









Treading Wind Farm

engena

prepared on behalf of

WindVentures

January 2011

Environmental Statement Appendices

PREFACE

These appendices accompany the second part of a four volume, five part Environmental Statement which describes the findings of the Environmental Impact Assessment (EIA) of the proposed Treading Wind Farm. The volumes of the complete document are:

DOCUMENT	TITLE	CONTENTS
Volume 1	Non-Technical Summary	Summarises the proposal and the key conclusions of the EIA for the non-technical reader
Volume 2	Written Statement	Presents the full assessments of the EIA
Volume 2	Appendices	Presents the appendices referred to in the Written Statement
Volume 3	Figures	Presents the figures referred to in the Written Statement
Volume 4	Visualisations	Presents the visualisations referred to in the Landscape and Visual Assessment (LVA)

Also included as an additional document is a confidential Badger Appendix available at request to appropriate consultees.

In addition to the Environmental Statement, Wind Ventures Limited have submitted an independent Planning Appraisal of the site, which summarises the planning policy context of the proposal.

Printed copies of all four volumes in addition to the Planning Appraisal are available at both the Fenland District Council, Fenland Hall, County Road, March, Cambridgeshire, PE15 8NQ and South Holland District Council Offices, Priory Road, Spalding, PE11 2XE, as well as Long Sutton Library and Wisbech Library.

Additional copies printed copies can be purchased at a cost of £500 + VAT or digital versions on CD-ROM at a cost of £10 + VAT.

To order copies, please contact Engena Limited at:

The Old Stables, Bosmere Hall, Creeting St Mary, IP6 8LL.

The Developer may also be contacted via the Treading Wind Farm information website www.windventures.co.uk/projects-treading.html

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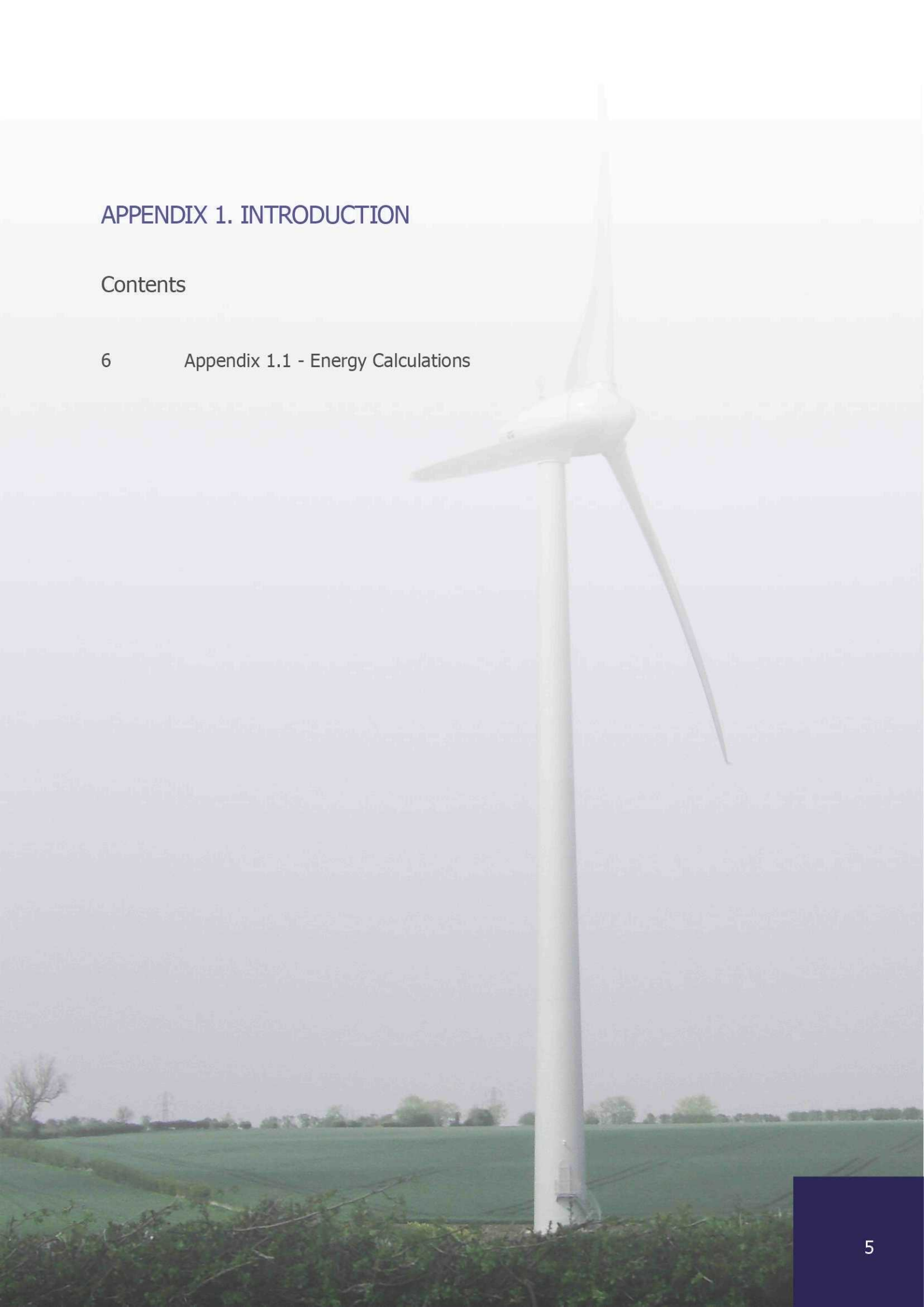
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APPENDIX 1. INTRODUCTION

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Appendix 1.1 - Energy Calculations

The following calculations are based on data provided by the Department for Energy and Climate Change (DECC), and the 2001 Census.

Calculations are based on six turbines with a generation capacity of 2.05MW. The total wind farm installed capacity is therefore 12.3MW.

Calculation Notes:	rated turbine capacity (MW)	= 2.05
	capacity factor*	= 0.252
	number of hours in a year	= 8 760

(i) Predicted Electricity Produced by the Treading Wind Farm

Annual Average Electricity Produced

= rated capacity x capacity factor x hours in a year

= 2.05 x 0.252 x 8 760

= 4 525MWh per turbine (to 3 significant figures)

Therefore, the anticipated average annual electricity produced by six turbines would be **27 200MWh** (3 s.f.).

Annual Average Household Equivalent

The electricity generated by the scheme will be consumed within an area surrounding the wind farm's electrical distribution network connection point and so is likely to supply dwellings within either Fenland District, South Holland or both. For the purposes of illustrating what the generated electricity may power, analysis has been made of the equivalent number of dwellings in Fenland District Council which may be powered by the scheme.

= annual average electricity produced / annual
Fenland district average domestic electricity consumption**

= 27 152 / 4.899

= **5 540 households** (3 s.f.)

*Capacity Factor: A constant which takes into account the intermittent nature of wind, the availability of wind and the array losses (energy lost due to one turbine being in the wake of another) compared with the full load plate rating of the generator. 25.2% is the average capacity factor for the East of England and this has been used for the whole site, as the site lies on a boundary between the East of England (4 turbines) and the East Midlands regions (2 turbines), (1998-2009) (DECC, 2010).

**Stated figure is taken from 'Sub-national authority electricity consumption statistics' published by the Department of Energy and Climate Change (DECC, 2010).

The district of Fenland consists of 35 192 households (from the 2001 Census). The Treading Wind Farm will therefore be able to meet up to the equivalent average annual electricity needs of **15.7%** (to 3 s.f.) of Fenland District's homes.

(ii) Emissions Offset Calculations

Based upon the wind energy calculations discussed earlier, the anticipated average annual electricity produced by six turbines with a rated capacity of 2.05MW and a capacity factor of 25.2%, would be 27 200 MWh (to 3 s.f.).

The generation of renewable electricity in this way will offset electricity generated from other sources. Different organisations have differing assumptions for calculating the emissions offset by wind energy generation, depending upon the power generation technology that is actually offset. For carbon dioxide these assumptions range from 860g/kWh (based upon coal generation) to 355g/kWh (based upon gas generation).

A recent Advertising Standards Authority (ASA) adjudication sought advice from National Grid as to the most appropriate figure to be used in such offset calculations. It was established that

A more accurate emissions factor for wind power lay between the two figures [given above] *taking account of the variations throughout the year. This is because the generation technology most likely to be offset (marginal plant) changes throughout the year according to fuel prices, wholesale energy prices and demand* (ASA, 2007).

Following this ASA adjudication, the ASA undertook an examination of the CO_2 offsetting issue, and consulted the British Wind Energy Association, Defra and Dr Stephen Peake of the Open University.

The ASA presented an advisory note to BWEA in September 2008 explaining the outcome of this examination. It was determined that '*it is not possible to calculate an exact figure for the carbon saving associated with wind power into the National Grid or for any future projection.*' This is due to the variable and dynamic nature of the electricity system where, on a half hourly basis different types of power plant are brought on and off line, where load varies on an instantaneous basis and fuel and running costs are a complex mix of long term contract and spot-market prices – all of these elements subject to change and shifts over the 25-year life of the project.

In addition (for the same reasons), where a 'static' figure for CO_2 offsetting is used, it was determined that it would be inappropriate to use this figure to calculate the total CO_2 offset during the entire operational life of the project because of the variances introduced above. As such, it has been recommended that the BWEA, in conjunction with Dr Stephen Peake explore the feasibility of establishing a 'dynamic baseline' methodology through the use of published quarterly historic fossil mix averages correlated against quarterly wind output. This would reflect inter-seasonal variations and longer term an-

nual trends and would be updated periodically. A representative methodology is now being established by BWEA.

In the meantime, the ASA recommend the use of a simple static CO_2 offset figure for wind generation of 430g CO_2/kWh. This is the figure used by Defra for Climate Change Levy Agreements and the UK Emissions Trading Scheme and is based upon the fuel mix for 1998-2000 ('Energy Projections for the UK' (DTI, 2005). The ASA state that this will '*most likely understate the benefits of wind energy.*'

In the absence of the dynamic baseline methodology, the simple static figure alongside the full range of historic recognised offset assumptions are considered within this Environmental Statement.

Emissions Offset Previously Advised by the BWEA:
Until the ASA judgment, the British Wind Energy Association assumed that electricity from wind turbines replaces the output of coal-fired power stations. This assumes that nuclear plants and gas fired plants operate at 'base load' and the output of such power stations varied as little as possible.

Nuclear plants operate at base-load, as do almost all gas plants. It is the output from coal-fired plants which is adjusted to meet the electricity demand on the system. In other words, most 'load following' is carried out by coal-fired plants. (BWEA, 2005)

BWEA calculations for emissions offsets used typical emissions from a coal-fired plant. For CO_2 this was 860g CO_2/kWh.

On this basis the level of carbon dioxode offset for the proposed wind energy project is calculated (in tonnes) as follows:

CO_2 = (Annual Average Electricity Produced (kWh) x 860)/1 000 000
= **27 152 496** x 860/1 000 000
= **23 400** tonnes (to 3 s.f.)

Emissions Offset Published by the SDC:

The Sustainable Development Commission considered the potential contribution of wind energy out to 2020 (SDC, 2005). They considered that it is unrealistic to assume that wind power would displace nuclear energy, and most likely that electricity associated with coal generation would be displaced in the short to medium term. For the purposes of their report the SDC assumed that wind would displace electricity generated predominantly by gas-fired plant by 2020, stating that this could be assumed as conservative as they expect that some coal plant will still be operating in 2020.

On this basis the SDC considered an emissions displacement figure for carbon dioxide of: 355g CO_2/kWh

Using this figure, the annual average carbon dioxide displacement for the Treading Wind Farm equates (in tonnes) to:

CO_2 = (Annual Average Electricity Produced (kWh)x 355)/1 000 000
= 27 152 496 x 355/1 000 000
= **9 640 tonnes per annum** (to 3 s.f.)

Even considering this second lower figure, a significant volume of carbon dioxide would be displaced by the Treading Wind Farm, providing a meaningful contribution to the both the Government's renewable energy targets, and the United Kingdom's commitment under the Kyoto Protocol.

Emissions Offset according to the ASA:

As stated above, it was established by the ASA that 'a more accurate emissions factor for wind power lay between the two figures taking account of the variations throughout the year' as the generation technology most likely to be offset (marginal plant) changes throughout the year according to fuel prices, wholesale energy prices and demand (ASA, 2007). Until a dynamic baseline model is produced, the ASA recommend the use of the 430g CO_2/kWh figure utilised by Defra for CCL Agreements and emissions trading.

Using this figure, the annual average carbon dioxide displacement for the Treading Wind Farm equates (in tonnes) to:

CO_2 = (Annual Average Electricity Produced (kWh)x 430)/1 000 000
= 27 152 496 x 430/1 000 000
= **11 700 tonnes per annum** (to 3 s.f.)

As stated above the ASA believe that this current figure will most likely underestimate the emissions offset.

On this basis, it can be concluded that the potential annual carbon dioxide offset could presently be between 9 640 tonnes per annum and 23 400 tonnes per annum, again equating to the avoidance of the emission of significant volume of carbon dioxide (all figures to 3 s.f.).

References

Advertising Standards Authority, 2007, Adjudication, ASA, UK, retrieved 17 October 2007 from http://www.asa.org.uk/asa/adjudications/Public/TF_ADJ_43298.htm

Advertising Standards Authority, 2008, advisory letter to BWEA dated 25 September 2008, reference A06-16254/AT, RE: Carbon Offsetting.

