass the threshold for 'Conspicuous' visibility. This would suggest that if new turbine development is to be accommodated along these routes it would be preferential to locate new turbines close to existing turbine locations where the journey experience has already been impacted upon.

3.19 Scottish Natural Heritage guidance on the 'Cumulative Effect of Windfarms' indicates in its Appendix 5 that when assessing the sequential impact of turbines on a route the following should be considered:

- direction of view ('direct', 'oblique', 'aligned on route', or 'looking NW of route' etc.);
- distance from nearest turbine;
- the number of turbines visible at each windfarm development; and
- which parts of the turbines are visible at each development (e.g. blade tips, hubs, upper towers or full towers).

3.20 As with non-cumulative visual impacts, there are a number of factors that may reduce the cumulative visual impact of turbines. These could include vegetation or built form, with roads that pass through urban areas likely to be less influenced by cumulative impacts than roads passing through open countryside. However, as previously discussed, the Fens as a whole are generally relatively open allowing most of the entire height of turbines to be seen from a considerable distance and turbines to be seen in several directions from any given location.

Table 15: Thresholds of Capacity for each Route

Road name	Length within Fenland (km)	Capacity Threshold 'Prominent'	Capacity Threshold 'Conspicuous'	Capacity Threshold 'Apparent'
A1101	10.57	20%	60%	100%
A141	20.9	25%	75%	100%
A142	5.55	15%	45%	100%
A47	14.84	25%	75%	100%
A605	18.58	25%	75%	100%
B1040	7.40	25%	75%	100%
B1050	8.36	25%	75%	100%
B1093	11.04	25%	75%	100%
B1094	1.20	25%	75%	100%
B1095	0.90	25%	75%	100%
B1096	1.97	25%	75%	100%
B1098	17.98	25%	75%	100%
B1099	6.22	25%	75%	100%
B1100	2.44	25%	75%	100%
B1101	14.52	25%	75%	100%
B1165	5.03	20%	60%	100%
B1166	6.77	25%	75%	100%
B1169	4.09	20%	60%	100%
B1187	7.02	25%	75%	100%
B198	6.84	20%	60%	100%
Railway – Peterborough to Stansted	30.78	25%	75%	100%

4 Additional constraints for wind turbines

Nature Conservation Considerations (see drawing 07044/12C)

4.1 Fenland District contains and is immediately adjacent to internationally important wildlife sites at the Ouse and Nene Washes, both of which are designated as Special Protection Areas, Special Areas of Conservation and Ramsar Sites, as well as Sites of Special Scientific Interest. The Great Fen Project is also in close proximity to Fenland, to the east of Fenland District within Huntingdonshire District. PPS22 states that planning permission for renewable energy developments that could have an adverse impact on a site of international importance should only be granted once an assessment has shown 'that the integrity of the site would not be adversely affected'. PPS22 also states that buffer zones should not be applied around such internationally designated sites but that the impact of renewable energy projects close to the boundaries of the sites will be a material consideration in determining planning applications. However, it has been suggested that Natural England consider that buffers of 800m may be necessary along the boundaries of some important ornithological sites (ref North East Regional Renewable Energy Strategy).

4.2 Natural England have been approached to provide advice in relation to wind turbine development in proximity to these protected sites. They consider that it is necessary for them to be consulted at an early stage of any application. They have advised that the Nene Washes and the Ouse Washes are the key nature conservation sites in the vicinity of Fenland District. The guidance they currently use would suggest that sensitive bird populations are likely to be present in the District, particularly flying between the two designated sites, and that robust survey data should be presented with any application in relation to birds and other protected species (especially bats). However, species that use the designated sites will migrate into the surrounding area, and will forage over surrounding areas of farmland away from the site itself. The arable area around the sites is of importance to a range of species such as Marsh Harrier, Golden Plover, Lapwing, Bewicks Swan, Whooper Swan, wintering Peregrine and Merlin, farmland bird assemblages (skylark, turtle dove, corn bunting, tree sparrow, grey partridge, yellowhammer) and a range of wildfowl. There are also ranges of bat species that use the area, and recent studies have shown that bats can be of particular risk from turbines. An especially important colony of Noctule bats is present in March, and it is thought that this species is of particular risk of impact due to the height it flies at.

4.3 Reference documents to consider in regard to nature conservation include:

- *Bats and onshore wind turbines*
- *Cumulative Effect of Windfarms*
- *Guidelines for the Consideration of Bats in Wind Farm Projects*
- *Planning Policy Statement 7: Sustainable Development in Rural Areas*
- *Planning Policy Statement 22: Renewable Energy*
- *Planning for Renewable Energy: A Companion Guide to PPS22*
- *Survey Methods for use in Assessing the Impacts of Onshore Windfarms on Bird Communities*
- *Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action*
- *Wind Farm Development and Nature Conservation: A guidance document for nature conservation organisations and developers when consulting over wind farm proposals in England*
- *Wind Turbines and Sensitive Bird Populations: Spatial Planning for Wind Turbines in the Fens Natural Area*

Heritage Considerations(see drawing 07044/12C)

4.4 Although there are no internationally designated heritage sites within Fenland District, there are national designations in the form of Scheduled Monuments, a Registered Park and Garden (Peckover House, Wisbech), Conservation Areas and Listed Buildings. PPS22 states that for nationally designated sites planning permission should only be granted 'where it can be demonstrated that the objectives of designation of the area will not be compromised by the development'. Again, buffer zones should not be applied to nationally protected sites. The impacts of turbine development on Scheduled Monuments, Registered Park and Gardens and Conservation Areas, as well as their settings should be assessed prior to submitting a planning application.

4.5 Within Fenland District, many of the Listed Buildings form important elements in the landscape, particularly church towers and spires. Visual conflict with these features should be avoided and wind turbine developments within a minimum distance of 2km of Conservation Areas and Listed Buildings and up to 5km distance will need to be carefully assessed to ensure there are not significant adverse effects on the settings of these features.

4.6 Reference documents to consider in regard to heritage considerations include:

- *Microgeneration in the Historic Environment*
- *Planning Policy Statement 22: Renewable Energy*
- *Planning for Renewable Energy: A Companion Guide to PPS22*
- *Wind Energy and the Historic Environment (due to be updated in 2009)*

Airfields(see drawing 07044/13B)

4.7 There are no airfields or aerodromes within Fenland District that are significant enough to require safeguarding of land and airspace around them. Chatteris airfield is located east of the A141 near Doddington, approximately 4km north of Chatteris and the North London Parachute Centre operates parachute jumps and microlight activities from this airfield. A 3km radius informal safeguarding zone should be applied to the parachute drop zone to the north west of the airfield and turbines are unlikely to be found acceptable in this zone. There are also some small privately run airstrips. PPS22 states that regional spatial strategies should not contain policies relating to the impact of wind turbines on airport operation, radar and aircraft and that it is the responsibility of developers to address any potential impacts. However, Local Planning Authorities should satisfy themselves that such issues have been addressed before considering planning applications.

4.8 The Directorate of Airspace Policy produced a document in 2009 entitled 'CAP 764: CAA Policy and Guidelines on Wind Turbines' that provides guidance on the requirements for consultation with the Civil Aviation Authority (CAA) and others in relation to wind turbine development. A flow chart is provided as an Appendix to that document to illustrate the stages that should be undertaken by an applicant prior to submitting a planning application to the local authority. This process involves the developer submitting details of their proposals to the CAA who assess civil aviation issues, advise on further consultation that might be required with Aerodrome operators, relay information to the National Air Traffic Services and provide statutory input to all other parties during the application process. Advice is provided by these organisations regarding effects on radar, impacts on air traffic services, obstructions to flight paths and lighting of wind turbine structures if required.

4.9 Should navigation lighting be required by the CAA, applicants will be required to provide further assessment of the implications of the lighting. This will be particularly important in relation to the landscape and visual impact or the lighting at night, as well as the cumulative impacts of the lighting.

4.10 Reference documents to consider in regard to Airfields:

- *CAP 764: CAA Policy and Guidelines on Wind Turbines*

Wind Speed

4.11 The Department for Business, Enterprise & Regulatory Reform maintains a database of indicative wind speeds for the whole country. This database has been consulted and indicates that on this general basis there is little variation throughout Fenland District with regard to wind speed, which does not limit locations where turbines can be located. At a height of 45m above ground level the average wind speed is indicated to be 6.2-6.3 m/s using this database. This database does not take account of local variations in windspeed caused by factors such as settlements or vegetation and applicants should supply their own detailed analysis of wind speed for their specific site.

4.12 PPS22 recommends measuring wind data on site for at least 12 months prior to finalising a scheme. Minimum wind speeds are not recommended within any of the guidance documents as this can vary from machine to machine. However, it is suggested in a number of documents, including the North East Regional Assembly's 'Windfarm Development and Landscape Capacity Studies: Knowesgate and Harwood Forest', that larger wind turbine developments are typically sited in areas with a minimum annual wind speed of 7+m/s at 45m above ground level. This is higher than the average in Fenland but has not prevented wind turbine development to date.

Grid Connections (see drawing 07044/13B)

4.13 PPS22 indicates that developers will need to supply onsite electricity infrastructure, including transformers for each turbine, underground cabling to a collection point and an onsite substation that will require access by the developer/operator and the electricity Distribution Network Operator (DNO). Responsibility for the routing of electrical cabling onwards from the sub-station to the nearest suitable point of the local electricity distribution network is the responsibility of the DNO, either mounted on wooden poles or buried underground. The distance between the sub-station and the connection point will be of critical commercial relevance because of the relative costs of overhead and underground lines and the impact such costs have on total site development costs.

Noise

4.14 PPS22 and its Companion Guide provide guidance on how to assess the noise impacts of a wind turbine development. The recommended approach to use is provided by ETSU in their document 'The Assessment and Rating of Noise from Wind Farms'. This is a specialised area of assessment and impacts will vary depending on the type of machine used and its height. However, common practice suggests that for turbines with a power output of 2-3Mw are likely to require a buffer of between 400 and 700m from surrounding residential properties to minimise impact of noise levels.

4.15 Reference documents to consider in regard to Noise:

- *ETSU-R-97*
- *Planning Policy Guidance Note 24: Planning and Noise*
- *Planning Policy Statement 22: Renewable Energy*
- *Planning for Renewable Energy: A Companion Guide to PPS22*

Flooding

4.16 Fenland District is generally low lying and the majority of the District is shown on the Environment Agency's flood maps as being at risk of flooding. Wind turbine developments should therefore be subject to Flood Risk Assessments and the requirements of Planning Policy Statement 25: Development and Flood Risk. The Environment Agency advise that in areas at risk of flooding plant infrastructure should be located sufficiently above ground to avoid damage in the event of a flood.

4.17 Reference documents to consider in regard to flooding:

- *Planning Policy Statement 25: Development and Flood Risk*

Ice Hazard

4.18 Ice can build up on turbines under certain weather conditions. The report 'State-of-the-art of wind energy in cold climates' indicates that ice can build up when either

- low level cloud covers part of a turbine and the temperature is below zero;
- when it is raining and temperatures are below zero;
- when there is an air frost; or
- if snow/sleet builds up on the blades.

The same report indicates that in the Fens these types of conditions are likely to occur infrequently, in the region of 2-7 days per year. However, there has been a reported incident of ice being thrown from a turbine within Fenland District and as a result the following equation should be applied to turbine developments, as an approximation, to ensure a safe zone around turbines from where people are likely to be present (taken from 'Wind Energy Projects in Cold Climates':

$$d = (D + H) x 1.5$$

Where

d = maximum falling distance of ice (in m)

D = rotor diameter (in m)

H = hub height (in m)

5 Turbines in urban extensions

5.1 Visual impact and noise issues generally preclude larger turbine developments within urban areas. At the most a single large turbine may be able to be accommodated within industrial areas, dependant on proximity to other sensitive user groups. Alternatively, groups of smaller turbines may be equally suitable. However in residential areas large turbines are likely to dominate housing and have unacceptable visual intrusion, but there may be scope for smaller, lower key wind generation. PPS22 and other government guidance indicate that new development should help to contribute to renewable energy targets, as well as reducing the energy that the new buildings use. In order for wind energy to contribute to renewable energy production in urban extensions, smaller scale turbines will be required.

5.2 Section 82 of the Energy Act 2004 defines microgeneration as 'small scale production of heat and/or electricity from low carbon sources'. Most urban wind turbines fall into the category of microgeneration and there is a growing amount of research and literature on this subject. The Department of Trade and Industry (now The Department for Business, Enterprise & Regulatory Reform) produced a document in 2006 called 'Our Energy Challenge – Power from the People', which is a microgeneration strategy for the UK. This looks at ways of promoting microgeneration technologies and potential funding streams to assist with meeting installation costs, which include tax incentives and grants.

5.3 Wind Energy Integration in the Urban Environment, a special project set up by the European Programme 'Intelligent Energy Europe', has produced a document entitled 'Urban Wind Turbines: Guidelines For Small Wind Turbines In The Built Environment'. This document identifies the main types of turbine that can be used in urban areas, as well as identifying best practice for the siting and implementation of urban wind turbines. The document identifies that urban wind turbines can have a horizontal or vertical axis and the most appropriate type of turbine will depend on the site location and features.

5.4 Key guidance provided in the document for developing an urban turbine development is as follows:

- The annual mean wind speed at the location should be at least 5.5 m/s;
- The mast or building roof should be approximately 50% taller than the surrounding objects;
- The turbines should be positioned near the centre of the roof;
- The turbine should be positioned on the side of the most common wind direction;
- The lowest position of the rotor has to be above the roof by at least 30% of the building height;
- If possible, ensure building orientation is towards the most common wind directions at the location as given on the local wind rose;
- If possible, introduce a sloped side to the building to increase the wind speed;
- Ensure that the roof can withstand the static and dynamic forces produced by the wind turbines;
- Place multiple turbines at the same location or on the same building if possible to increase energy yield;
- Ensure that the quantity of the generated energy is in proportion with the energy needs on location;
- Ensure that energy saving measures are in place before deploying UWTs;
- Take measures against flicker, noise and vibrations;
- Ensure acceptance of the turbines in the neighbourhood.

5.5 Amendments were made to the General Permitted Development Order (GPDO) in 2008 to allow many types of micro generation in residential areas. Further work is being undertaken with a view to further revising the GPDO to allow certain types of wind turbine to be erected in residential areas without the need to apply for planning

permission. The main issues that have stopped wind turbines being included so far, and that need to be addressed in order to amend the GDPO further, are noise and vibration. Thresholds for these issues are still being developed. These permitted development rights will not apply in Conservation Areas (or World Heritage Sites which are not applicable in Fenland) or within the curtilage of Listed Buildings. In the mean time, planning permission is still required for wind turbines in residential and commercial areas.

5.6 Guidance produced elsewhere in this document in relation to larger wind turbines is also applicable to smaller scale microgeneration. The distances provided in Table 3 of this report can also be applied to small scale turbines to indicate where there are likely to be considerable visual impacts. English Heritage have also produced guidance relating to micogeneration in the proximity of historic features, entitled 'Microgeneration in the Historic Environment'.

6 Criteria for assessing future applications

6.1 The following landscape and environmental criteria and thresholds should be applied for all future wind turbine proposals. Drawing 07044/14A combines some of the main landscape and visual constraints within Fenland. The criteria should initially be applied at the Scoping Opinion stage and then if the scheme progresses through a full Planning Application and supporting Environmental Statement. Environmental Statements should provide detailed assessments of all the factors outlined below, as well as other relevant issues identified in PPS22, such as radar and aviation. These assessments will need to be reviewed as part of the decision making process, alongside the recommendations of all consultees.

6.2 Non-compliance with an individual criterion should not necessarily preclude turbine development. All the environmental factors should be carefully evaluated and then balanced by the planning authority against the requirements to contribute to regional and national targets for renewable energy generation and the benefits of reducing carbon consumption. The guidelines should also always be considered in conjunction with a detailed study of the site and its surroundings, particularly in terms of existing trees, hedges, buildings and structures that may provide visual mitigation of a wind turbine development.

- **Landscape character** – does the proposal respect and fit with the key characteristics of the landscape character area within which it is sited?
  Relevant thresholds and criteria
  - Key characteristics of the landscape character areas within Fenland District are identified in Appendix 5.
  - Further guidance on the form and siting of turbine developments in relation to the characteristics of landscape character types is provided in 6.3 below.

- **Landscape capacity** – what is the capacity of the landscape character area/type to accommodate the scale of wind turbine development proposed?
  Relevant thresholds and criteria
  - The Drained Fenland Landscape Character Type has capacity to accommodate all scales of wind turbine development, although it is more sensitive to medium (12-16) and large scale groups (17+). The cumulative impact of wind turbine development on this landscape needs to be carefully considered, as detailed below.
  - The Settled Fen Landscape Character Type has capacity to accommodate single turbines but is more sensitive to small (2-5) and small to medium (6-11) turbine groups. It would be difficult to accommodate medium (12-16) or large turbine groups (17+) in this landscape. The cumulative impact of wind turbine development on this landscape needs to be carefully considered, as detailed below.
  - The Clay Fen Island Landscape Character Type has capacity to accommodate single turbines but is more sensitive to small (2-5) turbine groups. It would be difficult to accommodate small to medium (6-11), medium (12-16) or large turbine groups (17+) in this landscape. The cumulative impact of wind turbine development on this landscape needs to be carefully considered, as detailed below.
  - The Extracted Clay Fen Island Landscape Character Type has capacity to accommodate single turbines and small (2-5) turbine groups but is more sensitive to small to medium (6-11) turbine groups. It would be difficult to accommodate medium (12-16) or large turbine groups (17+) in this landscape. The cumulative impact of wind turbine development on this landscape needs to be carefully considered, as detailed below.

- **Visual impacts** – will the proposal have an unacceptable impact on views? Is the proposal located too near to existing built up areas and settlement? Will the proposals impact on important views? Has the applicant provided sufficient visually verified photomontages and wire frame views from agreed key viewpoints around the development to assess the impact of the proposed scheme, in line with current best practice such as 'Visual Representation of Windfarms Good Practice Guidance' (e.g. taken with a 50mm focal length or equivalent lens, images at least 130mm high, correct viewing distance indicated)? Has the impact of any navigation lighting been assessed?
  Relevant thresholds and criteria
  - Proposals within 400m of settlement are highly unlikely to be considered acceptable in visual terms, unless existing features can be proven to fully screen views of the turbines, which otherwise would be dominant features and overpower sensitive receptors including residential locations.
  - Proposals for wind turbines should ensure that shadow flicker does not affect any residential properties, A roads or B roads. Shadow flicker can affect properties within 130° either side of north and may occur within ten times the rotor diameter of a turbine, so turbines should be located to avoid these locations.
  - Proposals within 2km of settlement will need to be carefully considered as turbines are highly likely to be prominent features and command/control views for sensitive viewers, including residential properties, within this range. Existing features including built form and vegetation may be able to locally reduce visual impacts of turbines within this range.
  - Proposals for wind turbines should be set back a minimum distance of 200m from public footpaths
  - Proposals should be in accordance with the current standards of the British Horse Society from bridleways. This recommends separation distances should be four times the overall height from National Trails and Ride UK routes, as these are likely to be used by equestrians unfamiliar with turbines. In other locations the recommended distance is three times overall height from all other routes, including roads. The 200m recommended minimum in the Technical Guidance to PPS 22 is given as 200m.
  - Locations for a full range of representative viewpoints for the assessment of the visual impacts including the use of photomontages and wire frames should be agreed with Fenland District Council prior to the preparation of Environmental Statements and submission of turbine proposals. Photomontages should include a range of receptor locations including significant residential locations, open space, public roads, rights of way and promoted/published routes. The locations should ensure that the viewpoints represent the impacts from a range of differing distances from the proposed development, with good coverage within a 5km range.
  - Residential properties and users of recreational routes/facilities are likely to be considered more sensitive as receptors. Road/rail users and industrial areas are likely to be considered less sensitive.

- **Cumulative landscape impacts** – Has the landscape character area/type reached the limit of its capacity when existing turbine developments are taken into account? There is danger that excessive development of wind turbines in any landscape would at some point result in such material change as to unbalance and overpower the existing key characteristics of the landscape. Thresholds have been derived using the existing coverage of turbines in the authority to allow for further wind turbine development while also ensuring that some areas are retained relatively free of significant adverse impact.
  Relevant thresholds and criteria
  - The Drained Fenland Landscape Character Type should not exceed 25% of its area being within 2km of wind turbine development (the 'Prominent'

zone) or 75% of its area being within 5km of wind turbine development (the 'Conspicuous' zone).

- The Settled Fen Landscape Character Type should not exceed 20% of its area being within 2km of wind turbine development (the 'Prominent' zone) or 60% of its area being within 5km of wind turbine development (the 'Conspicuous' zone).
- The Clay Fen Island Landscape Character Type should not exceed 15% of its area being within 2km of wind turbine development (the 'Prominent' zone) or 45% of its area being within 5km of wind turbine development (the 'Conspicuous' zone). As 68% of the Clay Fen Island Landscape Character Type is already within the 'Conspicuous' zone it can be considered that this landscape character type has already reached its capacity for wind turbine development and only developments close to existing turbine locations are likely to be acceptable in landscape terms.
- The Extracted Clay Fen Island Landscape Character Type should not exceed 25% of its area being within 2km of wind turbine development (the 'Prominent' zone) or 75% of its area being within 5km of wind turbine development (the 'Conspicuous' zone). As 28% of the Extracted Clay Fen Island Landscape Character Type is already within the 'Prominent' zone it can be considered that this landscape character type has already reached its capacity for wind turbine development and only developments close to existing turbine locations are likely to be acceptable in landscape terms.

- **Cumulative visual impacts** – how far is the development from existing turbine developments? Will the proposal increase the combined/simultaneous, successive/repetitive and sequential visibility of turbine development in the area? Has the cumulative impact of any navigation lighting been assessed?
  Relevant thresholds and criteria
  - Proposals for new wind turbine development, detached from existing turbines sites by more than 500m but within 4km of existing turbine developments are unlikely to be acceptable in visual terms as the combined and successive cumulative impacts would result in their 'Prominent' zones overlapping. There may, however, be circumstances where it can be demonstrated that a distance of greater than 500m is required e.g. in order to improve efficiency within the development or to reflect the pattern or spacing of an existing turbine group
  - Proposals for new wind turbine development within 10km of existing turbine developments will need to be carefully considered as the combined and successive cumulative impact could result in their 'Conspicuous' zones overlapping, unless intervening features significantly reduce the cumulative impact.
  - Locations where it is proposed to construct new turbines that would effectively extend an existing site should be considered in the light of the existing turbines, the new ones and the combined group.
  - Settlements of more than 10 dwellings should not have wind turbines in more than 90° of their field of view from public or residential view points within or around the settlement for a distance of 5km from the viewpoint.
  - Individual dwellings should not have wind turbines in more than 180° of their field of view for a distance of 10km from the property.
  - Proposals for new wind turbine development should be considered in relation to the sequential visibility of turbine development when experienced from A and B classification roads and railway lines. In most cases this will mean that the route should not exceed 25% of its length across or within Fenland being within 2km of wind turbine development (the 'Prominent' zone) or 75% of its length being within 5km of wind turbine development (the 'Conspicuous' zone).

- **Biodiversity considerations** - have Natural England been consulted at an early stage? Has robust survey data been presented with the application in relation to birds and other protected species including bats? Will sensitive habitats be affected? Do the proposals provide suitable mitigation and enhancement of the biodiversity interest of the area?
  Relevant thresholds and criteria
  - It is unlikely that wind turbine development in the vicinity of the Nene or Ouse Washes would be acceptable due to their sensitive bird populations, migration patterns and foraging flights.
  - Robust ecological surveys of birds, bats and other protected species will need to demonstrate that proposals will not have adverse effects on wildlife that cannot be mitigated, including the migrating routes, flight paths and foraging areas of birds and bats.
  - Applicants should have early consultation with Natural England to ensure they are following the latest and most up to date guidance and that appropriate survey work is undertaken. See '*Wind Turbines and Sensitive Bird Populations: Spatial Planning for Wind Turbines in the Fens Natural Area'*
  - Any sites of nature conservation importance designated at an international, national or local level likely to be affected either directly or indirectly by a wind turbine development should be assessed within an Environmental Statement. Any development which may have a likely significant effect on a Natura 2000 site will need to be considered in accordance with Article 6 of the Habitats Directive, and Regulations 48, 49 and 53 of the UK's implementing legislation, the Conservation (Natural Habitats &c.) Regulations 1994 (the 'Habitats Regulations'), and should therefore be the subject of an 'appropriate assessment' of the implications in view of the site's conservation objectives.

- **Heritage considerations** – Have English Heritage, the district conservation officer and the county archaeology team been consulted at an early stage? Has the impact on Schedules Monument's, archaeological features, Conservation Areas, Listed Buildings and Registered Parks and Gardens been considered? Has the impact arising from proposed turbines either directly or on the setting of these features been avoided where possible?
  Relevant thresholds and criteria
  - Adverse impact on important views from conservation areas, including those identified in Conservation Area Appraisals, and Registered Parks and Gardens should be avoided when considering wind turbine applications.
  - Adverse impact from and to prominent structures and landmarks in the landscape, including listed buildings, e.g. church spires and brick chimneys, should be avoided with in a minimum distance of 2km and where there is likely to be a 'conspicuous' impact, up to 5km from the proposed turbines should be evaluated to avoid adverse impacts. This distance should be extended for major landmarks, e.g. St Wendreda's in March, St Mary's in Whittlesey and Ely and Peterborough Cathedrals, where the intervisibility distance of up to 15km should be considered.
  - Impact on Scheduled Monuments and high grade (Grade I and II*) listed buildings should be subject to early consultation with English Heritage who should provide guidance over the suitable setting of the features involved.
  - Impact on any archaeological features should be determined following an appropriate level of desk and field survey, as agreed with the county archaeology team, with suitable mitigation being identified and followed.

- **Recreation and Transport Routes** – are the proposals far enough away from footpaths and bridleways? Are the proposals far enough away from A-roads, railways and power lines?

Relevant thresholds and criteria

- PPS22 quotes the British Horse Society's guidance that turbines should not be located within 200m of a bridleway to avoid frightening horses. The British Horse Society has subsequently revised this advice and consequently turbines should be located four times the overall height of turbines for National Trails and Ride UK routes, as these are likely to be used by equestrians unfamiliar with turbines, and a distance of three times overall height from all other routes, including roads.
- The layout of turbine developments should also comply with PPS22 in relation to rights of way. Turbine blades should not oversail public rights of way and should preferably be their fall over distance away.
- Applicants should have early consultation with the Highways Agency, local highways authority and Network Rail/the Network Property Board to ensure they are following the latest and most up to date guidance. Turbines should be set back from roads, railways and power lines at least fall over distance.

- **Mitigation** – to what extent does the proposal help reinforce the local landscape character and enhance the condition of the landscape? To what extent have the impacts of the proposals been reduced?
  Relevant thresholds and criteria
  - All turbines within a group should be of the same appearance and size to create visual harmony. This will apply to 'extension' of existing sites or proposals which are visually read as part of an existing group
  - Layout of turbines in 'extensions' of existing sites, or proposals which are visually read as part of an existing group, should be compatible to create a pattern of overall order, structure and conformity.
  - Turbines should be coloured off-white or light grey to minimize visual impacts in the most prevalent weather and lighting conditions within Fenland District.
  - A three bladed wind turbine with a solid, tapering tower is generally considered the most elegant form and is most in keeping with existing turbines in Fenland District.
  - Ancillary clutter relating to the turbines should be housed within the turbine structure as far as possible.
  - Mitigation and enhancement of features of biodiversity interest within the site should be included within proposals for any application.
  - Mitigation and enhancement of features of archaeological interest within the site should be included within proposals for any application.
  - Off-site planting should be considered where practical to mitigate visual impacts where practical and in keeping with the character and strategy for management of the landscape.