British Wind Energy Association, 2005, Calculations for Wind Energy Statistics, http://www.bwea.com/edu/calcs.html, viewed July 2006

Department of Energy and Climate Change, 2010, Energy Trends, September Issue, HMSO, UK

Sustainable Development Commission, 2005, Wind Power in the UK, HMSO, London

APPENDIX 2. DEVELOPMENT RATIONALE

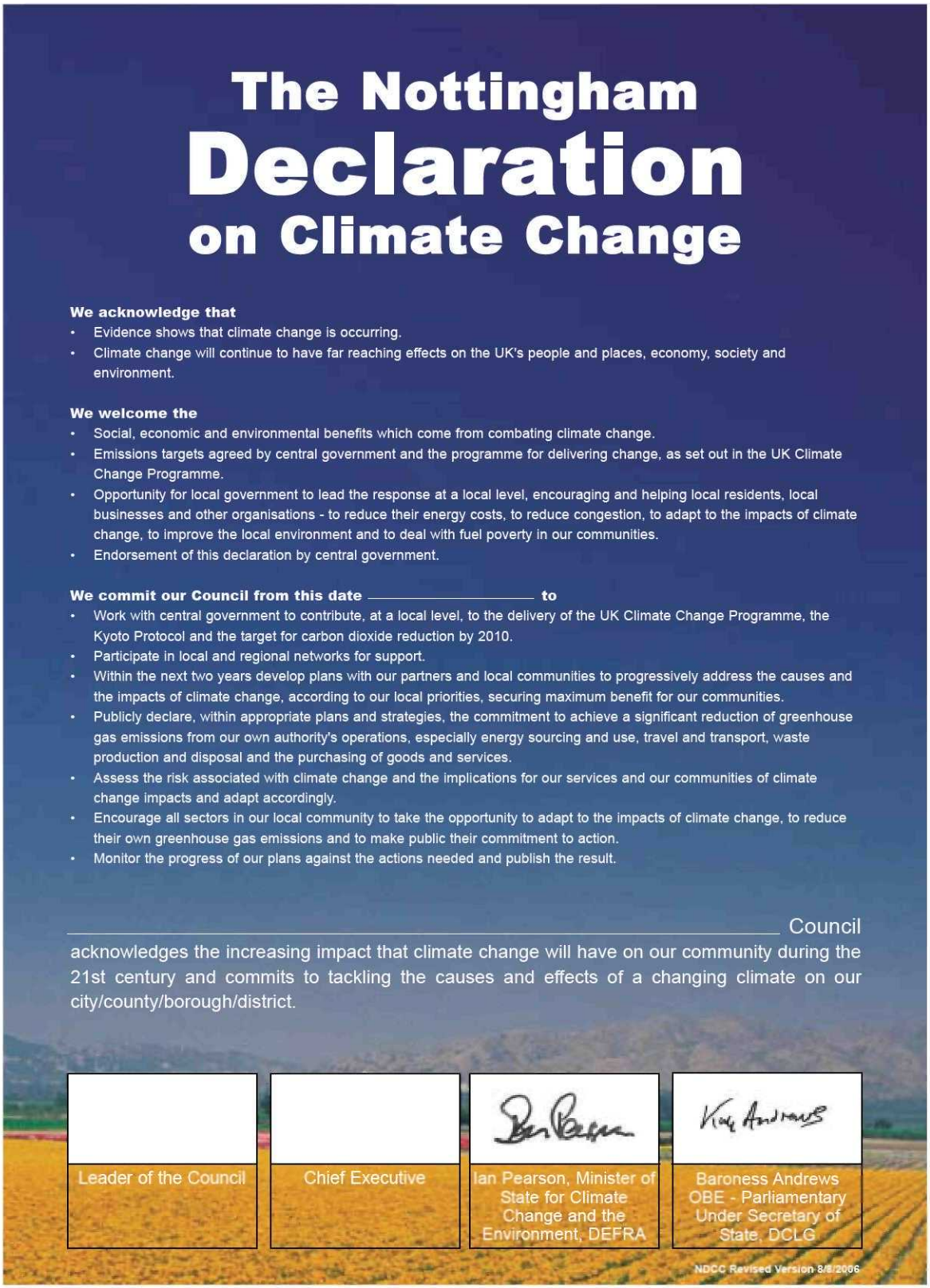
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Appendix 2.1 -The Nottingham Declaration



The Nottingham Declaration on Climate Change

We acknowledge that

- Evidence shows that climate change is occurring.
- Climate change will continue to have far reaching effects on the UK's people and places, economy, society and environment.

We welcome the

- Social, economic and environmental benefits which come from combating climate change.
- Emissions targets agreed by central government and the programme for delivering change, as set out in the UK Climate Change Programme.
- Opportunity for local government to lead the response at a local level, encouraging and helping local residents, local businesses and other organisations - to reduce their energy costs, to reduce congestion, to adapt to the impacts of climate change, to improve the local environment and to deal with fuel poverty in our communities.
- Endorsement of this declaration by central government.

We commit our Council from this date _____ to

- Work with central government to contribute, at a local level, to the delivery of the UK Climate Change Programme, the Kyoto Protocol and the target for carbon dioxide reduction by 2010.
- Participate in local and regional networks for support.
- Within the next two years develop plans with our partners and local communities to progressively address the causes and the impacts of climate change, according to our local priorities, securing maximum benefit for our communities.
- Publicly declare, within appropriate plans and strategies, the commitment to achieve a significant reduction of greenhouse gas emissions from our own authority's operations, especially energy sourcing and use, travel and transport, waste production and disposal and the purchasing of goods and services.
- Assess the risk associated with climate change and the implications for our services and our communities of climate change impacts and adapt accordingly.
- Encourage all sectors in our local community to take the opportunity to adapt to the impacts of climate change, to reduce their own greenhouse gas emissions and to make public their commitment to action.
- Monitor the progress of our plans against the actions needed and publish the result.

_____ Council acknowledges the increasing impact that climate change will have on our community during the 21st century and commits to tackling the causes and effects of a changing climate on our city/county/borough/district.

Leader of the Council	Chief Executive	Ian Pearson, Minister of State for Climate Change and the Environment, DEFRA	Baroness Andrews OBE - Parliamentary Under Secretary of State, DCLG

NDCC Revised Version 8/8/2006

Appendix 2.2 - Wind Turbine Development Policy Guidance Extract

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

APPENDIX 2. DEVELOPMENT RATIONALE

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2. Field Survey Form
3. Definitions of Key Characteristics and their relationship to Sensitivity
4. Current and Historical Guidance on Visual Influence of Turbines
5. Outline Descriptions of Landscape Character Areas in Fenland District
6. Sensitivity Analysis of Landscape Types in Fenland District
7. Turbine numbers in surrounding Authorities
8. References
9. Glossary

Drawings

07044/01	Location Plan
07044/02A	Landscape Character Areas
07044/03B	Landscape Capacity for single turbines
07044/04C	Landscape Capacity for small turbine groups
07044/05C	Landscape Capacity for small to medium turbine groups
07044/06C	Landscape Capacity for medium turbine groups
07044/07C	Landscape Capacity for large turbine groups
07044/08B	Theoretical Visibility – Existing turbines (Prominent and Conspicuous zones only)

APPENDIX 2. DEVELOPMENT RATIONALE

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.

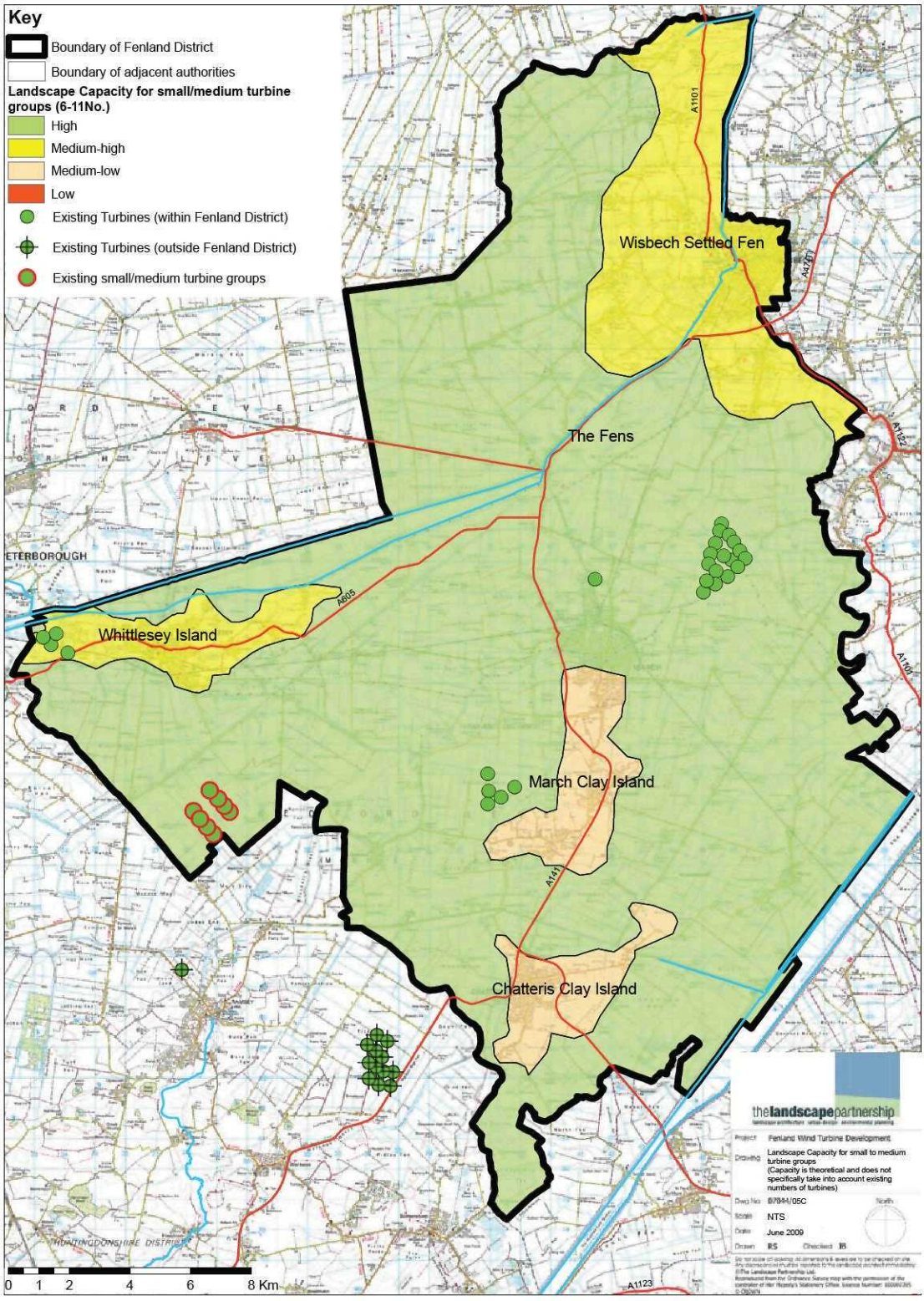
0.11 A number of further environmental constraints to wind turbine development are considered including nature conservation, heritage, airfields, grid connections and noise.

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.

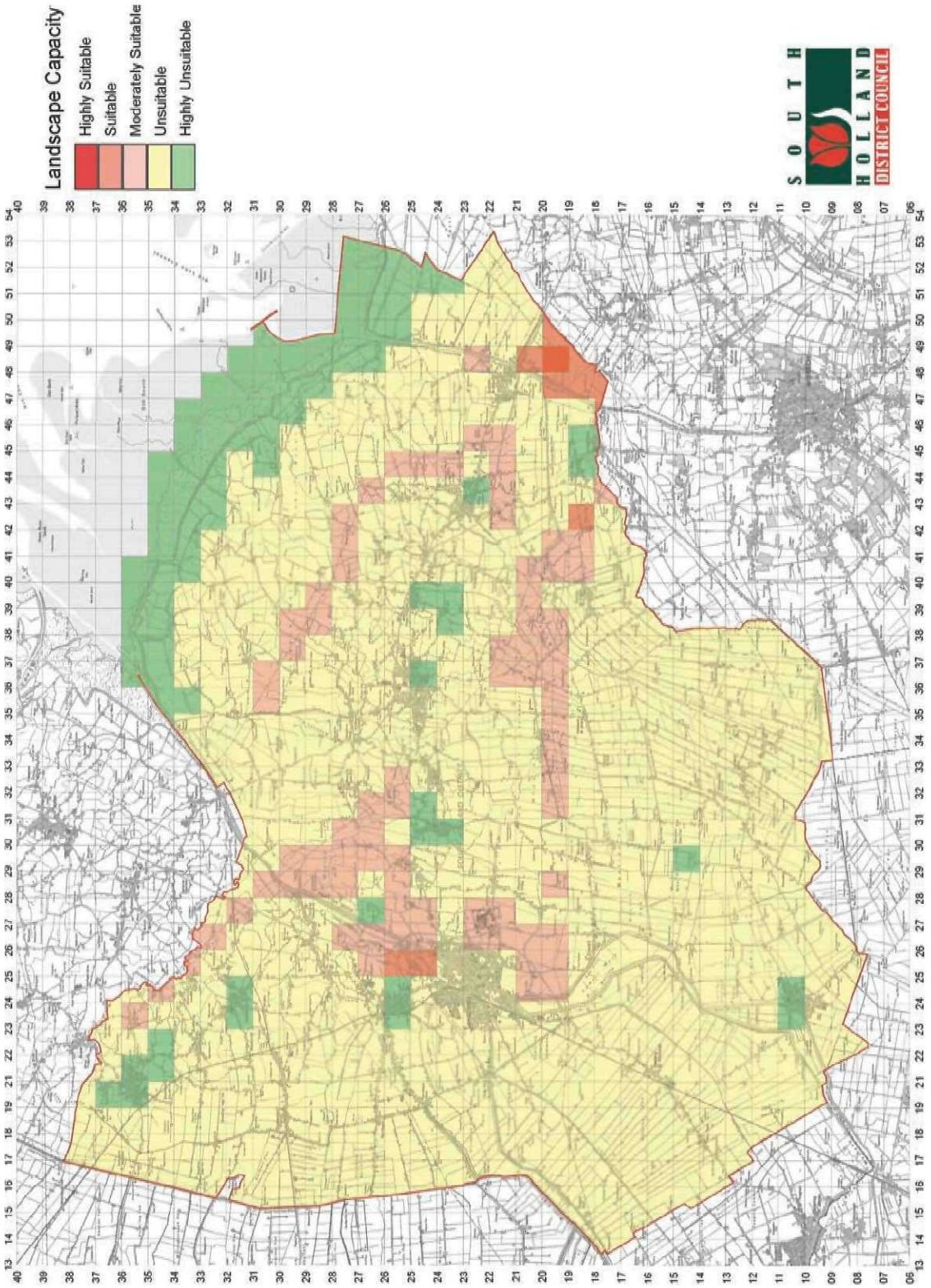
0.13 The report concludes by setting out detailed landscape and environmental criteria and thresholds to assist with the future assessment of wind turbine applications. These criteria should initially be applied at the Scoping Opinion stage and then if a scheme progresses further more fully through a 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