Guidance on Form and Siting

6.3 Where wind turbine development is considered appropriate in the light of the above criteria above then the form and siting of the turbines should relate to the characteristics of the landscape in which it is situated. Guidance is provided below on how this should be achieved for each of the four Landscape Character Types in the area as follows.

Drained Fenland

- Turbines, particularly single turbines and small groups, should create individual landmark features in this simple, open landscape.

- Turbines should relate to the linear, geometric nature of the majority of this landscape, with turbines aligning with linear drainage ditches/roads or creating

nodes at the junctions of linear features. These should ideally be evenly spaced or form a grid to relate to the field pattern. However, this geometric arrangement of turbine will be inappropriate in any localised areas of a more sinuous, organic pattern.

- Turbines should be located to avoid visual clutter with existing vertical elements in the landscapes, such as pylons/overhead wires and existing turbine groups.

- Views to existing landmark or historic features, such as the brick chimneys at Whittlesey, church spires, including St Wendreda's in March and St Mary's in Whittlesey, and Ely and Peterborough Cathedrals, should be carefully considered to avoid visual conflict.

- Single turbines or small groups could be related to large scale agricultural or industrial buildings, in sympathy with their functional appearance.

- Turbines should be located sufficiently far from small settlements to avoid the turbines dominating the settlements, including their historic character, and appearing out of scale.

- Cumulative impacts of turbines, in both landscape and visual terms, should be carefully considered in this landscape type, as a number of turbine developments are already present and additional sites may result in an overpowering influence on the open landscape character.

Settled Fen

- Views to and from existing landmark or historic features, such as church spires and village greens, should be carefully considered to avoid visual conflict.

- Turbines should be located to avoid visual clutter with existing vertical elements in the landscapes, such as pylons/overhead wires and cranes along the River Nene.

- Turbines should be located sufficiently far from historic and linear settlements to avoid the turbines dominating the settlements, including their historic character, and appearing out of scale.

- Turbines could be related to industrial or dockside buildings and structures, in sympathy with their functional appearance.

- Turbines should relate to the more organic field pattern of this character type, with turbines grouped in clusters rather than linear or grid arrangements.

- Medium and Large turbine groups should generally be avoided within the orchard based landscape close to Wisbech where they would dominate the scale of the landscape. In this location turbine groups should be broken down into small clusters of turbines to fit with the grain of the landscape.

Clay Fen Island

- Turbines, particularly single turbines and small groups, should create individual landmark or gateway features in this elevated 'island' landscape.

- Single turbines or small groups could be related to large scale agricultural or industrial buildings, in sympathy with their functional appearance.

- Turbines should relate to the more organic field pattern of this character type, with turbines grouped in clusters rather than linear or grid arrangements. However, a more geometric arrangement of turbines may be more appropriate in more localised areas of linear landcover pattern, following hedgerows or drainage patterns.

- Turbines should be located sufficiently far from settlements to avoid the turbines dominating the settlements, including their historic character, and appearing out of scale.

- Turbines should be located to avoid visual clutter with existing vertical elements in the landscapes, such as pylons/overhead wires and existing turbine groups.

- Views to existing landmark or historic features, such as church spires, should be carefully considered to avoid visual conflict.

- Medium and Large turbine groups will generally appear out of scale with this smaller scale landscape type.

- Cumulative impacts of turbines, particularly in visual terms, should be carefully considered in this landscape type, as many turbine developments are already present surrounding this landscape type.

Extracted Clay Fen Island

- Turbines, particularly single turbines and small groups, should create individual landmark or gateway features in this elevated 'island' landscape.

- Single turbines or small groups could be related to large scale agricultural or industrial buildings, in sympathy with their functional appearance, as at the McCain's factory west of Whittlesey.

- Areas of woodland should be retained and respected in relation to wind turbine development.

- Turbines should be located sufficiently far from settlements to avoid the turbines dominating the settlements, including their historic character, and appearing out of scale.

- Turbines should be located to avoid visual clutter with existing vertical elements in the landscapes, such as pylons/overhead wires, the brick chimneys at Whittlesey and existing turbine groups.

- Views to existing landmark or historic features, such as church spires and the brick chimneys at Whittlesey, should be carefully considered to avoid visual conflict.

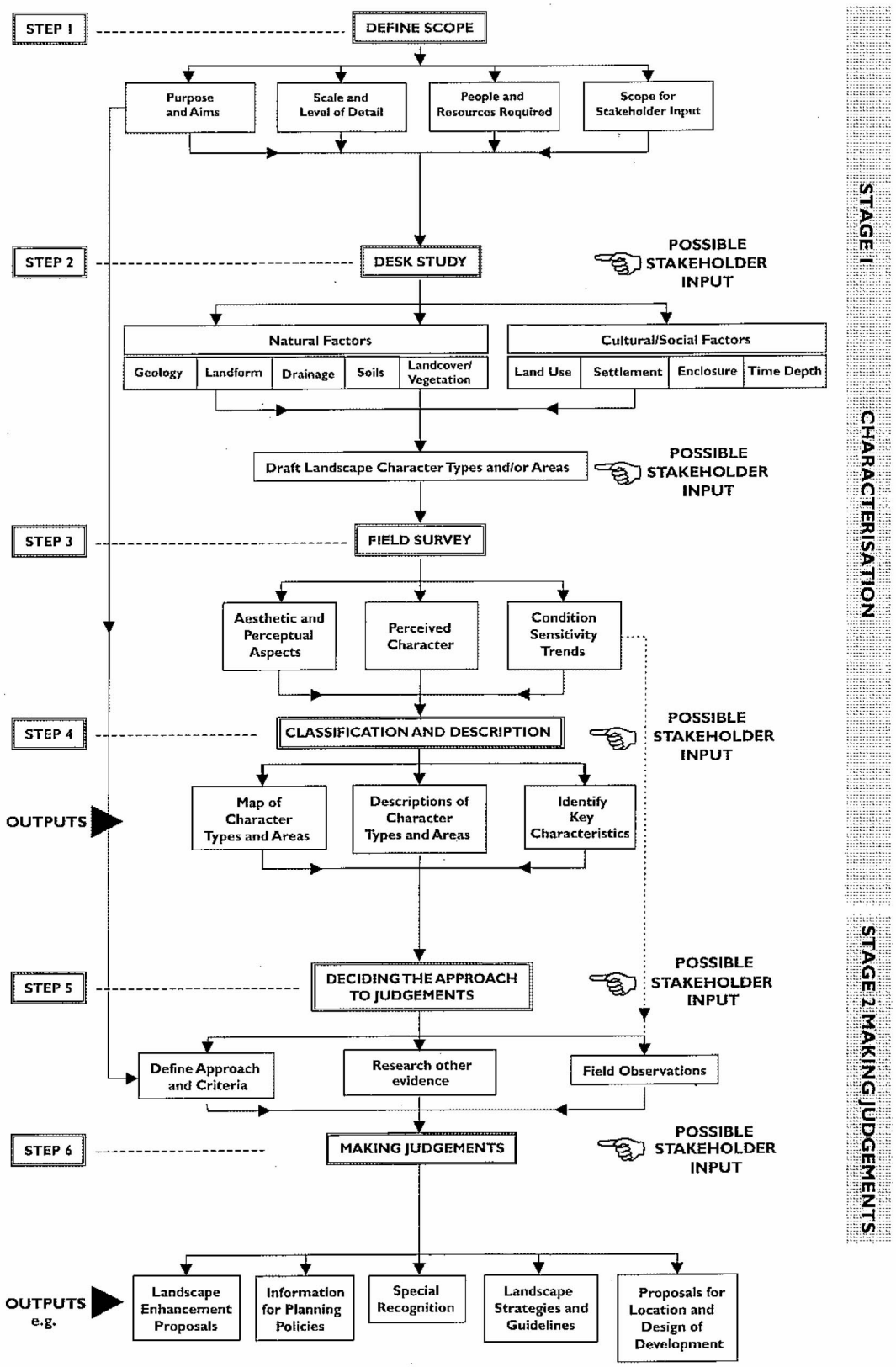
- Large and Medium turbine groups will generally appear out of scale with this smaller scale landscape type.

- Cumulative impacts of turbines, in both landscape and visual terms, should be carefully considered in this landscape type, as many turbine developments are already present in and around this landscape type.

Appendix 1

The Main Stages of a Landscape Character Assessment

Figure 2.4: Flow diagram of Landscape Character Assessment methodology



Footnote: Stakeholder contributions may be possible at all stages.

The whole process may be iterative.

Appendix 2

Field Survey Form

Fenland Wind Turbine Development — FIELD SURVEY RECORD

Date :	**Surveyors' Name/s :**	**National Typology Code:**
Location : **Landscape Character Area :** **Conditions :**		**LDU Nos:**

STRENGTH OF CHARACTER

LANDFORM (S1) dominant prominent apparent (widespread/localised) insignificant

Description:
flat
gently undulating
strongly undulating
steep
broad valley
narrow valley
plain
plateau
upland
sloping

Hydrology:
river
stream
ponds
lakes
reservoir
wetlands
other

Degree of slope: | **Altitude :**

LANDCOVER (S2) dominant prominent apparent (widespread/localised) insignificant

Description:
open farmland
treed farmland
wooded farmland
parkland
woodland
grassland / common
open water or wetlands

Primary land use:
ommercial / industrial
farmland:arable/pastoral/mixed
forestry:broadleaf/conifer/mixed
common or green: grassed/treed
nursery / allotments / orchard
recreation or amenity:type
reservoir
disturbed : type

Associated features: e.g. glasshouses/ marina.

Secondary land use
(select from above)

Woodland cover:	**Species:**	**Field boundaries** (in order of prominence):	**Species:**
extensive interlocking linear discrete fragmented		hedgerow (with/without trees) tree rows hedgebank fence wall/wet ditch other (high/medium/low)	

HISTORICAL PATTERN (S3) dominant prominent apparent (widespread/localised) insignificant

Description:
organic
planned
unenclosed

Field pattern:
geometric (ordered)
regular (rectilinear)
subregular (interlocking – curved boundaries)
irregular (organic, winding lanes)
discontinuous (no discernable pattern)

Transport pattern:
motorway
A road
B road
track / lane
canal
railway
straight
winding
sinuous
sunken

Field size:
1- small < 2ha
2- small/medium
3- medium/large
4- large > 8ha

Settlement:
Form: village / hamlet / isolated house or farm/ other
Building style: vernacular / non-vernacular
Age: Tudor/Stuart/Georgian/ Victorian/Edwardian/20thC
Materials: walls and roof

Verges:
absent
variable
uniform wide / medium / narrow
ditched

Country houses:
Age: Tudor/Stuart/Georgian/Victorian/Edwardian 20thC
Materials:

Other built features (function, age and materials):

Other comments e.g. cultural features

VISUAL AND SENSORY PERCEPTION

Views of area from outside (S4):
widely visible
locally visible
concealed

Sense of enclosure (S5):
confined
contained
partial
open
exposed

Tranquility (S6):
tranquil/moderate/discordant

Rarity (S7):
unique
rare
unusual
frequent

CONDITION

HISTORICAL INTEGRITY

Extent and type of landcover change (C1):		**Age structure of tree cover (C2):**	**Survival of cultural pattern (C5):**
pasture to arable change in extent of woodland/tree cover on farmland loss of field boundaries parkland to farmland minerals other	widespread localised insignificant	over mature mature/young mixed	intact and well managed intact but poorly managed interrupted (gen. intact but locally interrupted) declining (boundaries poorly managed) relic

Notes:

ECOLOGICAL INTEGRITY

Extent of habitat/corridor survival (C3):	**Management of habitats (C4):**
Widespread Linked Scattered relic	Good Not obvious Poor

Notes:

VISUAL IMPACT

Impact of built development (C6):		**Visual Unity (C7):**
Urban/Transport corridor/rural housing/ utilities/structures/other	high moderate low	Unified Coherent Incoherent
Notes:		**Notes:**

Boundary notes:

CHARACTER SUMMARY

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	Apparent	Dominant/Prominent
S2 Impact of landcover*	Insignificant	Apparent	Dominant/Prominent
S3 Historic pattern*	Insignificant	Apparent	Dominant/Prominent
S4 Visibility from outside	Widely visible	Locally visible	Concealed
S5 Sense of enclosure	Open/exposed	Partial	Contained/confined
S6 Tranquillity	Discordant	Moderate	Tranquil
S7 Distinctiveness/rarity	Frequent	Unusual	Unique/rare
Totals ** Prime condition categories if tie*			

CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	Widespread	Localised	Insignificant
C2 Age Structure of Tree Cover*	Overmature	Mature or young	Mixed
C3 Extent of semi-natural habitat survival*	Relic	Scattered	Widespread/Linked
C4 Management of semi-natural habitats	Poor	Not obvious	Good
C5 Survival of cultural pattern (fields and hedges)	Declining/Relic	Interrupted	Intact
C6 Impact of built development*	High	Moderate	Low
C7 Visual unity	Incoherent	Coherent	Unified
** Prime condition categories if tie*			
Totals ** Prime robustness categories if tie*			

MATRIX

Condition				
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**
	Weak	**Moderate**	**Strong**
		Strength of Character	

Appendix 3

Definitions of Key Characteristics and their relationship to Sensitivity

Definition of Key Characteristics and their relationship to sensitivity

Landscape Character Sensitivity

Scale and sense of enclosure – these characteristics relate to factors such as landscape scale, extent of views to and from an area and sense of containment. These issues help to assess the visual perception of a Landscape Character Type and how it is experienced by the viewer.