Key
Boundary of Fenland District
Boundary of adjacent authorities
Landscape Capacity for small/medium turbine groups (6-11No.)
High
Medium-high
Medium-low
Low
Existing Turbines (within Fenland District)
Existing Turbines (outside Fenland District)
Existing small/medium turbine groups
Wisbech Settled Fen
The Fens
Whittlesey Island
March Clay Island
Chatteris Clay Island
A1101
A605
A141
A1123
A1
0 1 2 4 6 8 Km
thelandscapepartnership
Fenland Wind Turbine Development
Landscape Capacity for small to medium turbine groups
(Capacity is theoretical and does not specifically take into account existing numbers of turbines)
NTS
June 2009

Appendix 2.3 - South Holland Adopted Wind Energy SPG Map



APPENDIX 2. DEVELOPMENT RATIONALE

APPENDIX 5. ENVIRONMENTAL IMPACT ASSESSMENT

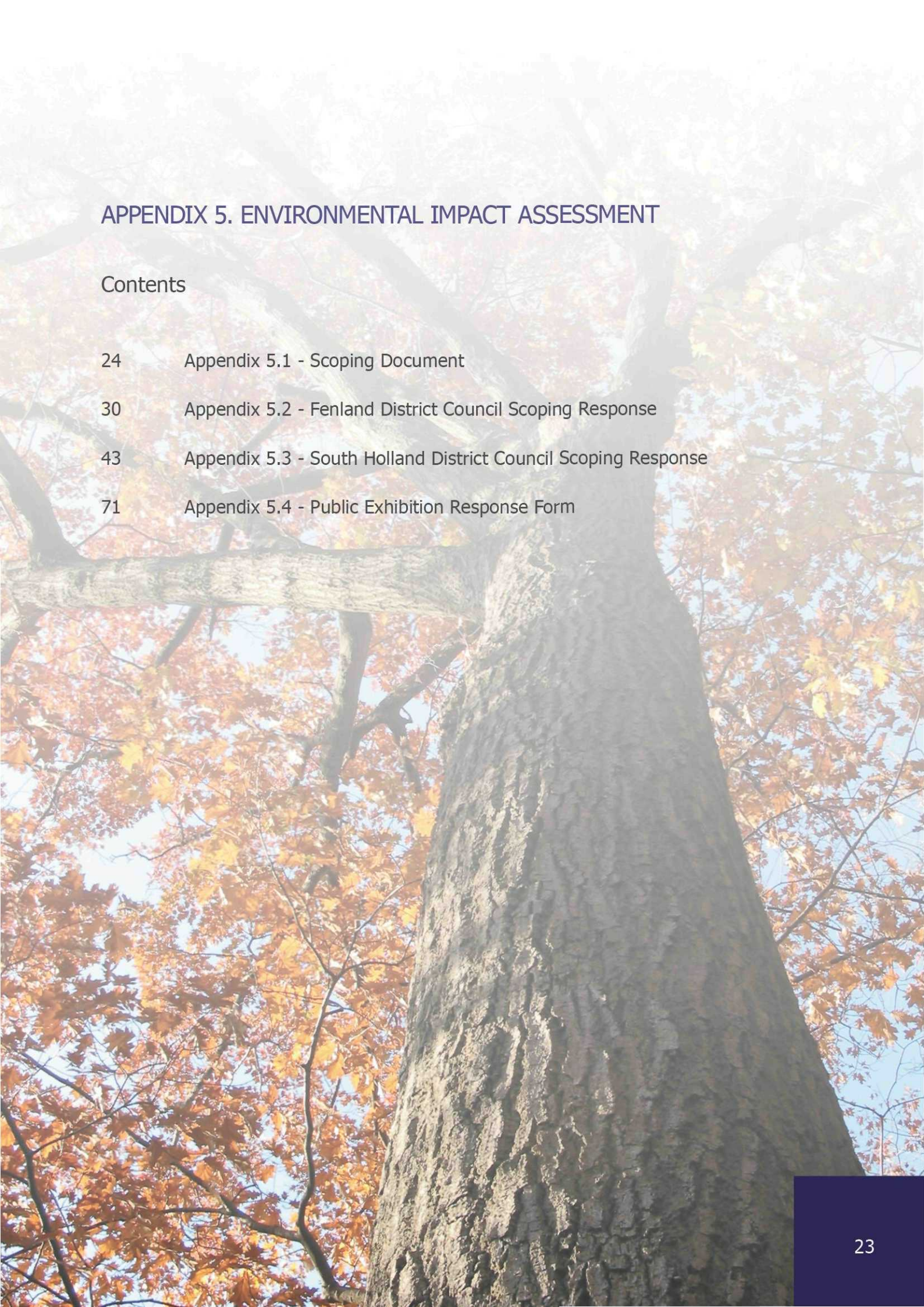
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Appendix 5.1 - Scoping Document

Graham Nourse
Principal Planning Officer
Fenland District Council
Fenland Hall
County Road
March
Cambridgeshire
PE15 8NQ

Attn: Graham Nourse

11 June 2009

Dear Graham

Proposal for Wind Farm, Sutton St Edmund

Request for Screening and Scoping Opinion

1. Introduction

Olive Green Energy develops, builds, owns and operates renewable energy projects throughout the U.K. We intend to seek planning permission for a wind turbine development on farm land owned by S A & D R Coates. The site location is illustrated in Figure 1.

Further to our meeting of 11 June, we request a formal screening and scoping opinion in terms of the Town and Country Planning (Environmental Impact Assessment) Regulations 1999.

2. Description of Proposal

We propose to construct four wind turbines on farm land east of Sutton Saint Edmund, and to the west of Gorefield. Two turbines will be within your Fenland District Council local planning authority area, and two within the neighbouring South Holland District Council planning authority area to the west. The turbines will have an overall blade tip height of up to 132 metres, and a rotor diameter not exceeding 104 metres. Each will be capable of generating up to 3.3 MW and therefore the windfarm will have a total installed capacity of up to 13.2 MW, with 6.6 MW located within the Fenland District.

Figure 2 illustrates a typical wind turbine style that is being considered. All four of the turbines will be of the same make and size.

The location of the turbines in relation to the property boundary and topographical features is illustrated in the attached site layout plan. The site area is approximately 190 ha.

Connection to the electricity grid is the responsibility of the relevant power distribution company and is outside the scope of this application.

Consultation has already taken place with the RSPB, Natural England, Ministry of Defence, Civil Aviation Authority and Ofcom. No significant issues were identified. The RSBP and Natural England requested that the following be undertaken to assess ecological issues:

- Breeding Bird and Wintering Survey (>1 year)
- Bat Survey
- Landscape Assessment
- A Phase 1 Habitat Survey and Desktop Investigation of available data.

A breeding bird survey is currently underway to address potential for bird strike.



Figure 1: Site Location



Figure 2: Indicative Wind Turbine

3. Potential Environmental Effects

The following is a broad description of some potential environmental effects, and their possible scale and significance. We propose to investigate these effects and identify means to avoid, remedy or mitigate them where possible. This investigation will be included in an Environmental Report, the proposed scope of which is outlined in Paragraph 5 of this letter.

3.1. Visual Amenity and Landscape Values

The nature of the development on flat farmland means the turbines will be visible for a distance, however visibility must not be equated with visual intrusion. The site is not within an Area of Outstanding Natural Beauty (AONB). Some nearby dwellings will have their views of the turbines screened by tall trees, and the open landscape is interrupted by high tension power lines.

We have reviewed the Wind Turbine Development Study (2008) (WTDS). The turbines are located just over 2km west of Gorefield. At this distance the turbines would be classified as “Conspicuous” in terms of the WTDS. The subject site is identified as having a high landscape capacity for a ‘small scale group’ (defined as 2-5 turbines).

It is intended that a Landscape and Visual Assessment be undertaken. This assessment will address the effects of this proposal, and the potential cumulative effects with already existing and approved wind farm developments in the area.

3.2. Recreation and Transport Routes

Construction of the turbines will require transport of large components on the public highway and access during the construction phase. This has the potential to cause temporary disruption to vehicle movement.

Public rights of way are identified passing through the site on 1:25000 Ordinance Survey maps. The turbines have the potential to adversely affect recreation routes such as public bridleways and walking tracks, particularly during the construction phase when access may need to be restricted for safety reasons.

An assessment will be undertaken to assess routing, timing and methods to avoid or minimise any disruption.

3.3. Noise

Given the flat fenland topography, the proposed separation distance of at least 700 m between the turbine group and nearby dwellings will likely avoid adverse noise effects. A noise assessment will be undertaken to confirm that this is the case.

3.4. Ecology

The site is 10 km distant from The Nene Washes Site of Special Scientific Interest (SSSI).

The RSPB and Natural England have been consulted. The RSPB identified that the site is situated in an area where, to the best of their knowledge, there are no foraging whooper and Berwick’s swans associated with the Nene Washes, and it is therefore unlikely that the proposal would give rise to concerns on these bird populations.

Further investigation to establish the existing environmental background was recommended.

3.5. Flooding

The site is within the Environment Agency's Flood Risk Zone. Because of the nature of wind turbine developments, in that they have a small foot print area, the proposal will not exacerbate flood risk and it will be designed so that it does not impede flood flows.

3.6. Duration and Reversibility of Effects

The environmental effects are temporary and largely reversible. Upon operation decommissioning, the turbines and associated infrastructure will be removed and the site reinstated with no ongoing effects. It is intended that a 32 year duration for the planning permission will be sought.

4. EIA Screening Opinion

A Council opinion on whether an EIA is to be required under Regulation 5(1) of the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 is sought.

We understand that the scheme should be reviewed in the context of Schedule 2 development, as defined in Schedule 2, paragraph 3(i) – Installations for the harnessing of wind power for energy production (wind farms) and DETR Circular 2/99. The proposal exceeds the Schedule 2 threshold which means that an EIA might be required. Paragraph A15 of the DETR Circular states that, "the likelihood of significant effects will generally depend upon the scale of the development, and its visual impact, as well as potential noise impacts. EIA is more likely to be required for commercial developments of five or more turbines, or more than 5 MW of new generating capacity". Within the Fenland District Council planning authority area two turbines are proposed with a total capacity of 6.6 MW, thereby marginally exceeding the suggested generating capacity threshold but falling below the turbine quantity threshold. The Circular notes that it does not automatically follow that because a threshold has been exceeded that a full EIA is required. According to the WTDS there is sufficient landscape capacity to accommodate visual effects in this location, and noise effects are less than minor.

5. Scoping Opinion

If the Screening Opinion is such that an EIA is required, we formally request a Scoping Opinion under Regulation 10 of the Town and Country Planning (Environment Impact Assessment) Regulations 1999, taking into account the potential effects outlined in Paragraph 3 of this letter.

Notwithstanding the outcome of the Screening Opinion, we propose to undertake an environmental assessment from which an Environmental Report will be prepared. The Environmental Report will set out positive and negative impacts together with mitigation, management, monitoring and remedial mitigation measures. The proposed scope takes into account the criteria and thresholds identified in Council's Wind Turbine Development Study (2008), and subject to the opinion of the Fenland District Council planning authority and that of any relevant consultees, is as follows;

- Non-technical summary
- Site Description,
    - A consideration of the environmental sensitivity of geographical areas likely to be affected by the development. Includes background environmental information.

    - A description of the site selection process.
- Project description
    - Including detail on the size, position and technical specification of the turbines as well as construction and operation information such as access tracks, construction laydown areas, and details of any ancillary structures such as a control building. Indicative timeframes for construction and decommission will also be included.
- Policy Context
    - A summary of national, regional and local planning policy relevant to the development.
- Visual and Landscape Assessment
    - This will be prepared by a qualified landscape architect to guideline standards. This will include an explanation of the assessment process, a 15km radius zone of visual influence analysis, photograph montages with before and after images, and an assessment of cumulative effects of other approved developments. The viewpoints will be agreed with Council staff.
    - The following landscape criteria and thresholds will be applied, as identified in the Wind Turbine Development Study (2008):
        - Landscape Character
        - Landscape Capacity
        - Visual Impacts
        - Cumulative Landscape Impacts
        - Cumulative Visual Impacts
- Recreation and Transport Routes
    - An assessment of effects on the public highway and public rights of way during the construction, operation and decommissioning phases. A management plan including methods to avoid or minimise any disruption will be prepared.
- Noise Assessment
    - Using published data from the turbine manufacturer noise levels will be predicted at the site boundary. A background noise monitoring exercise will be carried out should predicted levels exceed 35dBA at the boundary.
- Electro-Magnetic Interference
    - The results of consultation with telecommunication system operators will be reported.
- Aviation Issues
    - Consultation will take place with the MOD, local airports and National Air Traffic Services. Depending on the outcome of consultation further specialist analyses may be carried out.
- Biodiversity and Ecology
    - It is proposed that a survey of breeding birds on the site and a survey of wintering and passage birds using the site be conducted. In addition, a Phase 1 Habitat Survey and Bat Survey will be undertaken. Further specialist analyses may be carried out depending on the findings of these tasks.
- Flood Risk Assessment
    - A flood risk assessment, suitable in scope for this type of development, will be provided in order to evaluate the risk and effect on flooding.

6. Conclusion

The proposed windfarm will provide 6.6 MW of renewable generation capacity within the Fenland District, which will contribute towards achieving National and Regional renewable energy targets. We note that the Fenland District Council has prepared and consulted on its "Core Strategy Preferred Options 2" report, detailing its intentions for preparing a new Local Development Framework (LDF). There are Preferred Options relating to renewable energy (N5), but also more specifically to Wind Turbine Development (N6) that support this development.

Olive Green Energy requests a formal Screening and Scoping Opinion pursuant to the Town and Country Planning (Environmental Impact Assessment) Regulations 1999. The above information places the project in context, and provides information on the proposal including potential environmental effects and extent of the proposed Environmental Assessment.

If you have any questions please contact me on 0118 900 8086 or by email at carl.howarth@ogenergy.com.

Yours sincerely,

Carl Howarth

Attached: site layout plan

Appendix 5.2 - Fenland District Council Scoping Response

Fenland
CAMBRIDGESHIRE
Fenland District Council

100% people driven

Rebecca Hunt
Tel 01354 622308
Fax 01354 606908
Email rehunt@fenland.gov.uk

Mr C Howarth
Olive Green Energy
Brook Henderson House
37 – 43 Blagrave Street
Reading
RG1 1PZ

22 JUL 2009

Our ref: F/YR09/0395/SCOP
Your Ref:

20 July 2009

Dear Mr Howarth

F/YR09/0395/SCOP - EIA Scoping Report – Town and Country Planning (Environmental Impact Assessment (England and Wales) Regulations 1999 for Erection of 2 wind turbines at land at Ashtree Farm, Broad Drove West, Tydd St Giles.

I refer to your Scoping Report submitted under the above Regulation received 24 March 2009.

The development has been considered under Schedule 2 and 3 of the relevant regulations. The request together with the associated information has been considered in respect of related guidance and regard has been given to the nature, size and location of this proposal and is considered that the effects would be significant and therefore an Environmental Impact Assessment is required in this instance.

I confirm that the content of the submitted information and the intention to produce an Environmental Statement in accordance with the requirements of Schedule 4 of the above Regulations is acceptable to the District Council.

Attached are a copy of the Officer's report which sets out the considerations to be within the Environmental Statement and a copy of the correspondence received from those groups and organisations consulted in relation to the proposal.

I trust that the above and the enclosed comments prove helpful. Should you wish to discuss this further please do not hesitate to contact me.

Yours sincerely

Rth.

Rebecca Hunt
Senior Planning Officer

LGC Council of the Year
THE MJ 2008 FINALIST Best Achieving Council
INVESTORS IN PEOPLE
CHARTER MARK

Fenland District Council • Fenland Hall • County Road • March • Cambridgeshire • PE15 8NQ
Telephone: 01354 654321 • DX 30955 March • Textphone: 01354 622213
Email: info@fenland.gov.uk • Website: www.fenland.gov.uk

TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (ENGLAND AND WALES) REGULATIONS 1999

SCOPING OPINION ISSUED BY FENLAND DISTRICT COUNCIL

IN RELATION TO TWO PROPOSED WIND TURBINES, ASHTREE FARM, BROAD DROVE WEST, TYDD ST GILES

INTRODUCTION

1. Olive Green Energy have submitted a formal scoping opinion under Regulation 10 of the Town and Country Planning (England and Wales) Regulations 1999. The proposed wind farm development is for 4 wind turbines, with 2 being within the district of Fenland and 2 within the district of South Holland, with a maximum height of 132m to the blade tip and would generate a maximum of 3.3 MW each.
2. Section 10, Part IV of the Regulations provides for the applicant to ask the relevant Local Planning Authority for its formal opinion as to the information to be provided in the applicant's ES. This is known as a 'Scoping Opinion'. Its purpose is to allow the applicant to be clear about what the local planning authority considers the main effects are likely to be and, therefore the topics on which, the ES should focus. The applicant sought a 'Screening and Scoping Opinion' by letter dated11 June 2009.
3. In preparing this Scoping Opinion, the Council has taken into account views received from statutory consultees.

GENERAL

4. The Council reminds the applicant of the information required to be included in the ES by virtue of Schedule 4 of the Regulations. The specific requirements of Schedule 4 of the Regulations are not repeated here.
5. The Council has regard to the suggested scope of the work for the ES incorporated in the applicant's letter and attached information received 11 June 2009.

POLICY FRAMEWORK

6. It is suggested that an analysis of the planning policy framework is submitted.

SITE SELECTION

7. It will be required to explain why the particular site has been selected.

COMMUNUNITY CONSULTATION

8. It will be necessary for the ES to set out how the developers have engaged with the community in terms of consultation, advertisement etc. Reference should be made to the Council's adopted SCI.

DESIGNATIONS

9. Account should be taken in the ES of any designation areas within the site or proximity to. The potential impact of the wind energy project on the designated areas and the significance of this impact should be assessed.

VISUAL AND LANDSCAPE ASSESSMENT

10. The existing landscape should be described and the potential landscape and visual impact of the proposed development assessed and evaluated.
11. A 'Zone of Influence' should be defined and public viewpoints and viewpoints in relation to settlements be detailed.
12. The ES should also consider the cumulative impacts with regard to the existing wind energy developments installed, under construction and approved.
13. I would also refer you to Natural England's consultation response dated 10 July 2009.

NOISE AND SHADOW FLICKER ASSESSMENT

14. A prediction of the sound produced by the proposed development should be made in an agreed format with the Council's Environmental Health Officer.
15. An assessment on the level of shadow flicker likely to be incurred on any properties near to the site will be required.
16. PPS 22 (England) commends the use of ETSU-R-97 for assessing wind turbine noise. A full ETSU-R-97 assessment should be carried out. Additionally the level of construction noise and the likely phase and any associated mitigation measures should also be included.

ECOLOGICAL ASSESSMENT

17. The flora and fauna that are found at the proposed site should be considered in relation to the loss of habitat, to their sensitivity of disturbance and to their importance. Site survey work will be required followed by an assessment of possible effects on flora and fauna. It is also important that this survey work is carried out at the appropriate time of year. There may also be a requirement for on going monitoring and management.
18. The site is situated approximately 10kn from the Nene Washes Site of Special Scientific Interest (SSSI). Therefore the EIA needs to consider in detail the potential effects of the development on these habitats.
19. The ES also needs to consider the impact on wildlife species and I would refer you to Natural England's consultation response dated 10 July 2009, and the consultation response from the Wildlife Trust dated 15 July 2009.

ARCHAEOLOGICAL AND HISTORICAL ASSESSMENT

20. The physical impact of the proposal and effect on the setting of any sites of significant archaeological or historical importance should be assessed.
21. The ES should include an archaeological section as well as geoarchaeological mapping undertaken to augment the archaeological section.

HYDROLOGICAL ASSESSMENT

22. An assessment of the impact of the proposed development on water courses, their quality and quantity will be required.
23. I would refer you to the consultation response from Environment Agency dated 8 July 2009.

INTERFERENCE WITH TELECOMMNICATION SYSTEMS

24. Wind energy projects can interfere with nearby television and microwave systems. As such it is suggested that communication system users should be approached for the views.

AIRCRAFT SAFETY

25. The civil and military aircraft authorities must be consulted.

SAFETY ASSESSMENT

26. An assessment of safety should be made to include consideration of the structural integrity of the wind turbines intended for use on site.
27. The possible impacts of ice throw from the turbine blades should be assessed and included in the ES.

TRAFFIC MANAGEMENT AND CONSTRUCTION

28. Details of the construction of the wind energy project should be included. The impacts of the construction (including the access roads) should be assessed as part of the visual, ecological, hydrological and archaeological assessments. Any essential road improvements needed to accommodate the development should be detailed in the ES and discussed and agreed with the Local Highway Authority.

ELECTRICAL CONNECTION

29. Details of the electrical connection (overhead and underground electricity lines and the substation) should be included as part of the ES. Careful account should be taken over the potential impacts on the environment and land use.

ECONOMIC EFEFCTS ON THE LOCAL ECONOMY

30. The ES may include an estimate on the number of temporary or permanent jobs created and the value of contracts available locally.

GLOBAL ENVIRONMENTAL EFFECTS

31. The ES should include estimates on the amount of electricity the wind energy project will produce and the quantity of polluting emissions that would be produced from a conventional power station producing the equivalent power.

TOURISM AND RECREATIONAL EFFECTS

32. Public rights of way should be identified and nearby tourist and recreational facilities should be identified and the impact of the proposed project on these should be included.

DECOMMISSIONING

33. The ES should cover decommissioning of the wind energy project and consideration should be given to the restoration measures including the removal of the ground equipment, access roads and foundations.
34. I would refer you to the consultation response from the Environment Agency dated 8 July 2009.

MITIGATING MEASURES

35. Mitigation measures need to be considered in particular relation to matters of ecological importance. I would refer you to Natural England's consultation response dated 10 July 2009and the consultation response from the Wildlife Trust dated 15 July 2009.

NON TECHNICAL SUMMARY

36. There must be a non technical summary supporting the ES setting out the issues considered and summarizing the conclusions reached for each section.

CONCLUSION

37. In accordance with Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 the fact that this Scoping Opinion has been issued by the Council does not prevent it from requesting further information at a later stage.

Natural England

Rebecca Hunt - Ref: F/YR09/0395/SCOP

From: "Taylor, Fiona (NE)" <Fiona.Taylor2@naturalengland.org.uk>
To: <gnourse@fenland.gov.uk>
Date: 10/07/2009 12:23:06
Subject: Ref: F/YR09/0395/SCOP

Dear Graham

Please find attached Natural England's response to the above request for Screening and Scoping Opinion.

Regards

<<FT-09July-EE4417-2 wind turbines-Ashtree Fm-Tydd St Giles-Scop+ScreenOp.pdf>>

Fiona Taylor

Government and Conservation Advisor (for Beds and Cambs), Four Counties Government Team

Ham Lane House, Ham Lane, Orton Waterville, Peterborough PE2 5UR

Tel: 0300 060 4940 (direct 4945); Mobile: 07833 239597

Fiona.Taylor2@naturalengland.org.uk

Natural England works for people, places and nature to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas. We conserve and enhance the natural environment for its intrinsic value, the wellbeing and enjoyment of people, and the economic prosperity it brings. For more information about Natural England, visit: www.naturalengland.org.uk

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Your ref: F/YR09/0395/SCOP
Our ref: LA.FDC/02 (EE4417)

10 July 2009

Graham Nourse
Development Services
Fenland District Council
Fenland Hall
County Road
March, Cambridgeshire
PE15 8NQ

ENGLAND

Four Counties Area
Ham Lane House
Ham Lane
Orton Waterville
Peterborough
PE2 5UR
T 01733 405850
F 01733 405860
www.naturalengland.org.uk

Dear Graham

Proposal: **Screening and Scoping Opinion: Erection of two wind turbines**
Location: **Ashtree Farm, Broad Drove West, Tydd St Giles, Cambridgeshire PE13 5NU**

Thank you for consulting Natural England regarding the above proposal. Your letter and supporting information were received in this office on 26 June 2009.

The two wind turbines in this application form part of a larger development crossing into Lincolnshire and comprises four turbines in total. As such, the development exceeds the thresholds set out in *Schedule 2* of *The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999* and therefore requires and Environmental Impact Assessment. The scope of the assessment is set out below.

Designated Sites
The proposed turbine site is situated approximately 10km from the nearest statutory site, the Nene Washes Site of Special Scientific Interest (SSSI)/ SPA Special Protection Areas. While the proposed sites are unlikely to result in significant impacts on the bird features of the SPA/ SSSI, we would expect the assessment of the proposals to take account of the site, with specific reference to any SPA/ SSSI species if they are recorded using the proposed sites or surrounding areas during the bird surveys (see below) undertaken as part of the developments. There are few other sites (either statutory or non-statutory) located in the surrounding area, however further information regarding these sites can be found via the MAGIC website (www.magic.gov.uk), Nature on the Map (www.natureonthemap.org.uk) and by contacting the Cambridgeshire and Peterborough Biological Records Centre (CPBRC). We would expect any application to ensure that negative impacts to SSSI are avoided in the first instance, with mitigation and compensatory measures provided where avoidance is not possible.

Protected and notable species
Although the Area Team does not currently hold comprehensive or detailed up-to-date information on legally protected species in the vicinity of the site, we recommend that full protected species assessments are made based on sufficient survey effort at suitable times of year, following current best practice guidelines. Efforts should be made in all instances to avoid any impacts, and provide full mitigation where avoidance is not possible. Again, we would advise that you contact the CPBRC for further information in this regard. The RSPB, the county bird recorder and Cambridgeshire Bat Group may also be able to provide valuable information as to the use of the area by species, and should be consulted for information regarding records and potential impacts in the area.