> e.g. a large-scale, exposed landscape is more able to accommodate large-scale intrusive features such as wind turbines, which would be in keeping with the scale and expansiveness of the landscape. A small-scale, contained landscape is less able to accommodate large-scale features as they could dominate views into and from the area.

Impact of landform – these characteristics relate to the degree of slope of a landscape, its altitude and form or change in relief. They help to assess the impact on the physical shape of the landscape.

> e.g. wind turbines in a flat landscape can form landmarks but are also visible from long distances. Wind turbines in a more rolling landscape can become visually cluttered if heights vary but can also be concealed by the landform in some views.

Impact of landcover and landcover change – these characteristics relate to factors such as landuse, vegetation cover, field boundaries and the pattern of field units and transport infrastructure. These matters create the structure of the landscape and the relationship between different features in the landscape.

> e.g. in a rectilinear or ordered landscape, lines or grids of turbines would be more in keeping with the landcover pattern. In a more organic or irregular landscape clusters or less formal groupings of turbines would be more appropriate.

Settlement Pattern and density – settlement form or siting can often form a key characteristic of a landscape. Factors such as settlement pattern, density of development and scale of built form define how settlement relates to the landscape and how existing and proposed elements in the landscape relate to settlements.

> e.g. a turbine or group of turbines may not dominate a large settlement but may be visible by a large number of people. Smaller settlements may be dominated by a turbine that is out of scale with it, but fewer people may have views of it.

Visual Sensitivity

Skyline – the elements that contribute to the skyline of a landscape, the vertical components or absence of them, determine whether new features complement or contrast with the existing situation. This contributes to the visual unity of a landscape.

> e.g. turbines can form a focal point or landmark within a skyline that has few existing vertical elements. A skyline that already has many vertical components can become cluttered and jumbled if further elements are added.

Landmarks and impact of built development – many built features can have an impact on a landscape. Features such as transport corridors, utilities/pylons and individual buildings or groups of buildings can be seen as either landmarks or visual intrusions. Existing built features can vary in function and form and could either complement or conflict with wind turbines.

> e.g. wind turbines may conflict with historic features such as church spires, which can be visible over long distances. Landscapes with a wide variety of different built forms may be more able to accommodate wind turbines than a largely undeveloped landscape but also become cluttered and confused if additional vertical elements are introduced, dependant on the types of features.

Visibility from outside and connections with adjacent landscapes – this relates to the extent to which a landscape can be viewed from beyond its boundaries, and visually connects with its surroundings. Turbines can be very tall features and be viewed over long distances, which could potentially impact on views from surrounding landscapes.

e.g. turbines located close to the boundaries of character areas may cause visual impacts on both landscape types.

Remoteness and tranquillity – these characteristics relate to the extent of human impact on the landscape, physically, visually and in terms of noise. These factors influence the sense of remoteness felt by the observer, which could be altered by the introduction of man-made features in the form of wind turbines.

e.g. in a landscape that is perceived to be remote and tranquil due to the lack of human influence and/or presence, wind turbines may have an adverse impact on these perceptions.

Appendix 4

Current Guidance on Visual Influence of Turbines

Document	Recommended Guidance/Definitions	Other Notes
NPPG6, 2000 – Scottish Executive		• Key issues relate to: visual impact, landscape, birds & habitats and others (aircraft flight paths, local amenity, noise, construction traffic, TV reception and driver distraction)
PAN45: Renewable Energy Technologies, 2002 - Scottish Executive	Up to 2km – likely to be a prominent feature 2-5km – relatively prominent 5-15km – only prominent in clear visibility – seen as part of the wider landscape 15-30km – only seen in very clear visibility – a minor element in the landscape	• Key issues relate to: communications systems, aerodromes, television reception, proximity to roads/railways, shadow flicker, noise, power lines, siting in the landscape, visual impact, birds and habitats, cumulative effects and decommissioning • Grouped turbines normally appear acceptable as a single, isolated feature in an open, undeveloped landscape • Rows of turbines may be more appropriate in an agricultural landscape with formal field boundaries
Visual Assessment of Windfarms: Best Practice, 2002 – University of Newcastle for SNH	Quotes above distances from PAN45 Quotes Thomas and Thomas-Sinclair Matrices (see below) Recommendations for ZVI: Turbine up to 50m – ZVI 15km Turbine 51-70m – ZVI 20km Turbine 71-85m – ZVI 25km Turbine 86-100km – ZVI 30km	• Influences on visibility include: general visibility; proportional visibility; lighting; movement and orientation; distance, colour and contrast; contrast, skylining and backclothing; elevation of windfarm and receptor; colour and design; landscape character and receptors • See 'Conceptual Model for Visual Impact Assessment' below • Thomas and Thomas-Sinclair Matrices no longer considered to be best practice as discredited at some Public Inquiries
Cumulative Impact of Wind Farms in the Kintyre/Bute/Arran Basin, 2005 – ArgyllWindFarms.com	Apparent – at extent of recommended ZVI distance Prominent – at ½ of recommended ZVI distance Dominant - at ¼ of recommended ZVI distance	• Quotes University of Newcastle study • Not considered to be best practice as developed by a Campaign Group but includes interesting approach with field research
Cumulative Effect of Windfarms, v2, 2005 - SNH		• Consider combined/ simultaneous, successive/ repetitive and sequential visibility • Possible effects include: landscape designations, designed landscapes, landscape character, sense of scale, sense of distance, existing focal points, skylining, sense of remoteness/wildness and other special landscape interests
Cumulative Impact of Wind Farms in the Outer Clyde Estuary, 2006 – ArgyllWindFarms.com	Impact dominant at ¼ of defined ZTV Impact prominent at ½ of defined ZTV	• Not considered to be best practice as developed by a Campaign Group but includes interesting approach with field research

Document	**Recommended Guidance/Definitions**	**Other Notes**
Visual Representation of Windfarms Good Practice Guidance, 2006 - horner + maclennan and Envision	Guidance on ZVI extents (expanded from recommendations within 'Visual Assessment of Windfarms: Best Practice' (University of Newcastle, 2002)): Turbine up to 50m – ZVI 15km Turbine 51-70m – ZVI 20km Turbine 71-85m – ZVI 25km Turbine 86-100km – ZVI 30km Turbine 101-130km – ZVI 35km	

THE THOMAS AND SINCLAIR-THOMAS MATRICES (section A) to estimate the potential visual impact of different sizes of wind turbines					
Overall height of turbines (m) >>>		**41-45**	**41-48**	**53-57**	**72-74**
Descriptors	Band	Thomas Matrix		Sinclair-Thomas Matrix	
		Original	Revised		
		Approximate distance range (km)			
Dominant impact due to large scale, movement, proximity and number	A	0-2	0-2	0-2.5	0-3
Major impact due to proximity: capable of dominating landscape	B	2-3	2-4	2.5-5	3-6
Clearly visible with moderate impact: potentially intrusive	C	3-4	4-6	5-8	6-10
Clearly visible with moderate impact: becoming less distinct	D	4-6	6-9	8-11	10-14
Less distinct: size much reduced but movement still discernible	E	6-10	9-13	11-15	14-18
Low impact, movement noticeable in good light: becoming components in overall landscape	F	10-12	13-16	15-19	18-23
Becoming indistinct with negligible impact on the wider landscape	G	12-18	16-21	19-25	23-30
Noticeable in good light but negligible impact	H	18-20	21-25	25-30	30-35
Negligible or no impact	I	20	25	30	35
Suggested radius for ZVI analysis		15	At least Junction of Band F and Band G; extended to reflect local circumstances or if cumulative impact may be involved		

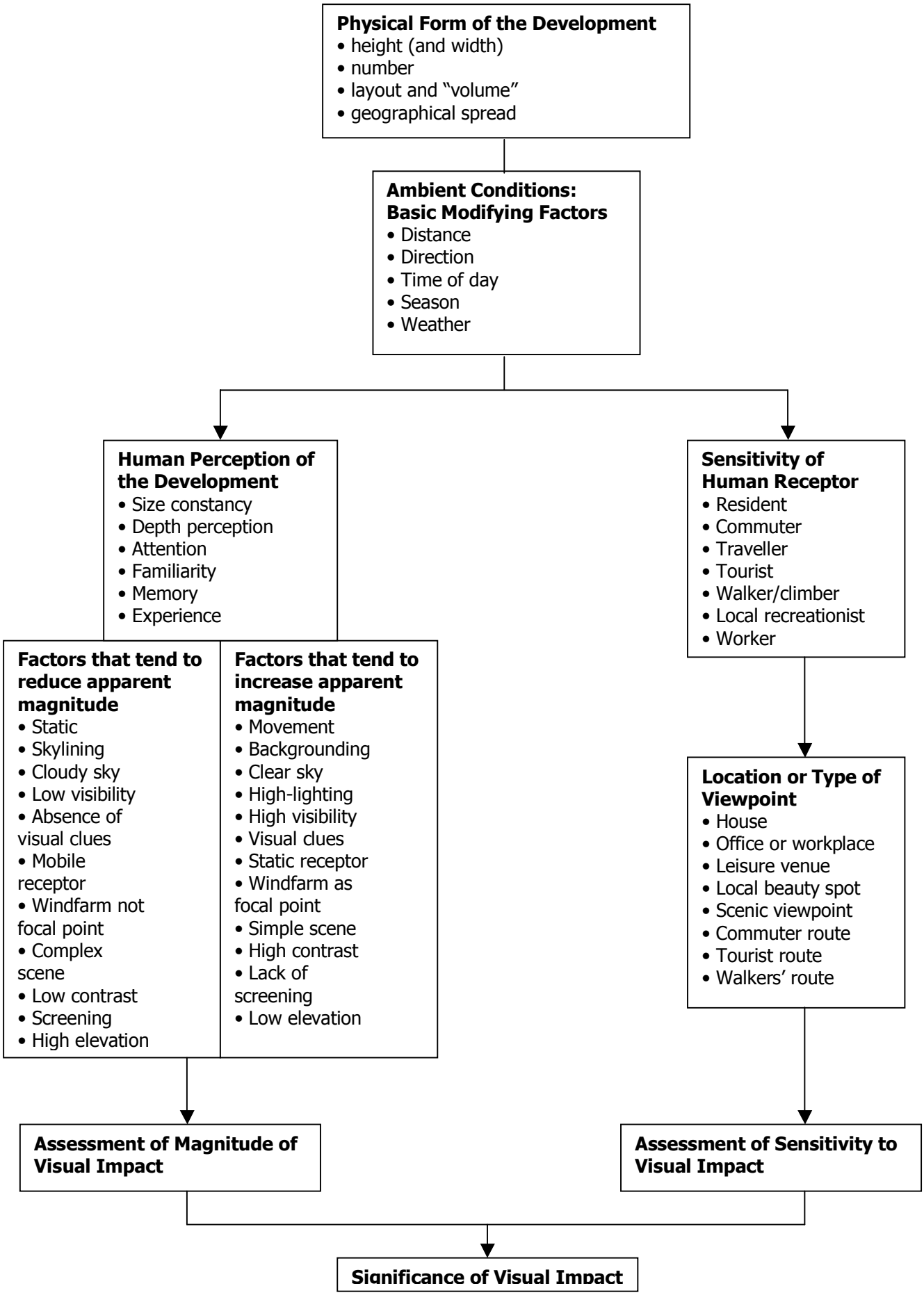
THE SINCLAIR-THOMAS MATRICES (section B) **Potential visual impact matrix for wind turbines of 72-74m overall height (field observation) and 90-100m (extrapolated). Distances in km**					
Band		**72-74m**	**90-100m**	**Magnitude**	**Significance**
				(subject to other factors)	
A	Dominant impact due to large scale, movement, proximity and number	0 - 3	0 - 4	High	Potential for independent significant impact
B	Major impact due to proximity: capable of dominating landscape	3 - 6	4 - 8	Medium/High	
C	Clearly visible with moderate impact: potentially intrusive	6 - 10	8 - 13	Medium	Potential for contributory significant impact
D	Clearly visible with moderate impact: becoming less distinct	10 – 14	13 - 18		
E	Less distinct: size much reduced but movement still discernible	14 – 18	18 - 23	Low/Medium	Potential for ancillary nonsignificant impact: only becoming significant if numerous or cumulative with other installations
F	Low impact, movement noticeable in good light: becoming components in overall landscape	18 – 23	23 - 30	Low	
Approximate recommended threshold for ZVI analysis					
G	Becoming indistinct with negligible impact on the wider landscape	23 –30	30 - 38	Negligible	
H	Noticeable in good light but negligible impact	30 -35	38 - 45		
I	Negligible or no impact	35+	45 +		

Size Classes, Names and Descriptors for Visual Effect (Magnitude) – From Visual Assessment of Windfarms: Best Practice

Size	**Class**	**Name Descriptors – appearance in central vision field**	**Modifying Factors**
Very Large	Dominant	Commanding, controlling the view	Few
Large	Prominent	Standing out, striking, sharp, unmistakable, easily seen	Few
Medium	Conspicuous	Noticeable, distinct, catching the eye or attention, clearly visible, well defined	Many
Small	Apparent	Visible, evident, obvious	Many Limit of Potential Visual Significance ↓
Very Small	Inconspicuous	Lacking sharpness of definition, not obvious, indistinct, not clear, obscure, blurred, indefinite	Many Limit of ZVI ↓
Negligible	Faint	Weak, not legible, near limit of acuity of human eye	Few

APPENDIX 4

Conceptual Model for Visual Impact Assessment – From Visual Assessment of Windfarms: Best Practice



Appendix 5

Outline Descriptions of Landscape Character Areas in Fenland District

1. CHATTERIS CLAY ISLAND

Location

This area is located to the south of Fenland District. The market town of Chatteris is located in the western portion of the island, which extends out into the Fens for up to 4km east of Chatteris. The A142 and A141 both run through the island.