In order to ensure that the proposal does not impact upon protected and notable wildlife, any application for turbines should include a full, robust assessment of the potential impacts based on a sufficient level of baseline survey work. This is especially relevant for birds and bats, and should address matters such as disturbance, collision risk and mortality, and loss of habitat. It is also very important to assess the potential cumulative ecological impact of this application, in relation to others granted or pending planning permission in the area.

As bird behaviour and distribution will vary depending on a range of factors, including disturbance, availability of preferred feeding areas, time of day and weather conditions, it is important that sufficient observations are made to collect adequately representative information. Thus observations on feeding and roosting areas and bird movements should be undertaken at different times of the day, including at dawn and dusk. Nocturnal observations should also be made where possible. Observations should be carried out under different weather conditions as this may particularly affect flight lines and flight altitude.

Although Natural England does not have specific survey guidelines for wind farm proposals, we recommend that a suitable methodology is produced using current industry best practice, with reference to material such as the *Scottish Natural Heritage (SNH) Onshore Wind Farm Guidance*, and use of their Collision Risk Model. At least one full year's worth of breeding and wintering survey data should be gathered, and future surveys may be required prior to submission depending on the results of these data.

Similarly, survey work undertaken for bats should take account of potential roost sites both within and adjacent to the proposed site, as well as activity across the site over the entire active season. Again, while Natural England does not have specific guidelines for wind farm proposals, we would recommend that a suitable methodology is developed with reference to the *Eurobats Guidelines for Consideration of Bats in Wind Farm Projects (2008)* and *Bat Conservation Trust Bat Surveys Good Practice Guidelines*. In addition, we are aware that a proposed standard methodology for wind farm bat surveys has recently been published in the IEEM membership bulletin (*In Practice*, no 62, Dec 2008 and no 64 June 2009) and we would suggest that this is also a useful frame of reference.

Any constraints that may influence the survey findings should be made clear within the EIA, such as abnormal weather conditions, suboptimal time of year for surveying etc. Further work should be carried out if survey results are not thought to be representative of how bird movements take place around the site in an 'average' year.

Measures should be taken to ensure that the site layout positions the turbines away from sensitive areas for protected species. For example, water-bodies, ditches, woodland and hedgerows can all be used for either foraging or as flight-lines by bats, and ensuring a sufficient distance[1] from the turbines to these areas, may reduce any impacts. Likewise, turbines and infrastructure works should aim to minimise impacts to terrestrial species by being sited away from other habitats of wildlife value, such as rough grassland and scrub. A strategy for future monitoring work may be required in following years to ensure that the turbines are not impacting bird and bat populations and that any mitigation is successful.

Enhancement and Landscape

Natural England considers that the potential for the development to provide nature conservation enhancements should be clearly distinguished from measures to mitigate or compensate for harm to nature conservation interests. Guidance is given in *Planning Policy Statement 9 (PPS9) Biodiversity & Geological Conservation*, recommending that all efforts are made to retain existing habitat of nature conservation value, and that specific enhancement works are made for the benefit of wildlife. Where appropriate these can take place at an off-site location.

We would expect a full landscape assessment to be made, using current industry best-practice measures such as the *Guidelines for Landscape and Visual Impact Assessment (GLVIA)* and SNH guidance. This type of development can have a potentially detrimental impact to the characteristics of the landscape, and may conflict with landscape scale habitat enhancement projects in the area. It is essential that the cumulative impacts of this scheme and all other existing and proposed turbines is fully assessed.

I hope you find these comments useful – please do not hesitate to contact me if you require any further information.

Yours sincerely

Fiona Taylor
Government and Conservation Advisor
Four Counties Government Team
Direct telephone: 01733 405869
Fiona.Taylor2@naturalengland.org.uk

The Wildlife Trust

From: Graham Nourse
To: Rebecca Hunt
Date: 15/07/2009 12:42:19
Subject: Fwd: Scoping opinion response Ashtree Farm

For you..

Graham Nourse
Principal Planning Officer
Fenland District Council
Tel. 01354 622315

We are committed to providing you with the best service possible and we value your comments and would welcome your feedback on our service.

If you are an external customer, please use our 3C's procedure (comment, compliment or complaint), available via our web site at http://www.fenland.gov.uk/ccm/navigation/council/3c-s-procedure/

If you are an internal customer, please click here http://intranet/forms/cse/start

>>> "Sian Williams" <Sian.Williams@wildlifebcnp.org> 07/15/09 10:59 am >>>
Dear Mr. Nourse,

Re: Scoping opinion - Erection of 2 wind turbines at Ashtree Farm, Broad Drove West, Tydd St Giles, Cambridgeshire, PE13 5NU

Thank you for consulting the Wildlife Trust regarding the scoping opinion for this potential wind farm site. We have the following comments to make:

- We are not aware of any nature conservation sites or records of species in the immediate area which are likely to be significantly affected by the proposals. However, records should be sought from the Cambridgeshire and Peterborough biological records centre to check this. Since the site is located on the border with Lincolnshire, the Lincolnshire records centre and Wildlife Trust should be contacted as well.

- The letter accompanying the scoping opinion request has identified that there is the potential for negative impacts on local habitats and populations of species such as birds and/or bats and mentions plans for surveys to assess this potential.

- Bird surveys should follow best practice guidelines, and consider such factors as flight paths, potential for collision, and potential for displacement.

- Similar surveys should be carried out for bats, again following best practice guidelines.

- Habitat surveys should also be included, to assess the type of habitat present and the potential for habitat loss - and to identify areas for potential habitat enhancement.

- The Environmental Report to be produced should include plans for mitigation and habitat enhancement, and consider restoration at the end of the life of the turbines.

Feel free to get in touch if you have any further questions.

Yours sincerely,

Siân Williams

Conservation Officer (Cambridgeshire and Peterborough)

The Wildlife Trust

Tel: 01954 713509

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Environment Agency

Development Manager
Fenland District Council
Fenland Hall
County Road
March
Cambridgeshire
PE15 8NQ

Our ref: AC/2009/109509/01-L01
Your ref: F/YR09/0395/SCOP

Date: 08 July 2009



Dear Sir/Madam

ERECTION OF 2 WIND TURBINES
ASHTREE FARM, BROAD DROVE, WEST TYDD ST GILES

Thank you for your letter dated 24 June 2009 regarding a request for a screening and scoping opinion for the above proposal.

Please note that part of the site lies within South Holland district but we have not been consulted on this screening/scoping opinion by South Holland District Council.

The site is located within Flood Zone 3 (high risk) on our Flood Maps. As such, the Sequential Test, as detailed in Annex D of PPS25, should be applied to the site.

A Flood Risk Assessment will need to be undertaken to assess the flood risk to the development and potential increase in flood risk elsewhere. If an Environmental Assessment (EIA) is required for this development, the FRA should form part of the EIA.

The site is located within the North Level Internal Drainage Board's area and the Board should be consulted with regard to the standard of protection provided by their flood defences and surface water drainage proposals.

If an EIA is required, the Environmental Statement (ES) should include a chapter on hydrology, to assess the potential impacts of the proposed development on ground and surface water quality.

The site contains a number of field drains that are vulnerable to pollution. As such, the ES should include the mitigation measures and best practice methods that will be used to address pollution prevention concerns during construction, operation and decommissioning of the site.

Environment Agency
Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk
Cont/d..

The installation of any piled foundations on the site may require dewatering. The ES should consider the likelihood of dewatering being required, its potential impacts and mitigation measures.

Decommissioning of the site should also be addressed in the ES. We would recommend that, as part of the decommissioning of this wind farm, all below ground cables are removed. Electrical cables contain insulation oils, which if left to degrade within the ground can lead to localised contamination of soils, which could leach to the surface water drains on site.

I hope this is of assistance to you.

Yours faithfully

Louise Best

Miss Louise Best
Planning Liaison Officer

Direct dial 01480 483898
Direct fax 01480 435193
Direct e-mail Planning_Liaison.Anglian_Central@environment-agency.gov.uk

End

Appendix 5.3 - South Holland District Council Scoping Response

date: 7th September 2009
your reference: Ch
our reference: 1870.19
ask for: David Roberts
email: droberts@sholland.gov.uk

SOUTH HOLLAND DISTRICT COUNCIL

Council Offices
Priory Road
Spalding
Lincolnshire PE11 2XE

tel: 01775 761161
fax: 01775 710772
www.sholland.gov.uk

Carl Howarth
Olive Green Energy
Brook Henderson House
37-43 Blagrave Street
Reading
RG1 1PZ

11 SEP 2009

Dear Sir

Scoping Opinion. Proposed Wind farm, Sutton St Edmund, Lincolnshire

I write further to previous correspondence relating to the above proposal and your request for a scoping opinion.

The submitted scoping report has now been considered having regard to the specific characteristics of the development and the environmental features likely to be affected by the proposal. A consultation exercise has also been carried out and copies of the responses received are enclosed for information.

It is the opinion of the Local Planning Authority that the key issues have been identified and will no doubt be expanded upon. Finally you are reminded that this response does not preclude the Authority from requesting further information at a later stage should the need arise.

Yours faithfully

David Roberts
Team Leader, Development Control

Terry Huggins - Chief Executive Andrew Pelcher and Sarah Naylor - Corporate Directors

Environment Agency

creating a better place

Environment Agency

Mr David Roberts
South Holland D C
Council Offices Priory Road
Spalding
Lincolnshire
PE11 2XE

Our ref: AN/2009/107999/01-L01

Your ref: 1870.19

Date: 03 August 2009

Dear Mr Roberts

PROPOSED WIND FARM WITH TURBINES OF MAXIMUM HEIGHT OF 132 METRES
SUTTON ST EDMUND

Thank you for referring the above request for a scoping opinion, which was received on 15 July 2009.

Please note that we have already responded to Fenland District Council in respect of this proposal (see attached letter) and our comments remain the same as stated in this letter.

As the letter details, at the formal application stage we will require a Flood Risk Assessment which demonstrates that the development will be safe. One possibility, to ensure the safety of the development, may be to set all sensitive electrical equipment above the predicted flood level.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Dean Rezzougui
Planning Liaison Officer

Direct dial 01522 785882
Direct fax 01522 512927
Direct e-mail dean.rezzougui@environment-agency.gov.uk

Environment Agency
Waterside House Waterside North, Lincoln, Lincolnshire, LN2 5HA.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

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Environment Agency

Development Manager
Fenland District Council
Fenland Hall
County Road
March
Cambridgeshire
PE15 8NQ

Our ref: AC/2009/109509/01-L01
Your ref: F/YR09/0395/SCOP

Date: *08 July 2009*

Dear Sir/Madam

ERECTION OF 2 WIND TURBINES
ASHTREE FARM, BROAD DROVE, WEST TYDD ST GILES

Thank you for your letter dated 24 June 2009 regarding a request for a screening and scoping opinion for the above proposal.

Please note that part of the site lies within South Holland district but we have not been consulted on this screening/scoping opinion by South Holland District Council.

The site is located within Flood Zone 3 (high risk) on our Flood Maps. As such, the Sequential Test, as detailed in Annex D of PPS25, should be applied to the site.

A Flood Risk Assessment will need to be undertaken to assess the flood risk to the development and potential increase in flood risk elsewhere. If an Environmental Assessment (EIA) is required for this development, the FRA should form part of the EIA.

The site is located within the North Level Internal Drainage Board's area and the Board should be consulted with regard to the standard of protection provided by their flood defences and surface water drainage proposals.

If an EIA is required, the Environmental Statement (ES) should include a chapter on hydrology, to assess the potential impacts of the proposed development on ground and surface water quality.

The site contains a number of field drains that are vulnerable to pollution. As such, the ES should include the mitigation measures and best practice methods that will be used to address pollution prevention concerns during construction, operation and decommissioning of the site.

Environment Agency
Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk
Cont/d..

The installation of any piled foundations on the site may require dewatering. The ES should consider the likelihood of dewatering being required, its potential impacts and mitigation measures.

Decommissioning of the site should also be addressed in the ES. We would recommend that, as part of the decommissioning of this wind farm, all below ground cables are removed. Electrical cables contain insulation oils, which if left to degrade within the ground can lead to localised contamination of soils, which could leach to the surface water drains on site.

I hope this is of assistance to you.

Yours faithfully

Miss Louise Best
Planning Liaison Officer

Direct dial 01480 483898
Direct fax 01480 435193
Direct e-mail Planning_Liaison.Anglian_Central@environment-agency.gov.uk

End 2

Peterborough Council

Roberts, David

From: Loveday David [David.Loveday@peterborough.gov.uk]
Sent: 28 July 2009 09:26
To: Roberts, David
Subject: Sutton St Edmund Lincs - 1870.19

Dear Mr Roberts

I refer to your consultation regarding the above and can advise as follows;

a) This Authority has been involved recently with a wind farm appeal near to Thorney, and the result is awaited. The sole issue related to MOD concerns regarding military aircraft flights. Dale Barker was the case officer involved.

b) As a general rule, this Council supports the provision of alternative energy sources, including wind. However, the issue of cumulative impact upon the landscape is now rearing its head. With Fenland DC allowing a number of turbines and ourselves likewise, the issue needs to be considered, in my own personal judgement, on a regional basis.

I trust that this information is helpful,

Yours sincerely

David J Loveday

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Natural England

Date: 31st July 2009
Our ref: B5.8.60
Your ref: 1870.19

ENGLAND

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T 01522 561470
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David Roberts
Development Control Team Leader
South Holland District Council
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

PLANNING & DEVELOPMENT
- 3 AUG 2009
PL

Dear Mr Roberts,

Proposal – Windfarm Scoping Consultation
Location – Sutton St Edmund, Lincolnshire

Thank you for consulting Natural England on the above application. Your letter was received by this office on 16th July 2009.

An assessment of the proposal should identify, describe and evaluate the likely significant effects on the environment of implementing the proposals, (along with any reasonable alternatives) taking into account the objectives and geographical scope of the development. The assessment should cover:

- The relevant aspects of the current state of the environment and the likely changes to this environment without implementation of the proposals
- The environmental characteristics of areas likely to be affected
- Any existing environmental problems or management plans which are relevant to the assessment
- The environmental protection objectives, established at international, national, regional or local level which are relevant to the assessment and the way those objectives and any other environmental considerations have been taken into account during its preparation
- The likely significant effects on the environment, including issues relating to fauna, flora, soil, water, air, climatic factors
- The measures envisaged to prevent, reduce and as fully as possible mitigate or compensate for any significant adverse effects on the environment of implementing the proposals

2. Designated and Protected Sites

There should be an analysis of the potential impacts of the proposal on all relevant statutory and non-statutory protected sites, as listed in the table below.

- Internationally designated sites such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites. Details are available from the Joint Nature Conservation Committee website (www.jncc.org.uk).
- Nationally designated sites such as Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs). Details are available from the Multi Agency Geographic Information for the Countryside website (www.magic.gov.uk) or the Natural England website (www.english-nature.org.uk).
- Sites arising from the requirements of Article 10 of the Habitats Directive i.e. those which by virtue of their linear and continuous nature or their function as stepping stones are essential for the migration, dispersal and genetic exchange of wild species (e.g. hedgerows, rivers, canals, ponds, copses, shelterbelts and woodlands). The assessment should include an analysis of how these features, if present, function as ecological linkages within the wider landscape and how the proposals may impact upon this function.
- Local Nature Reserves (LNRs). Details are available from the relevant Local Authority.
- Sites of local importance (e.g. County Wildlife Sites). Details are available from the relevant local Wildlife Trust.
- Geological/geomorphological sites (RIGS) and Sites of Local Importance for Earth Science.
- Sites which are of particular value in the context of any built up area (e.g. urban green spaces and brownfield sites of demonstrable nature conservation value).
- Other sites of high biodiversity value

3. Species surveys

Appropriate and relevant species surveys should be undertaken within the maximum land take area and these may need to extend beyond these boundaries, up to 500m away. This would apply, for example, if nesting birds' territories or birds' foraging areas extend beyond the proposal area or if a group of ponds used by a metapopulation of great crested newts is identified both within and beyond the proposal area. The table below lists species that should be considered for field and desk studies. We would welcome the opportunity to comment on proposed species survey methodologies before they commence.

- Species listed under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals).
- Species listed under the Berne Convention (Annex 1 and 2 of the Convention on the Conservation of European Wildlife and Natural Habitats 1979).
- Red Data Book (RDB) species.
- Species listed in Schedules 1,5 and 8 of the Wildlife and Countryside Act 1981, as amended.
- Species listed in national, regional and local Biodiversity Action Plans (BAPs), including lower plants and invertebrates.
- Other potentially under-recorded groups that might reasonably be present, based on the habitats identified in the phase one and two surveys, for example, lower plants and invertebrates.

Surveys should use agreed standard techniques where available and applicable and be undertaken at suitable times of the year by qualified and, where appropriate, licensed ecologists (see below for further comments relating to bird and bat surveys).

The methodology design and subsequent discussion of results should aim to identify the following information:

- Is there any known history of legally protected and other notable species on the site?
- What species are present?
- What population is present or would be affected by the proposal?
- What can be done to mitigate for any impact?
- What opportunities exist for enhancement?
- Is any residual impact acceptable/necessary?
- Will a license be required from Natural England?

4. Bird Surveys

Natural England does not have specific avian survey guidelines for wind farm proposals. However, we generally recommend that a suitable methodology is produced using current industry best practice, with reference to material such as *Survey Methods for use in Assessment of the Impacts of Onshore Wind Farms on Bird Communities* (Scottish Natural Heritage, November 2005). As every site will have its own unique set of characteristics such as topography, habitats present and setting within the wider landscape an element of site-specific methodology design is acceptable.

All wind farm proposals should include a full assessment of the impact on birds based on a sufficient level of baseline survey work. This should address matters such as disturbance leading to displacement/exclusion, collision risk/mortality and loss/degradation of habitat. Some other factors to take into account for this type of survey should include:

- Surveys covering a full calendar year are generally considered to be the **minimum** effort required
- Surveys cover the full range of seasonal, diurnal and weather conditions to ensure some survey effort covers poor visibility conditions
- Nocturnal surveys for owls and night-flying migrants if appropriate
- Record flight behaviour (e.g. altitude, direction) and foraging areas used by different species
- The number, location and time spent at Vantage Points (VPs) should be suitable for the size, shape and topography of the site – no point within the development site should be greater than 2km away from a VP and all areas of the site should be viewable from at least one VP
- Consider that woodland, high hedgerows, buildings or topographical features for example, might block the view between a VP and an area of the site.
- A consideration of habitat outside the site boundary – to aid discussion of potential displacement of birds e.g. if birds are displaced/disturbed, where are they likely to go?

5. Bat surveys

With regard to bats the UK government has adopted the Eurobats Guidance http://www.eurobats.org/publications/publication_series.htm. Natural England has not yet prepared its own guidance based on this. We therefore advise that you use the Eurobats guidance in conjunction with information about the presence or likelihood of bat habitat

nearby to determine the amount of survey effort required, the likely impact and the mitigation required.

6. Habitat surveys

A phase one habitat survey marked up on maps of a suitable scale should be undertaken which will identify habitats of nature conservation interest. Where recent information is not already available from other sources (e.g Local Biological Record Centres etc), identified habitats of nature conservation interest should be surveyed at a finer level using the appropriate phase two methodology (e.g National Vegetation Classification (NVC)) so that the interest of these sites can be placed in context. Surveys should also record the vascular plants associated with these habitats and their relative abundance. The presence and specific locations of any rare and uncommon plant species should be recorded.

7. Monitoring

The importance of comprehensive baseline ecological surveys should not be underestimated. The results and subsequent analysis should:

- Provide an assessment of the overall potential impact of the development on wildlife
- Advise on the number, design and siting of turbines – along with lighting issues
- Guide mitigation, compensation and habitat enhancement proposals
- Provide 'before' data to feed into possible 'Before-After-Control-Impact' (BACI) studies. These are comprehensive studies which include a comparison of the site before and after development with a control site. Ideally, this should be the 'industry standard' and feed into regional/national research, but BACI studies maybe beyond the requirements of this EIA
- Provide baseline data for site-specific post-development monitoring

8. Landscape and Visual Assessment (LVA)

A Landscape and Visual Assessment (LVIA) should be included within the assessment of the scheme. This should follow good practice guidelines such as those produced jointly by the Landscape Institute/Institute of Environmental Assessment 2002 and the Countryside Agency's and Scottish Natural Heritage's Landscape Character Assessment Guidance 2002. Topic Paper No. 6 Techniques and Criteria for Judging Capacity & Sensitivity should also prove useful and can be downloaded directly from the following web link http://www.landscapecharacter.org.uk/app-sens-cap.html

Reference should be made to the Countryside Character Areas. Each character area provides a useful broad overview of the key characteristics and distinctive features of an area in terms of the landscape, physical influences, historical and cultural influences, buildings and settlements and land cover.

Should you require further information please do not hesitate to contact me.

Yours sincerely,



Sally Murray
Planning & Conservation Advisor
01522 561484 (no voicemail)
sally.murray@naturalengland.org.uk

English Heritage

ENGLISH HERITAGE

EAST MIDLANDS REGION

Mr David Roberts
South Holland District Council
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

Direct Dial: 01604 735454
Direct Fax: 01604 735401

Our ref: PA00010680

Your ref: 1870319

30 July 2009

Dear Mr Roberts

Request for Pre-application Advice

PROPOSED WINDFARM AT SUTTON ST EDMUND, SOUTH HOLLAND, LINCOLNSHIRE

Thank you for your letter of 13 July 2009 inviting English Heritage to provide preliminary views on this proposal.

While English Heritage broadly supports renewable energy we are aware that such developments can be challenging to the historic environment. With this in mind English Heritage has drawn up guidelines for planners and developers, *Wind Energy and the Historic Environment*, a copy of which has been included for your information or it can be downloaded from www.helm.org.uk <http://www.helm.org.uk> . These guidelines are designed to be used alongside other current standard methodologies associated with the development of such proposals.

In general terms, English Heritage advises that a number of considerations will need to be taken into account when proposals of this nature are being assessed. This includes consideration of the impact of ancillary infrastructure, such as tracks and grid connections, as well as the turbines themselves:

- The potential impact upon the landscape, especially if a site falls within an area of historic landscape;
- Direct impacts on historic/archaeological fabric (buildings, sites or areas), whether statutorily protected or not. All grades of listed buildings should be identified;

44 DERNGATE, NORTHAMPTON, NN1 1UH
Telephone 01604 735 400 Facsimile 01604 735 401
www.english-heritage.org.uk

English Heritage is subject to the Freedom of Information Act. All information held by the organisation will be accessible in response to a Freedom of Information request, unless one of the exemptions in the Act applies.
English Heritage will use the information provided by you to evaluate any applications you make for statutory or quasi-statutory consent, or for grant or other funding. Information provided by you and any information obtained from other sources will be retained in all cases in hard copy form and/or on computer for administration purposes and future consideration where applicable.

ENGLISH HERITAGE

EAST MIDLANDS REGION

- Other impacts, particularly the *setting* of listed buildings, scheduled monuments, registered parks and gardens, conservation areas etc, including long views and any specific designed views and vistas within historic designed landscapes. In some cases, intervisibility between historic sites may be a significant issue;
- The potential for buried archaeology;
- Effects on landscape amenity from public and private land;
- Cumulative impacts

Such information would usually be expected to be presented as part of any planning application in a document such as an Environmental Assessment or Visual Impact Assessment, including the production of a Zone of Theoretical Visibility (ZTV) in line with the appropriate guidance*. The ZTV of the proposed development should initially be based on topographical data before the impact of existing trees and buildings etc on lines of sight is assessed. Finally, the effects of proposed mitigation measures on the ZTV should be demonstrated. We also recommend that photomontages are produced for key viewpoints. English Heritage would wish to be consulted about possible viewpoints where significant historic assets are affected.

From a brief review of our own records, it is apparent that

Scheduled Ancient Monuments:
Boundary Cross, Old Fen Dyke NM 22685, Medieval Boundary Earthworks at Queens Bank, NM 20817, Settlement in Moulton West Fen NM LI223, Settlement West of Cates Cove Corner NM LI225, White Cross 80 M North of Poultry Farm NM 22713, Boundary Cross, Manor Hill Corner NM 22683, Fleet Settlement Site Near Lambert Drain NM LI285 and Romano-British Settlement South of Shell Bridge NM LI 168.

Listed Buildings:
Church of Holy Trinity, Gedney Hill grade II* LBS 198005 and Tower to Church of St James, Sutton St James grade II* LBS 197940 are key visual receptors in this area and any impact upon them would need to be considered in depth.

The two turbines that fall within Feniand District Council should be referred to our East of England Regional Office at 24 Brooklands Avenue, Cambridge, CB2 8BU for comments on the affects on Heritage assets in their area.

The County Historic Environment Record holds information on undesignated archaeology and should also be consulted.

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We look forward to receiving more information/ a copy of the planning application in due course.

Yours sincerely

Glyn Coppack
Inspector of Ancient Monuments
E-mail: glyn.coppack@english-heritage.org.uk

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English Heritage will use the information provided by you to evaluate any applications you make for statutory or quasi-statutory consent, or for grant or other funding. Information provided by you and any information obtained from other sources will be retained in all cases in hard copy form and/or on computer for administration purposes and future consideration where applicable.

Lincolnshire Highways

Lincolnshire
COUNTY COUNCIL

Highways and Traffic
Boston and South Holland Division
Highways Depot, Bourne Road
Pode Hole, Spalding,
Lincolnshire, PE11 3LN
Tel: 01522 782070 Fax: 01775 7621
Email: dev_ht_bsh@lincolnshire.gov.

My ref: D/MS/CLW/SUTTON ST EDMUND PF8 & TYDD ST MARY PF4/COUNTRY
Your ref:
Date 27 July 2009

South Holland District Council
Priory Road
Spalding
Lincolnshire
PE11 2XE

Dear Sirs

SCOPING REPORT
LOCATION: PROPOSED WINDFARM, SUTTON ST EDMUND, LINCOLNSHIRE

Thank you for your letter dated 13 July 2009 regarding the above application.

The Definitive Rights of Way Map shows Sutton St Edmund PF8 and Tydd St Mary PF4 affecting the property. I enclose an extract from the electronic working copy of the Definitive Public Rights of Way Map for your information.

Whilst the showing of a path on a Definitive Map is conclusive evidence as to its existence and status, the reverse is not necessarily true. However, anyone claiming a path not shown on the Map to be a Public Right of Way must prove his claim by submitting sufficient suitable evidence of the path's free and uninterrupted use by the public as the public for at least 20 years before it can be considered for inclusion on the Map. Alternatively, some sort of documentary evidence (such as a Parish Enclosure Award) that the path had been dedicated as a right of way would suffice. However, we are not aware in this office of any such evidence.

Comments:

1. Whilst the proposed development site at Sutton St Edmund appears to affect Sutton St Edmund PF8 and Tydd St Mary PF4
2. It does not appear that it will permanently obstruct the definitive line of the right of way and it is expected that this line and the customary width of the path will remain open during the duration of the works.
3. During any works allowed by this proposal, users of the Public Right of Ways should not be inconvenienced or exposed to hazards by any such works.

Should there be **any** doubt about being able to comply with these conditions, please advise the applicant to contact Maxine Stukins at this office on the above telephone number before starting any work.