Key Characteristics

- Slightly elevated clay island set within the surrounding peaty Fens, rising to a maximum height of 11m AOD
- Highly visible settlement edge with several dominant storage and agricultural packing plants
- Historic core of buildings along the main roads through Chatteris, using locally traditional buff brick
- Most other housing typically 20th century with minimal vernacular style
- Poplar and other tree belts create strong linear features around some fields and isolated properties
- Field units smaller than in surrounding Fens and more organic in shape, with remnant hedgerows
- Road levels less pronounced than in surrounding Fens

Distinctive Features

- A142 Chatteris Bypass
- Vegetable crops

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	**Apparent**	Dominant/Prominent
S2 Impact of landcover*	Insignificant	**Apparent**	Dominant/Prominent
S3 Historic pattern*	Insignificant	**Apparent**	Dominant/Prominent
S4 Visibility from outside	**Widely visible**	Locally visible	Concealed
S5 Sense of enclosure	Open/exposed	**Partial**	Contained/confined
S6 Tranquillity	**Discordant**	Moderate	Tranquil
S7 Distinctiveness/rarity	**Frequent**	Unusual	Unique/rare
Totals ** Prime condition categories if tie*	**3**	**4**	**0**
CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	Widespread	**Localised**	Insignificant
C2 Age Structure of Tree Cover*	Overmature	**Mature or young**	Mixed
C3 Extent of semi-natural habitat survival*	Relic	**Scattered**	Widespread/Linked
C4 Management of semi-natural habitats	Poor	**Not obvious**	Good
C5 Survival of cultural pattern (fields and hedges)	**Declining**/Relic	Interrupted	Intact
C6 Impact of built development*	**High**	Moderate	Low
C7 Visual unity	**Incoherent**	Coherent	Unified
Totals ** Prime robustness categories if tie*	**3**	**4**	**0**

MATRIX

Condition	Weak	Moderate	Strong
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**

Strength of Character

2. MARCH CLAY ISLAND

Location

This area is located towards the centre of Fenland District. The villages of Wimblington and Doddington are located within the area with part of the market town of March located in the northern portion of the island. The A141 runs through the middle of the island.

Key Characteristics

- Slightly elevated clay island set within the surrounding peaty Fens, rising to a maximum height of 6m AOD
- Built edge of settlements include some unsympathetic industrial structures
- Very little woodland but some large individual oak trees
- Vegetation and built form creates good visual enclosure in places, particularly in the villages
- Paddocks and smaller fields related to settlements
- Hedgerows and poplar belts present, particularly along the sides of roads
- Older roads are much more winding than the straight roads of the Fens
- Open panoramic views across Fens

Distinctive Features

- Large pylons visible close to the island
- A141 bypassing March, Wimblington and Doddington
- Clay soil is lighter in colour than surrounding peaty Fens
- Views to wind farm at Ranson Moor

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	**Apparent**	Dominant/Prominent
S2 Impact of landcover*	Insignificant	**Apparent**	Dominant/Prominent
S3 Historic pattern*	Insignificant	**Apparent**	Dominant/Prominent
S4 Visibility from outside	**Widely visible**	Locally visible	Concealed
S5 Sense of enclosure	Open/exposed	**Partial**	Contained/confined
S6 Tranquillity	Discordant	**Moderate**	Tranquil
S7 Distinctiveness/rarity	**Frequent**	Unusual	Unique/rare
Totals ** Prime condition categories if tie*	**2**	**5**	**0**
CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	Widespread	**Localised**	Insignificant
C2 Age Structure of Tree Cover*	Overmature	**Mature** or young	Mixed
C3 Extent of semi-natural habitat survival*	Relic	**Scattered**	Widespread/Linked
C4 Management of semi-natural habitats	Poor	**Not obvious**	Good
C5 Survival of cultural pattern (fields and hedges)	**Declining**/Relic	Interrupted	Intact
C6 Impact of built development*	High	**Moderate**	Low
C7 Visual unity	Incoherent	**Coherent**	Unified
Totals ** Prime robustness categories if tie*	**1**	**6**	

MATRIX

Condition	Weak	Moderate	Strong
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**

Strength of Character

3. WISBECH SETTLED FEN

Location

This area is located in the north east of Fenland District. The market town of Wisbech and villages of Tydd St Giles, Newton, Leverington, Wisbech St Mary, Friday Bridge and Elm are located within the area. The A47 and A1101 both run through the area.

Key Characteristics

- A relatively flat landscape that is heavily settled compared to the surrounding peaty Fens
- Settlement pattern includes a number of nucleated villages with 20th century ribbon development along the local roads
- Market towns and villages have an historic core with traditional buildings, village green and church
- A mix of straighter main roads and more organic winding secondary roads
- Linear waterways, river and ditches
- Fruit orchards and other plant nurseries form a sub area west of Wisbech
- Orchards enclosed by shelter belts of pollarded poplars and alders to create a small to medium scale landscape
- Traditional buildings are red brick as opposed to the buff brick used in surrounding areas

Distinctive Features

- Pylons, particularly north of Wisbech
- A47
- Navigable River Nene with associated ships, port and lifting equipment
- Large drains such as North Level Main Drain
- Wisbech with its elegant Georgian merchant houses fronting onto the river
- Large number of bungalows
- Glasshouses associated with orchards and nurseries

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	**Apparent**	Dominant/Prominent
S2 Impact of landcover*	Insignificant	Apparent	Dominant/**Prominent**
S3 Historic pattern*	Insignificant	Apparent	Dominant/**Prominent**
S4 Visibility from outside	Widely visible	**Locally visible**	Concealed
S5 Sense of enclosure	Open/exposed	**Partial**	Contained/confined
S6 Tranquillity	Discordant	**Moderate**	Tranquil
S7 Distinctiveness/rarity	Frequent	Unusual	Unique/**rare**
Totals ** Prime condition categories if tie*	**0**	**4**	**3**
CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	Widespread	**Localised**	Insignificant
C2 Age Structure of Tree Cover*	Overmature	Mature or young	**Mixed**
C3 Extent of semi-natural habitat survival*	Relic	**Scattered**	Widespread/Linked
C4 Management of semi-natural habitats	Poor	**Not obvious**	Good
C5 Survival of cultural pattern (fields and hedges)	Declining/Relic	Interrupted	**Intact**
C6 Impact of built development*	High	Moderate	**Low**
C7 Visual unity	Incoherent	**Coherent**	Unified
Totals ** Prime robustness categories if tie*	**0**	**4**	**3**

MATRIX

Condition	Weak	Moderate	Strong
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**

Strength of Character

4. WHITTLESEY ISLAND

Location

This area is located to the north west of Fenland District. The market town of Whittlesey and the villages of Coates and Eastrea are located within the area, which abuts the boundary with Peterborough City Council to the west. The River Nene is located to the north of the area, the A605 runs through the middle of the island, as does the Peterborough to Cambridge railway line.

Key Characteristics

- Slightly elevated clay island within the surrounding Fens, rising to a maximum height of 8m AOD
- Island appears relatively wooded in distant views, particularly to the east of the area
- Highly visible settlement edge, particularly to the north and east of Whittlesey
- Degraded landscape in association with Hanson brickworks west of Whittlesey
- Brick pits at different stages of extraction – active, restored and unrestored
- Large industrial buildings and associated infrastructure to the east of Whittlesey
- Whittlesey contains considerable areas of mid to late 20th century housing
- Historic core to centre of market town including some grand historic buildings, particularly along the main road and the market square
- Older buildings buff brick and thatched roofs

Distinctive Features

- Brickworks west of Whittlesey, particularly the chimneys
- 3 large wind turbines near McCain's factory
- King's Dyke
- King's Dyke Nature Reserve
- Duck decoy
- Whittlesey church

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	Apparent	Dominant/**Prominent**
S2 Impact of landcover*	Insignificant	**Apparent**	Dominant/Prominent
S3 Historic pattern*	Insignificant	**Apparent**	Dominant/Prominent
S4 Visibility from outside	**Widely visible**	Locally visible	Concealed
S5 Sense of enclosure	Open/exposed	**Partial**	Contained/confined
S6 Tranquillity	**Discordant**	Moderate	Tranquil
S7 Distinctiveness/rarity	Frequent	Unusual	**Unique**/rare
Totals ** Prime condition categories if tie*	**2**	**3**	**2**
CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	**Widespread**	Localised	Insignificant
C2 Age Structure of Tree Cover*	Overmature	Mature or young	**Mixed**
C3 Extent of semi-natural habitat survival*	Relic	**Scattered**	Widespread/Linked
C4 Management of semi-natural habitats	Poor	**Not obvious**	Good
C5 Survival of cultural pattern (fields and hedges)	**Declining**/Relic	Interrupted	Intact
C6 Impact of built development*	**High**	Moderate	Low
C7 Visual unity	**Incoherent**	Coherent	Unified
Totals ** Prime robustness categories if tie*	**4**	**2**	**1**

MATRIX

Condition	Weak	Moderate	Strong
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**

Strength of Character

5. THE FENS

Location

This area forms the majority of Fenland District. A large proportion the market town of March is located towards the centre of the area. The villages of Benwick, Christchurch, Guyhirn, Manea, Murrow, Parson Drove, Thorney Toll and Turves are also located within the area. The River Nene forms the northern boundary of Fenland District and the River Ouse forms the southern boundary. The A47, A605 and A141 run through the middle of the area, as does the Peterborough to Cambridge railway line and its offshoot to Wisbech.

Key Characteristics

- Large scale, flat and open landscape with extensive views and large skies
- Largely unsettled, arable landscape with isolated villages and scattered individual properties
- Individual properties often surrounded by wind breaks including numerous conifers
- Rectilinear field structure divided by the pattern of artificial drainage ditches
- Very few hedgerows in landscape
- Productive and functional landscape with few recreational uses
- Long straight roads, elevated above surrounding fields but locally uneven

Distinctive Features

- Wind turbines at Coldham, Glass Moor, Ransom Moor and on the northern edge of March
- Coldham Estate which has a more structured pattern of trees, hedges and woodland
- North Level Main Drain
- March with its historic core
- Old Course of the River Nene
- Pylons and overhead wires

STRENGTH OF CHARACTER	**WEAK**	**MODERATE**	**STRONG**
S1 Impact of landform*	Insignificant	Apparent	**Dominant**/Prominent
S2 Impact of landcover*	Insignificant	Apparent	**Dominant**/Prominent
S3 Historic pattern*	Insignificant	Apparent	Dominant/**Prominent**
S4 Visibility from outside	**Widely visible**	Locally visible	Concealed
S5 Sense of enclosure	Open/**exposed**	Partial	Contained/confined
S6 Tranquillity	Discordant	Moderate	**Tranquil**
S7 Distinctiveness/rarity	Frequent	**Unusual**	Unique/rare
Totals ** Prime condition categories if tie*	**2**	**1**	**4**
CONDITION	**POOR**	**MODERATE**	**GOOD**
C1 Landcover Change	Widespread	**Localised**	Insignificant
C2 Age Structure of Tree Cover*	Overmature	**Mature** or young	Mixed
C3 Extent of semi-natural habitat survival*	Relic	**Scattered**	Widespread/Linked
C4 Management of semi-natural habitats	Poor	**Not obvious**	Good
C5 Survival of cultural pattern (fields and hedges)	Declining/Relic	Interrupted	**Intact**
C6 Impact of built development*	**High**	Moderate	Low
C7 Visual unity	Incoherent	**Coherent**	Unified
Totals ** Prime robustness categories if tie*	**1**	**5**	**1**

MATRIX

Condition	Weak	Moderate	Strong
Good	**Strengthen and reinforce**	**Conserve and strengthen**	**Safeguard and manage**
Moderate	**Improve and reinforce**	**Improve and conserve**	**Conserve and restore**
Poor	**Reconstruct**	**Improve and restore**	**Restore condition to maintain character**

Strength of Character

Appendix 6

Sensitivity Analysis of Landscape Types in Fenland District

Landscape Character Type – Drained Fenland

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small to Medium Scale Group	Medium Scale Group	Large Scale Group
Scale and sense of enclosure Large scale, flat and open landscape with extensive views and large skies. Landscape feels exposed and widely visible	**Low (1)** The large scale, expansive landscape would be able to accommodate single turbines as they would be in keeping with the scale of the landscape and not dominate views.	**Low (1)** The large scale, expansive landscape would be able to accommodate small scale groups of turbines as they would be in keeping with the scale of the landscape and not dominate views.	**Low (1)** The large scale, expansive landscape would be able to accommodate small to medium scale groups of turbines as they would be in keeping with the scale of the landscape and not dominate views.	**Low (1)** The large scale, expansive landscape would be able to accommodate medium scale groups of turbines as they would be in keeping with the scale of the landscape and not dominate views.	**Low (1)** The large scale, expansive landscape would be able to accommodate large scale groups of turbines as they would be in keeping with the scale of the landscape and although a significant feature they are unlikely to dominate views.
Impact of landform The altitude of this landscape type varies from –1 to 4m AOD. This results in a flat, low lying landform with very little change in relief	**Low (1)** The low lying, flat landscape offers little change in relief, allowing single turbines to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landscape offers little change in relief, allowing small scale groups of turbines to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landscape offers little change in relief, allowing small to medium scale groups of turbines to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landscape offers little change in relief, allowing medium scale groups of turbines to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landscape offers little change in relief, allowing large scale groups of turbines to form a simple contrast to the horizontal landform and be viewed at a constant height, avoiding visual confusion.
Impact of landcover and landcover change Rectilinear field pattern divided by the regular arrangement of linear artificial drainage ditches. Straight roads that are elevated above the surrounding landscape help to accentuate this pattern. Lack of hedgerows can make fields seem even larger than they are.	**Low (1)** The rectilinear field pattern and large scale of field units provide the opportunity to relate a single wind turbine to junctions or nodes in the landscape.	**Low (1)** The rectilinear field pattern and large scale of field units provide the opportunity to relate a small group of wind turbines to the linear features of the	**Low (1)** The rectilinear field pattern and large scale of field units provide the opportunity to relate small to medium groups of wind turbines to the linear	**Low (1)** The rectilinear field pattern and large scale of field units provide the opportunity to relate medium scale groups of turbines to the linear pattern of the	**Low (1)** The rectilinear field pattern and large scale of field units provide the opportunity to relate large scale groups of turbines to the linear pattern of the