Yours faithfully

for Director for Development
Enc:

County Offices, Newland, Lincoln LN1 1YL

RSPB

RSPB Eastern England
65, Stalham House
Thorpe Road
Norwich
Norfolk
NR1 1UD

Mr D. Roberts
South Holland District Council
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

7th August 2009

Dear Mr Roberts,

SCOPING REPORT – PROPOSED WINDFARM, SUTTON ST EDMUND, LINCOLNSHIRE
REFERENCE: 9S1092/L/303797/1

Thank you for consulting the RSPB regarding the proposed wind farm at Sutton St Edmund, Lincolnshire. We are pleased to be able to offer comments.

Background
Our understanding is that Olive Green Energy is planning to develop a wind farm comprising four turbines, a permanent meteorological mast, and ancillary infrastructure on arable land at Sutton St Edmund. The proposed turbines are likely to have a blade diameter of not more than 104m and a maximum overall height of 132m.

The RSPB's position on wind technologies
The RSPB is supportive of renewable energy projects **providing that adverse impacts upon wildlife are avoided by appropriate siting and design**. Renewables offer an opportunity to modify or reverse the deleterious changes associated with climate change arising from an over-reliance upon fossil fuels.

The available evidence suggests that wind farms can pose three main problems for birds: disturbance, habitat loss or damage, and collision. Birds may be scared away by construction noise, vehicle movements, or the presence of operating turbines. The wind farm itself may physically destroy bird's feeding, breeding or roosting sites. In addition, birds may fly into the turbine tower or blades and be killed or injured; storms or conditions of poor visibility will increase the likelihood of this occurring.

Environmental Impact Assessment (EIA)
Any EIA prepared in support of this proposal must clearly be comprehensive and assess fully all likely impacts. We would expect nature conservation interests to feature as part of this exercise. In particular, the RSPB would expect thorough ornithological surveys to be conducted. We would expect information on the following areas to be presented in the Environmental Statement:

1. The definition of a suitable study area.
2. An assessment of statutorily protected nature conservation sites in the wider vicinity of the proposal.
3. A survey of breeding birds on the site.

4. A survey of wintering or passage birds using the site.
5. A conservation evaluation of 3. and 4. above (that is, an assessment of the significance of the species recorded).
6. An assessment of ornithological effects:
   - direct habitat loss,
   - collision risks,
   - indirect habitat loss.
7. Proposed mitigation of impacts.
8. A proposal for post-construction monitoring.

The RSPB would also expect to see an EIA assess the potential effects of the wind turbines on birds. We would expect this to include flight path surveys, including flight height, to determine if birds are crossing the site, and an assessment of likely collision rates.

The RSPB expects to see an EIA include an assessment of the cumulative impacts of the wind energy development with other projects that have been developed in, or are planned for, the area surrounding the proposed development site.

Nature Conservation Interests

The proposed development site at Sutton St Edmund lie approximately 10km from The Nene Washes Special Protection Area (SPA), Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI), and a Ramsar site.

To the best of our knowledge, there are no populations of foraging whooper and Bewick's swans associated with the Ouse and Nene Washes designated sites in the area, but bird surveys may prove otherwise. Whilst it is unlikely that the proposal would give rise to concerns about impacts on the Ouse or Nene Washes bird populations, which are subject to stringent legal protection, there may be other wider environmental constraints.

It is unlikely the RSPB would have any particular concerns or further comments to make on the proposal, **subject to the findings of any survey work conducted by you to accompany the planning application.**

Mitigation measures suitable to this site

The RSPB would be happy to discuss mitigation such as site design, nest boxes and biodiversity enhancement packages once survey data is available. Until data is available our key concern is ensuring that the Sutton St Edmund wind farm is a suitable location for such a project.

We trust that these comments are helpful. If you have any queries on the issues discussed above, please do not hesitate to contact me.

Yours sincerely,

Philip Pearson (Dr)
Conservation Officer
RSPB Eastern England Regional Office

Annex to RSPB comments on the proposed wind farm at Sutton St Edmund, *Lincolnshire.*

1. Waterfowl

Whilst the RSPB is not of important numbers of wintering swans, wildfowl or waders using the area around Sutton St Edmund *we would recommend that surveys for* these particularly groups be undertaken. These are likely to include species listed under Annex 1 of European Directive 79/409/EEC on the Conservation of Wild Birds *(the Birds Directive). Although* these species are not protected by a statutory nature conservation designation, the Birds Directive states that populations of Annex 1 species are subject to 'special conservation *measures'. The RSPB recommends that the* potential impacts of the proposed wind farm be assessed.

The RSPB would normally expect that VP surveys of a minimum duration of 36 hours in each season should be undertaken. For certain species, we would expect a significantly greater *survey effort to be* conducted, as outlined in Section 1. Given the likely presence of Golden Plover and Lapwing, the RSPB would normally expect that additional survey effort also be conducted between September to November, and March to May; the peak migration periods. It is recommended that migration VPs should be surveyed at a far higher frequency, with a minimum of two surveys undertaken per month, each lasting for 4-6 hours. Between December and February, VP surveys of a minimum of one survey per month would be acceptable. Given the likely presence of Golden Plover on the site, nocturnal surveys should also be undertaken, as this species forages in different areas at night than during the day.

2. Barn Owl

The RSPB expects Barn Owl to be breeding and foraging within the vicinity of Sutton St Edmund. Barn Owls are protected under Schedule 1 of the Wildlife and Countryside Act. The RSPB *recommends that detailed monitoring* work be carried out to assess the likely impact of the proposed development on breeding Barn Owl within the vicinity of the site. Barn Owl surveys should be conducted *outside the wind turbine site, as well as* within, to a distance of at least 1km, and should include monitoring at dawn and dusk. A minimum of 48 hours of observation, year round, is recommended for Barn Owl *surveying.*

3. Marsh Harrier and other raptors

Marsh Harrier is listed on Schedule 1 of the Wildlife and Countryside Act, giving it special protection at all times. It is also listed on Annex 1 of the EU Birds *Directive affording* the species special protection throughout its European range. It is considered to have a high risk of colliding with wind turbines, especially during breeding displays and as juveniles.

The RSPB recommends that the Scottish Natural Heritage (SNH) guidance[1] *should be referred to for* survey methods to predict the likely impact of the proposed development on breeding harriers and other raptors. The RSPB anticipates that marsh harrier may use the area around Sutton St. *Edmund.*

Surveys will need to undertake a minimum of 36 hours of Vantage Point (VP) surveys. Given the wide-ranging behaviour of marsh harrier, we would recommend that VP watches exceed the minimum 36 hours. This is particularly the case during the breeding season, as additional survey effort must be undertaken to fully document the use of the site during display flights and when juveniles have fledged from the nest.

4. Lowland/farmland species

[1] SNH (2005) Bird survey methods for use in assessing the impacts of onshore wind farms on bird communities.

The RSPB consider it likely that the area around Sutton St Edmund supports a potentially significant population of farmland birds, as the area is identified by the Bird Conservation Targeting Project as supporting at least 4 or 5 of the key arable assemblage species which are the focus for agri-environment funding.

The SNH guidelines for this group suggests that a modified Common Bird Census (CBC) style survey is most appropriate for smaller areas and providing the best information for assessing wind turbines. The RSPB advises that the modified CBC survey should also include April, and should cover a **minimum** of three visits. Surveys should start early in the morning, preferably from dawn or shortly after, with at least one visit at dusk to assess the site use by nocturnal species. Surveys should take place at different times of day, including dawn and dusk. Surveys should extend to 500m outside the proposed site, as set out in the SNH guidance.

5. Cumulative and in-combination impacts

The RSPB expects to see the EIA to include an assessment of the cumulative impacts of the proposed wind turbine with other projects that have been developed in, or are planned for, the area surrounding the proposed development site. This is important in order to assess fully the disturbance effect and collision risk of the project.

* * * * * *

Page 4 of 3

Civil Aviation Authority

Directorate of Airspace Policy

COMMENTS

17 JUL 2009

Mr David Roberts
South Holland District Council
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

15 July 2009

Ref ERM/DAP/Wind/SuttonStEdmund
Your Ref 1870.19 dated 13 July 2009

Dear Mr Roberts

Proposed Wind Turbine Development at Sutton St Edmund, Lincolnshire – Scoping Comment

Thank you for your recent correspondence relating to a proposed wind turbine development at Sutton St Edmund, Lincolnshire. You sought related Civil Aviation Authority (CAA) comment related to the associated Scoping Report (SR); I trust the following is useful.

As alluded to with the documentation provided, like any wind turbine development, the proposed subject development has the potential to impact upon aviation-related operations; the Department for Trade and Industry (DTI – now the Department for Energy and Climate Change)-sponsored document 'Wind Energy and Aviation Interests' and Civil Air Publication 764 refer[1]. The related need to establish the scale of the potential impact of the Sutton St Edmund development (or indeed any other wind turbine related proposal) is evident.

Further to the comment above and in line related comment in the SR concerning future consultation with aviation stakeholders, the best means by which to initiate the aviation related consultation process is via the completion and submission of an associated aviation pre-planning proforma in line with the process described within the aforementioned DTI guidance document. To date I can find no record of the submission of a pre-planning proforma in respect of a development under the title of '*Sutton St Edmund*'.

Notwithstanding the above, having reviewed the SR and, in particular, the site in question and can advise that the development might have a potential impact upon operations associated with Fenland Aerodrome and recommend that the developer open lines of communication with the aerodrome operator / licensee to establish the scale of any such

[1] These documents are available at http://www.bwea.com/pdf/Wind-Energy-and-aviation-interim-guidelines.pdf and http://www.caa.co.uk/docs/33/Cap764.pdf respectively. Please note that after a full review CAP 764 was re-issued on 12 February 2009.

Civil Aviation Authority
CAA House 45-59 Kingsway London WC2B 6TE www.caa.co.uk
Telephone 0207 453 6545 Fax 0207 453 6565 marks.smailes@caa.co.uk

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impact. All parties should be aware that aerodrome safeguarding responsibility rests with the aerodrome operator / licensee. Any related Environmental Impact Assessment (EIA), or equivalent, would be expected to acknowledge and quantify any potential impact upon the aerodrome-related operations and, where applicable, detail appropriate mitigation.

Similarly, the relative perspectives of both the Ministry of Defence (MoD) should be established by the developer and any related concerns addressed.

Additionally, if more generically, all parties should be aware that:

- There might be a need to install aviation obstruction lighting to some or all of the associated wind turbines should development proposals be progressed.

  This comment is made specifically if there were concerns expressed by other elements of the aviation industry, ie the operators. For example, if the MoD or a local aerodrome had suggested such a need, we the CAA (sponsor of policy for aviation obstruction lighting) would wish, in generic terms, to support such a claim. We would do so if it could reasonably be argued that the structure(s), by virtue of their location and nature, could be considered a significant navigational hazard. That said, if the claim was clearly outside credible limits (ie the proposed turbine(s) was/were many miles away from an any aerodrome or it/they were of a height that was unlikely to effect even military low flying) the Authority would play an 'honest-broker' role. Whilst responsibility for establishing further lighting related comment rests with the developer, I should highlight that, in isolation, the CAA would not make any related case or recommendation for aviation lighting.

- An anticipated amendment to international aviation regulatory documentation will require that the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study. It follows that the CAA advice on the colour of wind turbines would align with these international criteria. As with the potential need for lighting, in isolation, the CAA would make no special case for marking.

- There is a civil aviation requirement in the UK for all structures over 300 feet high to be charted on aviation maps. Should this development progress and the 300 feet height be breached, to achieve this charting requirement, developers will need to provide details of the development to the CAA and Defence Geographic Centre.

- The number of pre-planning enquiries associated with windfarm developments has been significant. It is possible that the proliferation of wind turbines in any particular area might potentially result in difficulties for aviation that a single development would not have generated. It is, therefore, not necessarily the case that, because a generic area was not objected to by the aviation industry, future, similarly located potential developments would receive the same positive response. There is a CAA perceived requirement for a co-ordinated regional wind turbine development plan, aimed at meeting renewable energy priorities, whilst addressing aviation concerns and minimising such proliferation issues.

- Due to the unique nature of associated operations in respect of operating altitudes and potentially unusual landing sites, it would also be sensible to establish the related viewpoint of local emergency services air support units.

Any associated EIA should mention and, where applicable, address the issues highlighted above.

Whilst none of the above negates the need, where applicable, for planning authorities to consult in accordance with ODPM / DfT Circular 1/2003, I trust that this information and guidance is of assistance. Please do not hesitate to contact me if you require further input or clarification of any point.

Yours sincerely

Mark Smailes
Off Route Airspace 5

Defence Estates

Claire Duddy
Assistant Safeguarding Officer

Safeguarding - Wind Energy
Defence Estates
Kingston Road
Sutton Coldfield
West Midlands
B75 7RL

Cyranne Taylor: 0121 311 2195
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Internet Site: www.defence-estates.MOD.uk

Mr David Robert
South Holland District Council
Council Offices
Priory Road
Spalding
Lincs
PE11 2XE

Your Reference: 1870.9
Our Reference: DE/C/SUT/43/10/1/6776

17 August 2009

Dear Mr Roberts

SCOPING REPORT – PROPOSED WIND FARM, SUTTON ST EDMUND, LINCS

Thank you for consulting the Ministry of Defence (MOD) on the scoping request with respect to the abov proposal.

The scheme outlined involves the construction of 4 free standing wind turbines with associated infra-structure. The turbines are expected to be 132 metres to blade tip above ground level.

The principal safeguarding concern of the MOD with respect to the development of wind turbines relates to their potential to create a physical obstruction to air traffic movements and cause interference to Air Traffic Control and Air Defence radar installations.