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small to Medium Scale Group	Medium Scale Group	Large Scale Group
		landscape – the ditches, dykes and road alignments.	features of the landscape – the ditches, dykes and road alignments.	landscape, to create lines or grids of turbines that emphasis the characteristic landcover pattern.	landscape, to create lines or grids of turbines that emphasis the characteristic landcover pattern.
Settlement pattern and density Largely unsettled, arable landscape with isolated villages and scattered individual properties. Villages often small and of a linear nature. Towns, with the exception of March, are located on clay islands, which are a separate landscape type surrounded by the Fens.	**Low (1)** A single turbine could be linked to individual properties or industrial areas on the edge of settlement. In relation to the smaller villages, a single turbine would be out of scale with the settlement form but the relative lack of settlement provides opportunities for turbines to be located in areas away from settlement.	**Low (1)** In relation to the towns and villages, a small turbine group would be out of scale with the settlement form but the relative lack of settlement provides opportunities for turbines to be located in areas away from settlement.	**Low (1)** In relation to the towns and villages, a small to medium turbine group would be out of scale and nature with the settlement form but the relative lack of settlement provides opportunities for turbines to be located in areas away from settlement.	**Moderate (2)** In relation to the towns and villages, a medium turbine group would be out of scale with the settlement form. Despite the relative lack of settlement, medium scale turbine groups could begin to dominate the open areas between settlements.	**Moderate (2)** In relation to the towns and villages, a large turbine group would be out of scale with the settlement form. Despite the relative lack of settlement, large scale groups could dominate the open areas between settlements and views from the settlements themselves.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small to Medium Scale Group	Medium Scale Group	Large Scale Group
Skyline For much of the Fens the skyline is simple and uninterrupted. There are, however, existing wind turbines at Coldham, Glass Moor, Ransom Moor and on the northern edge of March, as well as pylons and overhead wires in some locations.	**Low (1)** The simple, uninterrupted skyline of much of the Fens, allows single turbines to form a simple contrast to the skyline. However, the potential for cumulative impact of turbine groups in association with other vertical elements needs to be considered.	**Low (1)** The simple, uninterrupted skyline of much of the Fens, allows small groups of turbines to form a simple contrast to the skyline. However, the potential for cumulative impact of turbine groups in association with other vertical elements needs to be considered.	**Low (1)** The simple, uninterrupted skyline of much of the Fens, allows small/medium scale groups of turbines to form a simple contrast to the skyline. However, the potential for cumulative impact of turbine groups in association with other vertical elements needs to be considered.	**Medium (2)** The simple, uninterrupted skyline of much of the Fens, could allow medium scale groups of turbines to form a simple contrast to the skyline. However, groups of this scale have a greater potential for cumulative impact of turbine groups in association with other vertical elements needs to be considered.	**Medium (2)** The simple, uninterrupted skyline of much of the Fens, allowing large scale groups of turbines to form a simple contrast to the skyline. However, groups of this scale have a greater potential for cumulative impact of turbine groups in association with other vertical elements needs to be considered.
Landmarks and impact of built development Existing wind turbines at Coldham, Glass Moor, Ransom Moor and on the northern edge of March are visible from many locations throughout the Fens. Pylons and overhead wires are also apparent in some locations, all of which form a sharp vertical contrast with the generally horizontal landform. Church towers and spires in many of the towns and villages also form a more historic vertical element in the landscape.	**Moderate (2)** There are a range of features that currently form landmarks within the Fenland landscape. Some of this are historic landmarks which are particularly important to avoid visual conflict with. Siting of single turbines will need to avoid visual confusion with existing landmark features.	**Moderate (2)** There are a range of features that currently form landmarks within the Fenland landscape. Some of this are historic landmarks which are particularly important to avoid visual conflict with. Siting of small groups of turbines will need to avoid visual confusion with existing landmark features.	**Moderate (2)** There are a range of features that currently form landmarks within the Fenland landscape. Some of this are historic landmarks which are particularly important to avoid visual conflict with. Siting of small to medium groups of turbines will need to avoid visual confusion with existing landmark features.	**Moderate (2)** There are a range of features that currently form landmarks within the Fenland landscape. Some of this are historic landmarks which are particularly important to avoid visual conflict with. Siting of medium scale groups of turbines will need to avoid visual confusion with existing landmark features.	**Moderate (2)** There are a range of features that currently form landmarks within the Fenland landscape. Some of this are historic landmarks which are particularly important to avoid visual conflict with. Siting of large scale groups of turbines will need to avoid visual confusion with existing landmark features.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small to Medium Scale Group	Medium Scale Group	Large Scale Group
Visibility from outside and connections with adjacent landscapes All the surrounding landscape types are slightly elevated above the Fens and therefore enjoy open views across the Fenland landscape.	**Moderate (2)** The adjacent landscapes types, Settled Fen, Clay Fen Island and Extracted Clay Fen Island are generally more sensitive to turbine development than The Fens. A single turbine located within the vicinity of these landscape types would still be highly visible.	**Moderate (2)** The adjacent landscapes types, Settled Fen, Clay Fen Island and Extracted Clay Fen Island are generally more sensitive to turbine development than The Fens. Small turbine groups located within the vicinity of these landscape types would be highly visible.	**Moderate (2)** The adjacent landscape types. Settled Fen, Clay Fen Island and Extracted Clay Fen Island are generally more sensitive to turbine development than The Fens. Small to medium sale turbine groups located within the vicinity of these landscape types would be highly visible.	**High (3)** The adjacent landscape types, Settled Fen, Clay Fen Island and Extracted Clay Fen Island are generally more sensitive to turbine development than The Fens. Medium scale turbine groups are likely to be visible from these landscape types and have an impact on them wherever they are located.	**High (3)** The adjacent landscape types, Settled Fen, Clay Fen Island and Extracted Clay Fen Island are generally more sensitive to turbine development than The Fens. Large scale turbine groups are likely to be visible from these landscape types and have an impact on them wherever they are located.
Remoteness and Tranquillity The Fens are crossed by many roads, most of which are elevated above surrounding fields, but few of which are major transport routes. The landscape is heavily influenced by human activity in the form of the pattern of artificial drainage ditches. However, the landscape is largely unsettled and gives the impression of being relatively tranquil.	**Low (1)** A single turbine is unlikely to create much additional influence on the tranquillity of the landscape.	**Low (1)** A small group of turbines is unlikely to create much additional influence on the tranquillity of the landscape.	**Low (1)** A small to medium group of turbines is unlikely to create much additional influence on the tranquillity of the landscape.	**Moderate (2)** A medium scale turbine group will cause a localised impact on the tranquil character of the landscape and cumulative impacts have the potential to further amplify this.	**Moderate (2)** A large scale turbine group will cause a localised impact on the tranquil character of the landscape and cumulative impacts have the potential to further amplify this.
Total	**10**	**10**	**10**	**14**	**14**
Overall Sensitivity	**Low**	**Low**	**Low**	**Medium-low**	**Medium-low**

Landscape Character Type – Settled Fen

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Scale and sense of enclosure A relatively flat landscape with partial enclosure afforded by shelter belts related to fruit orchards. The level of enclosure is therefore greater in the orchard areas. The scale of the landscape varies from small and intimate to large and open.	**Low (1)** Although some areas of the landscape are small scale and turbines may appear out of scale, single turbines could be accommodated in more open areas	**Moderate (2)** Although some areas of this landscape type are small scale, careful siting of turbines could allow small clusters to be accommodated.	**Moderate (2)** Although some areas of this landscape type are small scale, careful siting of turbines could allow small to medium clusters to be accommodated.	**High (3)** The small scale of parts of this landscape type, and its partially enclosed nature, would make it difficult to accommodate medium scale turbine groups, which would dominate this landscape.	**High (3)** The small scale of parts of this landscape type, and its partially enclosed nature, would make it difficult to accommodate large scale turbine groups, which would dominate this landscape.
Impact of landform The altitude of this landscape type varies from 0 to 5m AOD. This results in a flat, low lying landform with very little change in relief	**Low (1)** The low lying, flat landform allows single turbines to form a simple contrast to the horizontal landform.	**Low (1)** The low, lying, flat landform allows small turbine groups to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landform allows small to medium turbine groups to form a simple contrast to the horizontal landform.	**Low (1)** The low lying, flat landform allows medium turbine groups to form a simple contrast to the horizontal landform.	**Low (1)** The low, lying, flat landform allows large turbine groups to form a simple contrast to the horizontal landform.
Impact of landcover and landcover change Medium to large scale organic field pattern, divided by tall linear shelter belts to create a small to medium scale pattern overall. Fruit orchards and other plant nurseries are a significant land use. Roads are more winding with a number of contrasting long, straight carriageways.	**Low (1)** The organic field pattern and its relationship to linear shelter belts creates the opportunity to locate single turbines to emphasise the junctions between them.	**Moderate (2)** Careful siting of small clusters of turbines could allow them to be accommodated within this organic field pattern, away from settlement and without removing orchards.	**Moderate (2)** Careful siting of small to medium clusters of turbines could allow them to be accommodated within this organic field pattern or linear groups of turbines to be associated with shelter belt patterns.	**High (3)** The predominance of orchards and nurseries within this landscape type makes it difficult to accommodate medium turbine groups without reducing this landcover and altering the characteristics of the landscape.	**High (3)** The predominance of orchards and nurseries within this landscape type makes it difficult to accommodate large turbine groups without reducing this landcover and altering the characteristics of the landscape.
Settlement pattern and density Heavily settled compared to the surrounding peaty Fens. Historic settlement pattern includes a	**Low (1)]** A single turbine could appear out of scale	**Moderate (2)** Settlement is frequent within this character	**Moderate (2)** Settlement is frequent within this character	**High (3)** Settlement is frequent within this character	**High (3)** Settlement is frequent within this character

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
number of nucleated villages and more recent linear settlements that have developed along, and at right angles to, the many roads in the area. Wisbech is the main settlement in the area, with Georgian merchant houses at its core.	with most of the small settlements in this landcape type. There is scope to accommodate single turbines away from settlement, however, or to be linked with industry or the docks in Wisbech to create a functional image.	type and allows fewer opportunities to accommodate small turbine groups without them dominating the settlement. There are more open areas however, particularly to the north of the area that could accommodate some small turbine groups.	type and allows fewer opportunities to accommodate small to medium turbine groups without them dominating the settlement. There are more open areas however, particularly to the north of the area that could accommodate some small to medium turbine groups.	type and allows very few locations where medium groups of turbine could be accommodated without dominating the settlements and views from them.	type and allows very few locations where large groups of turbines could be accommodated without dominating the settlement and views from them.
Skyline The skyline is quite varied within the Settled Fen. Shelter belts associated with orchards form the skyline in many locations, but other locations have a more simple skyline, although to the north of Wisbech pylons often interrupt it. Cranes associated with the River Nene also interrupt the skyline in this locality.	**Moderate (2)** The number of features that already form horizontal elements on the skyline mean that single turbines would need to be carefully sited to avoid increasing clutter on the skyline.	**Moderate (2)** The number of features that already form horizontal elements on the skyline mean that small turbine groups would need to be carefully sited to avoid increasing clutter on the skyline.	**Moderate (2)** The number of features that already form horizontal elements on the skyline mean that small/medium turbine groups would need to be carefully sited to avoid increasing clutter on the skyline.	**Moderate (2)** The number of features that already form horizontal elements on the skyline mean that medium turbine groups would need to be carefully sited to avoid increasing clutter on the skyline.	**Moderate (2)** The number of features that already form horizontal elements on the skyline mean that large turbine groups would need to be carefully sited to avoid increasing clutter on the skyline.
Landmarks and impact of built development Church towers and spires in some of the villages form landmark features in this landscape and can be visible for long distances. Pylons and overhead wires are also apparent in some locations and form a sharp vertical contrast with the generally horizontal landform in these locations.	**Low (1)** Single turbines could create additional landmarks but would still need to be located to avoid conflict with exiting features.	**Moderate (2)** Small clusters of turbines could form landmarks within this landscape type; if carefully sited to avoid conflict with existing features although existing landmarks tend to be single features.	**Moderate (2)** Small to medium clusters of turbines could form landmarks within the landscape type, if carefully sited to avoid conflict with existing features, although existing landmarks tend to be single features.	**High (3)** Medium groups of turbines could form landmarks within the landscape, if carefully sited to avoid conflict with existing features, although existing landmarks tend to be single features.	**High (3)** Large groups of turbines could form landmarks within the landscape, if carefully sited to avoid conflict with existing features, although existing landmarks tend to be single features.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Visibility from outside and connections with adjacent landscapes The tall shelter belts around the orchards in the Settled Fen create areas that are well enclosed. This means that views into the area are on the whole localised.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Settled Fen and is less likely to be adversely effected by views of a single turbine.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Settled Fen and is less likely to be adversely effected by views of small groups of turbines	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Settled Fen and is less likely to be adversely effected by views of small to medium groups of turbines.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Settled Fen but medium scale groups could still have an adverse impact on views if turbines are not sensitively located.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Settled Fen but large scale groups could still have an adverse impact on views if the turbines are not sensitively located.
Remoteness and Tranquillity Although the area is rural and not urban the Settled Fens are crossed by many roads and are heavily settled. The landscape is also heavily influenced by human activity in the form of the pattern of agriculture and orchards. This leads to the landscape being only moderately tranquil.	**Low (1)** The Settled Fen is heavily disturbed by human activity at present. A single turbine will have little impact on the tranquillity of the landscape.	**Low (1)** The Settled Fen is heavily disturbed by human activity at present. A small turbine group will have little impact on the tranquillity of the landscape.	**Low (1)** The Settled Fen is heavily disturbed by human activity at present. A small to medium turbine group will have little impact on the tranquillity of the landscape.	**Low (1)** The Settled Fen is heavily disturbed by human activity at present. A medium scale group of turbines will have little impact on the tranquillity of the landscape.	**Low (1)** The Settled Fen is heavily disturbed by human activity at present. Even a large scale group of turbines will have little impact on the tranquillity of the landscape.
Total	**9**	**13**	**13**	**18**	**18**
Overall Sensitivity	**Low**	**Medium-low**	**Medium-low**	**Medium-high**	**Medium-high**

Landscape Character Type – Clay Fen Island

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Scale and sense of enclosure Paddocks and smaller fields related to settlements within this landscape type. Hedgerows and tree belts are present around some of these fields and create a partial sense of enclosure.	**Low (1)** Although some elements of the landscape, particularly close to settlement, are small scale, there are also open areas that could accommodate single turbines.	**Moderate (2)** Careful siting of small groups of turbines would be required in order to accommodate them within the smaller scale, partially enclosed landscape.	**Moderate (2)** Careful siting of small to medium groups of turbines would be required in order to accommodate them within the smaller scale, partially enclosed landscape.	**High (3)** The relatively small area covered by this landscape type, its small scale nature and the enclosure created by both vegetation and built form would make it very difficult to accommodate a medium sized group of turbines.	**High (3)** The relatively small area covered by this landscape type, its small scale nature and the enclosure created by both vegetation and built form would make it very difficult to accommodate a large group of turbines.
Impact of landform The altitude of this landscape type varies from 0 to 11m AOD. This is still a relatively low lying landform but it is slightly elevated over the surrounding landscape.	**Low (1)** The slightly elevated but flat landscape offers little change in relief, allowing single turbines to form a simple contrast to the horizontal landform.	**Moderate (2)** The slight elevation of this landscape type means that small groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that small to medium sized groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that medium groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that large groups of turbines will be highly visible from the surrounding low lying land.
Impact of landcover and landcover change Field units are more organic in shape than in the surrounding Fens. Field boundaries are formed by linear artificial drainage ditches or hedgerows and tree belts closer to settlement. Relatively modern roads are a characteristic of these islands, which are more winding and sinuous than traditional Fen roads.	**Low (1)** The contrast of linear drainage ditches and hedgerows with more sinuous roads and a more organic field pattern in general would allow single turbines to emphasise the junction between the two patterns.	**Low (1)** The contrast of linear drainage ditches and hedgerows with more sinuous roads and a more organic field pattern in general would allow small turbine groups to emphasise the junction between the two patterns.	**Low (1)** The contrast of linear drainage ditches and hedgerows with more sinuous roads and a more organic field pattern in general would allow small to medium turbine groups to emphasise the junction between the two patterns.	**Moderate (2)** The smaller field pattern and more organic shape to them, as well as the increased number of roads present would make it difficult to accommodate a medium scale group of turbines without careful consideration of its positioning.	**Moderate (2)** The smaller field pattern and more organic shape to them, as well as the increased number of roads present would make it difficult to accommodate a large scale group of turbines without careful consideration of its positioning.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Settlement pattern and density Settlements are distinct clusters in the form of small villages and market towns. Historic core of buildings along the main roads through market towns. Highly visible settlement edges with dominant storage and agricultural packing plants.	**Moderate (2)** The high proportion of this landscape type that is settlement will make locating even a single turbine difficult without it becoming dominant over the scale of the settlement and particularly its historic core.	**Moderate (2)** The high proportion of this landscape type that is settlement will make locating even a small turbine group difficult without it becoming dominant over the scale of the settlement and particularly its historic core.	**High (3)** The high proportion of this landscape type that is settlement will make locating a small to medium turbine group difficult due to lack of undeveloped land to locate it on and without it becoming dominant over the scale of the settlement and particularly its historic core.	**High (3)** The high proportion of this landscape type that is settlement will make locating a medium sized turbine group difficult due to lack of undeveloped land to locate it on and without it becoming dominant over the scale of the settlement and particularly its historic core.	**High (3)** The high proportion of this landscape type that is settlement will make locating a large turbine group difficult due to lack of undeveloped land to locate it on and without it becoming dominant over the scale of the settlement and particularly its historic core.
Skyline Many features already contribute to the skyline of this landscape type. Church towers and spires form an important historic element in the landscape, but settlement and pylons create clutter on the skyline from many viewpoints. Wind turbines in the adjacent Fens are also visible from many viewpoints.	**Moderate (2)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would require careful siting of a single turbine to integrate it sensitively into the existing skyline.	**Moderate (2)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would require careful siting of a small turbine group to integrate it sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a small to medium turbine group sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a medium turbine group sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a large turbine group sensitively into the existing skyline.
Landmarks and impact of built development Church towers and spires in many of the towns and villages form an historic vertical element in the landscape. Pylons and overhead wires are also apparent in some locations and form a sharp vertical contrast with the generally horizontal landform in these locations.	**Moderate (2)** The many features that currently create vertical elements in the landscape and act as landmarks would require careful siting of a single turbine to allow it to form a landmark in its own	**Moderate (2)** The many features that currently create vertical elements in the landscape and act as landmarks would require careful siting of a small turbine group to allow it to form a landmark in its	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a small to medium group is to	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a medium group is to be	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a large group is to be integrated.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
	right and avoid conflict.	own right and avoid conflict.	be integrated.	integrated.	
Visibility from outside and connections with adjacent landscapes The slightly elevated nature of the island makes it widely visible from the surrounding landscape types. It also runs gently into the surrounding Fenland landscape, connecting well with its context.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Clay Fen Island. This makes it less likely to be adversely effected by views of a single turbine that may be positioned close to its boundary, despite the elevation of the landform.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Clay Fen Island. This makes it less likely to be adversely effected by views of a small turbine group that may be positioned close to its boundary, despite the elevation of the landform.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Clay Fen Island. However, a small to medium scale group of turbines could be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Clay Fen Island. However, a medium scale group of turbines could be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.	**High (3)** The surrounding Fen landscape is less sensitive to turbine development than the Clay Fen Island. However, a large group of turbines would be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.
Remoteness and Tranquillity The varied landuses and the human impact on this landscape type give it a discordant and unsettled appearance. This results in a landscape that does not generally feel remote or tranquil.	**Low (1)** The Clay Fen Island landscape type is heavily settled and has been subjected to much human activity. A single turbine will have little impact on the tranquillity of the landscape.	**Low (1)** The Clay Fen Island landscape type is heavily settled and has been subjected to much human activity. A small turbine group will have little impact on the tranquillity of the landscape.	**Low (1)** The Clay Fen Island landscape type is heavily settled and has been subjected to much human activity. A small to medium turbine group will have little impact on the tranquillity of the landscape.	**Low (1)** The Clay Fen Island landscape type is heavily settled and has been subjected to much human activity. A medium scale turbine group will have little impact on the tranquillity of the landscape.	**Low (1)** The Clay Fen Island landscape type is heavily settled and has been subjected to much human activity. A large turbine group will have little impact on the tranquillity of the landscape.
Total	**11**	**13**	**17**	**19**	**20**
Overall Sensitivity	**Low**	**Medium-low**	**Medium-high**	**Medium-high**	**Medium-high**

Landscape Character Type – Extracted Clay Fen Island

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Scale and sense of enclosure Slightly elevated clay island that appears relatively wooded and enclosed in distant views.	**Low (1)** Although some elements of the landscape, particularly close to settlement, are small scale, there are also open areas that could accommodate single turbines, particularly in association with brickworks.	**Moderate (2)** Careful siting of small groups of turbines would be required in order to accommodate them within the smaller scale, partially enclosed landscape.	**Moderate (2)** Careful siting of small to medium groups of turbines would be required in order to accommodate them within the smaller scale, partially enclosed landscape.	**High (3)** The relatively small area covered by this landscape type, its small scale nature and the enclosure created by both vegetation and built form would make it very difficult to accommodate a medium sized group of turbines.	**High (3)** The relatively small area covered by this landscape type, its small scale nature and the enclosure created by both vegetation and built form would make it very difficult to accommodate a large group of turbines.
Impact of landform The altitude of this landscape type varies from 0 to 8m AOD. This is still a relatively low lying landform but it is slightly elevated over the surrounding landscape.	**Low (1)** The slightly elevated but flat landscape offers little change in relief, allowing single turbines to form a simple contrast to the horizontal landform.	**Moderate (2)** The slight elevation of this landscape type means that small groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that small to medium sized groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that medium groups of turbines will be highly visible from the surrounding low lying land.	**Moderate (2)** The slight elevation of this landscape type means that large groups of turbines will be highly visible from the surrounding low lying land.
Impact of landcover and landcover change A variable field pattern, comprising of organic field shapes divided by the regular arrangement of linear artificial drainage ditches. Field size is variable but smaller close to settlements. Brick pits at different stages of extraction to the west of Whittlesey – active, restored and unrestored. Most roads are of a relatively minor nature and at more winding than in the surrounding landscapes.	**Low (1)** The contrast of linear drainage ditches and hedgerows with more sinuous roads and a more organic field pattern in general would allow single turbines to emphasise the junction between the two patterns.	**Low (1)** The contrast of linear drainage ditches and hedgerows with more sinuous roads and a more organic field pattern in general would allow small groups of turbines to emphasise the junction between the two patterns.	**Low (1)** The disturbed nature of parts of this landscape type, and the variable field pattern in the remainder, would allow small to medium scale groups of turbines to be accommodated without significantly altering these key characteristics.	**Low (1)** The disturbed nature of parts of this landscape type, and the variable field pattern in the remainder of the area, would allow medium scale groups of turbines to be accommodated without significantly altering these key characteristics.	**Low (1)** The disturbed nature of parts of this landscape type, and the variable field pattern in the remainder of the area, would allow large scale groups of turbines to be accommodated without significantly altering these key characteristics.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
Settlement pattern and density Settlements are distinct clusters in the form of small villages and one market town. Whittlesey contains considerable areas of mid to late 20th century housing but has an historic core. Highly visible settlement edge, particularly to the north and east of Whittlesey.	**Low (1)** The amount of disturbed land that is already in close proximity to settlement, along with the more open areas that this creates, could accommodate a single turbine without it being out of scale with settlement form.	**Low (1)** The amount of disturbed land that is already in close proximity to settlement, along with the more open areas that this creates, could accommodate small turbine groups without them being out of scale with settlement form.	**Moderate (2)** The high proportion of this landscape type that is settlement will make locating a small to medium turbine group difficult without it becoming dominant over the scale of the settlement and particularly its historic core.	**High (3)** The high proportion of this landscape type that is settlement will make locating a medium turbine group difficult due to lack of undeveloped land to locate it on and without it becoming dominant over the scale of the settlement and particularly its historic core.	**High (3)** The high proportion of this landscape type that is settlement will make locating a large turbine group difficult due to lack of undeveloped land to locate it on and without it becoming dominant over the scale of the settlement and particularly its historic core.
Skyline Many features already contribute to the skyline of this area. Whittlesey church forms an important historic element in the landscape, but chimneys at the brickworks in Whittlesey, settlement, woodland and 3 large wind turbines near McCains factory create clutter on the skyline from many viewpoints.	**Moderate (2)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would require careful siting of a single turbine to integrate it sensitively into the existing skyline.	**Moderate (2)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would require careful siting of a small turbine group to integrate it sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a small to medium turbine group sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a medium turbine group sensitively into the existing skyline.	**High (3)** The many features that currently make up the skyline, some of which are historic and in particular need of protection from clutter, would make it almost impossible to integrate a large turbine group sensitively into the existing skyline.
Landmarks and impact of built development The existing turbines at McCains factory are visible from many locations throughout the Fens and the Extracted Clay Fen Island. The church spire and brick chimneys in Whittlesey also form landmarks in the surrounding countryside. The edges of settlement within the Extracted Clay Fen Island tend to be very visible.	**Moderate (2)** The many features that currently create vertical elements in the landscape and act as landmarks would require careful siting of a single turbine to allow it to form a landmark in its own	**Moderate (2)** The many features that currently create vertical elements in the landscape and act as landmarks would require careful siting of a small turbine group to allow it to form a landmark in its	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a small to medium group is to	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a medium group is to be	**High (3)** The many features that currently create vertical elements in the landscape and act as landmarks would make it difficult to avoid conflict with them if a large group is to be integrated.

Key Characteristics of the landscape Type	Single Turbine	Small Scale Group	Small – Medium Scale Group	Medium Scale Group	Large Scale Group
	right and avoid conflict.	own right and avoid conflict.	be integrated.	integrated.	
Visibility from outside and connections with adjacent landscapes The slightly elevated nature of the island makes it widely visible from the surrounding landscape types. It also runs gently into the surrounding Fenland landscape, connecting well with its context.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Extracted Clay Fen Island. This makes it less likely to be adversely effected by views of a single turbine that may be positioned close to its boundary, despite the elevation of the landform.	**Low (1)** The surrounding Fen landscape is less sensitive to turbine development than the Extracted Clay Fen Island. This makes it less likely to be adversely effected by views of a small turbine group that may be positioned close to its boundary, despite the elevation of the landform.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Extracted Clay Fen Island. However, a small to medium scale group of turbines could be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.	**Moderate (2)** The surrounding Fen landscape is less sensitive to turbine development than the Extracted Clay Fen Island. However, a medium scale group of turbines could be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.	**High (3)** The surrounding Fen landscape is less sensitive to turbine development than the Extracted Clay Fen Island. However, a large group of turbines would be highly visible if positioned close to its boundary, particularly due to the elevation of the landform.
Remoteness and Tranquillity The varied landuses and the large human impact on this landscape type give it a discordant and unsettled appearance. This results in a landscape that does not feel remote or tranquil.	**Low (1)** The Extracted Clay Fen Island landscape type is heavily settled and has been subjected to much human activity, particularly in association with clay extraction. A single turbine will have little impact on the tranquillity of the landscape.	**Low (1)** The Extracted Clay Fen Island landscape type is heavily settled and has been subjected to much human activity, particularly in association with clay extraction. A small turbine group will have little impact on tranquillity.	**Low (1)** The Extracted Clay Fen Island landscape type is heavily settled and has been subjected to much human activity, particularly in association with clay extraction. A small to medium turbine group will have little impact on tranquillity.	**Low (1)** The Extracted Clay Fen Island landscape type is heavily settled and has been subjected to much human activity, particularly in association with clay extraction. A medium scale turbine group will have little impact on tranquillity.	**Low (1)** The Extracted Clay Fen Island landscape type is heavily settled and has been subjected to much human activity, particularly in association with clay extraction. A large turbine group will have little impact on tranquillity.
Total	**10**	**12**	**16**	**18**	**19**
Overall Sensitivity	**Low**	**Low**	**Medium-low**	**Medium-high**	**Medium-high**

Appendix 7

Turbine numbers in surrounding Authorities

Turbine numbers in surrounding Authorities

	Operational	**Under Construction**	**Consented**	**In planning**
Cambridgeshire				
Cambridge City				
East Cambridgeshire				
Fenland	McCain's – 3No. Stag's Holt/Coldham – 9No. Ransonmoor – 5No. Glass Moor – 8No. Coldham – 8No. Foundry Way – 1No. Abbey Group – 1No **Total – 35No.**		Coldham Extension – 7No. Anglian Water – 1No. **Total – 8No.**	Foundry Way – 1No. Floods Ferry – 9No. Australia Farm – 4No. Burnt House Farm – 5No. Knights End Road – 5No. **Total - 24 No.**
Huntingdonshire	Red Tile Farm – 12No. Abbey Group – 1No. **Total – 13No.**			Catworth – 3No. Graveley – 8No. **Total – 11No.**
Peterborough City			Wryde Croft – 7No. **Total – 7No.**	Nutsgrove Farm – 7No. Wryde Croft – 6No. Morris Fen – 8No. **Total – 21No.**
South Cambridgeshire			Rockery Farm – 1No. **Total - 1No.**	Wadlow – 13No. Linton – 7No. **Total – 20No.**
Total	**48**	**0**	**16**	**76**

	Operational	**Under Construction**	**Consented**	**In planning**
Lincolnshire				
Boston		Bicker Fen – 13No. **Total – 13No.**		
East Lindsey	Bambers Farm – 8No. Mablethorpe – 2No. Bambers Farm II – 6No. **Total – 16No.**	Fen Farm/Conisholme Fen – 20No. The Hollies – 2No. **Total – 22No.**	Spencer Farm – 2No. **Total – 2No.**	Langham – 6No. Orby Marsh – 20No. **Total – 26No.**
Lincoln City				
North Kesteven				
South Holland	Gedney Marsh/Red Farm – 6No. Deeping St Nicholas – 8No. **Total – 14No.**			
South Kesteven				Thackson's Well Farm – 10No. **Total – 10No.**
West Lindsey				Laughton – 8No. Vale of Lincoln/Star Energy Clusters – 14No. **Total – 22No.**
North Lincolnshire			Keadby Grange – 34No. Bagmoor – 8No. **Total – 42No.**	
North East Lincolnshire				Novatis – 3No. **Total - 3No.**
Total	**30**	**35**	**44**	**61**

	Operational	**Under Construction**	**Consented**	**In planning**
Norfolk				
Breckland	Eco Tech/Swaffham – 1No. Swaffham II – 1No. North Pickenham – 8No. **Total – 10No.**		Shipdham – 2No. **Total – 2No.**	Swaffham II Extension – 6No. Sedgeford – 6No. **Total - 12No.**
Broadland				Guestwick – 6No. **Total - 6No.**
Great Yarmouth	Somerton – 1No. Blood Hill – 10No. **Total - 11No.**		South Beach – 4No. **Total – 4No.**	Hemsby – 4No. **Total – 4No.**
King's Lynn and West Norfolk				QEH, King's Lynn – 1No. Marshland – 19No. **Total – 20No.**
North Norfolk				
Norwich City				
South Norfolk				Lotus Cars – 3No. **Total - 3No.**
Total	**21**	**0**	**6**	**45**

Appendix 8

References

References

BERR, 2008, *The UK Renewable Energy Strategy Consultation*

CAA, 2009, *CAP 764: CAA Policy and Guidelines on Wind Turbines*

Coates Associates, 2007, *Cumbria Wind Energy Supplementary Planning Document Part 2 landscape and Visual Considerations*

CLG, 2007, *Planning Policy Statement: Planning and Climate Change. Supplement to Planning Policy Statement 1*

CLG, 2006, *Planning Policy Statement 25: Development and Flood Risk*

Cumbria County Council, Allerdale Borough Council, Carlisle City Council, Copeland Borough Council, Eden District Council, Lake District National Park Authority and South Lakeland District Council, 2007, *Cumbria Wind Energy Supplementary Planning Document Part 1*

DTI, 2007, *Meeting The Energy Challenge: A White Paper on Energy*

East of England Regional Assembly, 2008, *Placing Renewables in the East of England*

English Heritage, 2008, *Microgeneration in the Historic Environment*

English Heritage, 2005, *Wind Energy and the Historic Environment*

English Nature, RSPB, WWF-UK, BWEA, 2001, *Wind Farm Development and Nature Conservation: A guidance document for nature conservation organisations and developers when consulting over wind farm proposals in England*

EUROBATS, 2008, *Guidelines for the Consideration of Bats in Wind Farm Projects*

Fenland District Council, 1993, *Fenland District-Wide Local Plan, Adopted 1993*

Fenland District Council, 2001, *Supplementary Planning Guidance: Interim Statement of Proposed Changes*

Fenland District Council, 2007, *Local Development Framework: Core Strategy and Development Policies – Preferred Options 2*

Fenland Strategic Partnership, 2007, *Shaping Fenland's Future Together: Fenland's Sustainable Community Strategy 2007 – 2010*

Government Office for the East of England, 2008, *East of England Plan: The Revision to the Regional Spatial Strategy for the East of England*

Horner + MacLennan and Envision, 2006, *Visual Representation of Windfarms Good Practice Guidance*

Huntingdonshire District Council, 2006, *Supplementary Planning Document: Wind Power*

T. Laakso, H. Holttinen, G. Ronsten, L.Tallhaug, R. Horbaty, I. Baring-Gould, A. Lacroix, E. Peltola, B. Tammelin, 2003, *State-of-the-art of wind energy in cold climates*

T. Laakso, 2005, *Wind Energy Projects in Cold Climates*

LUC (for Breckland Council and King's Lynn and West Norfolk Borough Council), 2003, *Wind Turbine Development: Landscape Assessment, Evaluation and Guidance*

Natural England, 2009, *Bats and onshore wind turbines*

North East Regional Assembly/Ove Arup, 2006, *Wind Farm Development and Landscape Capacity Studies: Knowesgate and Harwood Forest*

Northumria University, 2003, *The Development of a regional Geographical Information System for the North East Renewable Energy Strategy 2003*

ODPM, 2004, *Planning Policy Statement 7: Sustainable Development in Rural Areas*

ODPM, 2004, *Planning Policy Statement 22: Renewable Energy*

ODPM, 2004, *Planning for Renewable Energy: A Companion Guide to PPS22*

ODPM, 1994, *Planning Policy Guidance Note 24: Planning and Noise*

RSPB, 2004, *Wind Turbines and Sensitive Bird Populations: Spatial Planning for Wind Turbines in the Fens Natural Area*

Scottish Executive, 2000, *NPPG6: Renewable Energy Developments*

Scottish Executive, 2002, *PAN45: Renewable Energy Technologies*

Scottish Natural Heritage, 2005, *Cumulative Effect of Windfarms, v2*

Scottish Natural Heritage, 2005, *Survey Methods for use in Assessing the Impacts of Onshore Windfarms on Bird Communities*

Scottish Natural Heritage, 2000, *Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action*

South Holland District Council, 2004, *Supplementary Planning Guidance on Wind Energy*

TCPA, 2005, *Planning for Wind Energy*

The Countryside Agency and Scottish Natural Heritage, 2003, *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity*

The Working Group on Noise from Wind Turbines, 1996, *ETSU-R-97: The Assessment and Rating of Noise from Wind Farms*

TNEI Services, 2005*, The North East Renewable Energy Strategy*

University of Newcastle (for SNH), 2002, *Visual Assessment of Windfarms: Best Practice*

Appendix 9

Glossary

Glossary

*Conservation Area** – Areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.

*Core Strategy** – A Development Plan Document setting out the spatial vision and strategic objectives of the planning framework for an area, having regard to the Community Strategy.

Cumulative impact – The combined effect of all developments when taken together, both present and those in the future.

Fall over distance – The height of the turbine to the tip of the blade. Also known as the topple height.

Intervisibility – The extent to which one area can see another and vice versa

Kyoto Protocol – An international agreement, signed in 1997, setting targets for industrialised countries to cut their greenhouse gas emissions.

*Landscape Capacity*** – The degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character. Capacity is likely to vary according to the type and nature of change being proposed.

*Landscape Character*** – The distinct and recognizable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.

Landscape Character Area – A unique geographic area with a consistent character and identity, defined by geology, landform, soils, vegetation, landuse, settlement and field pattern.

*Landscape Character Assessment*** – An umbrella term for description, classification and analysis of landscape.

*Landscape Character Type*** – A landscape type will have broadly similar patterns of geology, landform, soils, vegetation, landuse, settlement and field pattern discernable in maps and field survey records.

Landscape Description Unit – LDUs are relatively homogenous units of land, each defined using a series of definitive attributes including landform, structural geology, rock type, soils, land use, tree cover, settlement, farm type.

*Landscape Quality*** – About the physical state of the landscape and its intactness, from visual, functional and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

*Landscape Sensitivity*** – The extent to which a landscape can accept change of a particular type and scale without adverse effects on its character.

*Landscape Value*** – The relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special qualities including perceptual aspects such as scenic beauty, tranquillity or wilderness, cultural associations or other conservation issues.

*Listed Building** – A building of special architectural or historic interest. Listed buildings are graded I, II* or II with grade I being the highest. Listing includes the interior as well as the

exterior of the building, and any buildings or permanent structures (e.g. wells within its curtilage). English Heritage is responsible for designating buildings for listing in England.

*Local Development Framework (LDF)** – The Local Development Framework (LDF) is a non-statutory term used to describe a folder of documents, which includes all the local planning authority's local development documents.

*Local Plan** – An old-style development plan prepared by district and other local planning authorities. These plans will continue to operate for a time after the commencement of the new development plan system, by virtue of specific transitional provisions.

Microgeneration – Small scale production of heat and/or electricity from low carbon sources.

*Mitigation*** – Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual impacts of a development project.

National (Landscape) Typology – A national classification of landscapes, undertaken by Natural England, derived by map analysis of the main physical, biological and cultural factors that determine landscape character.

Planning Advice Note (PAN) – Scottish planning document providing advice on good practice and other relevant information.

*Planning Policy Statement (PSS)** – Issued by central government to replace the existing Planning Policy Guidance notes in order to provide greater clarity and to remove from national policy advice on practical implementation, which is better expressed as guidance rather than policy.

Preferred Options – The alternative proposals and policy choices devised for meeting a particular aim or objective. Preferred Options papers are published for public consultation before a Council decides on which strategy and policy approaches to take on different planning issues.

*Ramsar Site** – Sites designated under the European Ramsar Convention to protect wetlands that are of international importance, particularly as waterfowl habitats.

*Regional Planning Guidance (RPG)** – Regional planning policy and guidance issued for each region in England by the Secretary of State. As part of the reform process the existing RPG becomes the spatial strategy for the region until revised by a replacement Regional Spatial Strategy (RSS).

*Regional Spatial Strategy (RSS)** – A strategy for how a region should look in 15 to 20 years time and possibly longer. The Regional Spatial Strategy identifies the scale and distribution of new housing in the region, indicates areas for regeneration, expansion or sub-regional planning and specifies priorities for the environment, transport, infrastructure, economic development, agriculture, minerals and waste treatment and disposal.

*Registered Park and Garden** – A park or garden of special historic interest. Graded I (highest quality), II* or II. Designated by English Heritage.

*Renewable Energy** – Renewable energy is energy flows that occur naturally and repeatedly in the environment, for example from the wind, water flow, tides or the sun.

*Scheduled Monument** – Nationally important monuments usually archaeological remains, that enjoy greater protection against inappropriate development through the Ancient Monuments and Archaeological Areas Act 1979.

Shadow flicker – Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off.

*Site of Special Scientific Interest (SSSI)** – A site identified under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) as an area of special interest by reason of any of its flora, fauna, geological or physiographical features

*Special Areas of Conservation (SAC)** - A site designated under the European Community Habitats Directive, to protect internationally important natural habitats and species.

*Special Protection Area (SPA)** – Sites classified under the European Community Directive on Wild Birds to protect internationally important bird species.

*Supplementary Planning Document (SPD)** – A Supplementary Planning Document is a Local Development Document that may cover a range of issues, thematic or site specific, and provides further detail of policies and proposals in a 'parent' Development Plan Document.

*Supplementary Planning Guidance (SPG)** – Supplementary Planning Guidance may cover a range of issues, both thematic and site specific and provide further detail of policies and proposals in a development plan.

Threshold – A specified level beyond which impacts will be unacceptable.

Typology – The classification of items into groups to allow their assessment.

Zone of Theoretical Visibility (ZTV) – Also known as a Zone of Visual Influence (ZVI), Visual Envelope Map (VEM) and Viewshed. This represents the area over which a development can theoretically be seen, based on digital terrain data.

* = as defined in the Glossary of Planning Terms on the Planning Portal website
** = as defined in the Glossary section of Guidelines for Landscape and Visual Impact Assessment 2nd edition, The Landscape Institute and Institute for Environmental Management and Assessment, 2002