We were consulted by the developer at the pre-planning stage on 3 turbines at 125m to blade tip heigh and this identified no concerns. However, the scoping request is for 4 turbines at 132 metres, and w have subsequently identified the following concerns:

Air Traffic Control (ATC) radar

The turbines will be 47 km from; in line of sight to; and will cause unacceptable interference to the ATC radar at RAF Cottesmore. Following trials carried out in 2005, it has been concluded that wind turbines can affect the probability of detection of aircraft flying over or in the vicinity of wind turbines. Due to this, the RAF would be unable to provide a full Air Traffic Radar service in the area of the proposed wind farm

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Precision Approach Radar (PAR)

The turbines will be 36.5 km from; in line of sight to; and will cause unacceptable interference to the Precision Approach Radar (PAR) at RAF Wittering. In late 2008, the PAR at RAF Lossiemouth was repositioned to observe targets of opportunity over the Rothes wind farm. This has shown that wind turbines affect the detection of aircraft by the PAR. Due to this, the RAF would be unable to provide a ful air traffic service in the area of the proposed wind farm.

Currently, the MOD is not aware of any acceptable technical mitigation for the interference that will be caused to the PAR by your wind farm proposal. The MOD is currently working towards a full trial to bette understand the effects of wind turbines on the PAR. It is the aspiration of the MOD to have this work complete by the end of 2009. The unclassified results of these trials will be provided to the wind energy industry.

If the developer is able to overcome the issues stated above, we will request the turbines be fitted with aviation lighting.

Government guidance on renewable energy developments as set out in Paragraph 25 of Planning Policy Statement 22 stipulates that:

" ...It is the responsibility of developers to address any potential impacts, taking account of Civil Aviatio Authority, Ministry of Defence and Department for Transport guidance in relation to radar and aviation and the legislative requirements on separation distances, before planning applications are submitted Local Planning Authorities should satisfy themselves that such issues have been addressed before considering planning applications".

Accordingly the applicant should take account of MOD aviation and radar operations in completing the EIA particularly in identifying a suitable site for development and the dimensions of the turbines that are to be installed.

Defence Estates Safeguarding wishes to be consulted and notified of the progression of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.

I hope this adequately explains our position on this matter. If you require further information or would like to discuss this matter further please do not hesitate to contact me.

Yours sincerely

C. Duddy.

Claire Duddy
Assistant Safeguarding Officer – Wind Energy
Defence Estates

SAFEGUARDING SOLUTIONS TO DEFENCE NEEDS

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Lincolnshire Bat Group

Roberts, David

From: Annette Faulkner [a.faulkner@care4free.net]
Sent: 06 August 2009 15:04
To: Roberts, David
Subject: Scoping Report, Sutton St Edmund

David,

Thank you for sending me this document for comment.

I see that Natural England has already stated that a bat survey should be carried out, and I would of course endorse that. I would add that this is a remote area with few records, because of its location. I would suggest they request a data search for 5km round the site - as most company's are doing now - as part of their desktop study. This will provide a much better picture of the local bat population.

Lincolnshire Bat Group also holds a few records for Cambridgeshire.

Regards,

Annette Faulkner
Recorder
Lincolnshire Bat Group

Sutton St. James Parish Council

Roberts, David

From: COCKERTON, Jennifer [Jennifer.COCKERTON@eur.crowncork.com]
Sent: 07 August 2009 13:21
To: Roberts, David
Subject: Scoping Report - Proposed Windfarm, Sutton St Edmund, Lincolnshire

Dear Sir

Further to your letter of 13 July, please note the comments of this Parish Council as under:

Serious concerns expressed regarding the seemingly ever increasing and insidious infiltration of wind turbines and the effects not only on people and the environment generally but more specifically for wildlife protection, e.g. bats, barn owls. The only advantages appear to be to the pockets of landowners and some other interested parties.

Yours faithfully

Jennifer Cockerton
Clerk to Sutton St James Parish Council

Tel: (work) 01945 428397 / 428399
Fax: (work) 01945 428 360
mailto: jennifer.cockerton@eur.crowncork.com

Tel: (home) 01945 440652
Fax: (home) 01945 440 689
Sandy Gate Farmhouse, Sandy Gate
Sutton St. James, Lincs. PE12 0HG
mailto: parishclerk@suttonstjamespc.org.uk

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Environmental Health

Roberts, David

From: Krahmer, Rachel
Sent: 05 August 2009 10:25
To: Roberts, David
Subject: SCOPING REPORT-PROPOSED WINDFARM, SUTTON ST EDMUND

Dave
I refer to the scoping report regarding the 4 wind turbines at Sutton St Edmund. If the proposal is pursued I would ask that a comprehensive noise assessment is carried out in accordance with the recommendations and guidelines detailed in the 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97.
Rachel

1

Sutton St. Edmund Parish Council

Sutton St Edmund Parish Council has the following comments to submit on **Scoping Report – Proposed Windfarm, Sutton St Edmund, Lincolnshire:**

3. Potential Environmental Effects

3.1 Visual Amenity and Landscape Values

- Comparing the visual intrusion of 132m high turbines with the electricity pylons is nonsense. These turbines will be visible for over ten miles. The adjacent pylons are not.
- Occupants of local houses will have their "view screened by tall trees" This is just not true.
- The proposal is perhaps smaller in number, but the towers are taller.

3.2 *Recreation and Transport Routes*

- The roads to the proposed sites are all in poor condition now and will not carry the heavy loads required when building operations start. Will the highway authority insist that the developers pay for the upgrading of road network?
- In close proximity to the proposed development are some of the best and most used footpaths and bridleways in the Parish. It is well known that horses and turbines are not compatible.

3.3 Noise

- Whilst the council reserves judgement until it has had personal experience of the noise created by these large turbines this issue is of major concern to residents.
- Would a visit to a site with this size of turbine be available to the council?

3.4 Ecology

- The site is perhaps 10km. From the Nene Washlands, but it is less than 800metres from major watercourses that attract a wealth of bird life.

3.5 Flooding

- Council would like to draw attention to the fact that the proposed site is within the Unsuitable bracket of SHDC preferred area for wind turbine placement and is within the Environment Agencies Flood Risk Zone.

3.6 Duration and Reversibility of Effects

- Environmental effects are temporary and reversible, 32 years is nearly half the average human lifespan and in councils opinion can hardly be classed as temporary.



South Holland District Council Conservation Officer

date 13 July 2009
your reference
our reference 1870.19
ask for David Roberts
email droberts@sholland.gov.uk

SOUTH HOLLAND DISTRICT COUNCIL

Council Offices
Priory Road
Spalding
Lincolnshire PE11 2XE

tel: 01775 761161
fax: 01775 710772
www.sholland.gov.uk

Liz Mayle
Conservation Officer

PLANNING & DEVELOPMENT
24 JUL 2009

Dear Sir/Madam

Scoping Report – Proposed Windfarm, Sutton St Edmund, Lincolnshire

I am writing to inform you of a proposal to develop a 4 turbine (total capacity 13.2 MW) windfarm development near Sutton St Edmund, Lincolnshire. As the development falls within Schedule 2 of the Environmental Impact Assessment Regulations (1999), an environmental impact assessment (EIA) will be prepared and a request for a scoping opinion has been submitted to South Holland District Council.

As a result, we are undertaking a wider consultation exercise in order to:

(i) identify any additional key issues arising from the proposals;
(ii) agree the methods by which the impacts of the development will be assessed in the EIA;
(iii) define any scope for mitigation of these potential impacts;
(iv) gather any data or information that would help to inform the EIA process.

A copy of the scoping report for the proposed windfarm development is available for inspection at the Council Offices. If you wish to make any comments please do so by **8 August 2009.** - copy attached.

If you have any further queries at this stage, please do not hesitate to contact me.

Yours faithfully

David Roberts
Development Control Team Leader

Dave,
I recall there is a requirement for such documents to consider the impact upon the setting of Listed buildings. This will need to be added/considered properly. Ivanhoe House and Yarwood Hall come to mind as nearest, but should also check for SAMs, and also take landmarks some distance away from Sutton St. Edmund

Terry Huggins - Chief Executive
Andrew Petcher and Sarah Naylor -Corporate Directors

Appendix 5.4 - Public Exhibition Response Form

Treading Wind Farm
Comment Form

We would like to collect as many views as possible regarding our plans for the wind farm. We would appreciate you taking the time to complete the form below, and leaving it in the box provided.

Thank you for informing us of your views.

1. **Do you support onshore wind farms? Please tick.**

   Yes ☐ No ☐ Don't Know ☐

2. **Do you support the proposed Treading Wind Farm?**

   Yes ☐ No ☐ Don't Know ☐

3. **Do you have any specific questions about the proposals that you would like us to answer? (Please supply your contact details below)**

   .....

   .....

4. **If successful, Wind Ventures would establish a community trust fund. Are there any projects or clubs that you would like to bring to Wind Ventures' attention that could benefit? How could the benefit to the local community be maximised?**

   .....

   .....

5. **Do you have any additional comments you would like to make regarding the proposals?**

   .....

   .....

Please supply your contact details if you have any specific questions you would like us to answer.

NAME ..... TEL. NUMBER .....

ADDRESS .....

EMAIL .....

APPROXIMATE DISTANCE FROM THE PROPOSED SITE .....

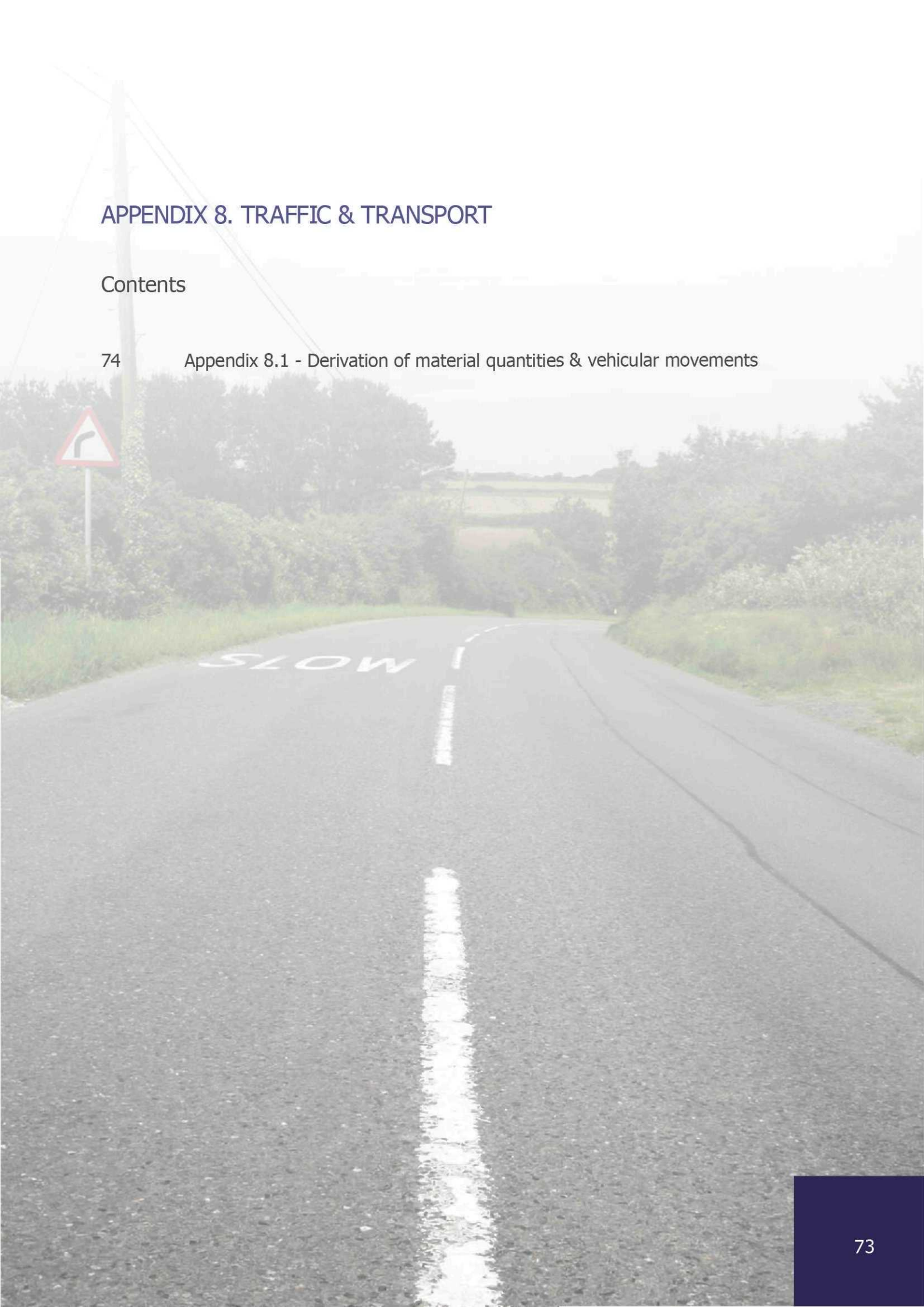
Any personal data relating to specific questions for the Wind Ventures team will be used solely in accordance with current UK data protection legislation and will not be disclosed to a third party without the individual's prior consent

Wind Ventures Limited
Brook Henderson House
37-43 Blagrave Street
Reading RG1 1PZ
Wind Ventures Limited. Registered office as above. Company Registration No: 06427282

APPENDIX 8. TRAFFIC & TRANSPORT

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Appendix 8.1 - Derivation of material quantities & vehicular movements

ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Access tracks	Stone	Imported stone for access track construction. Approximately 4.51km of access track will be constructed. Based upon a 5m track width and 4.5m running width, and 0.45m overall thickness, an overall volume of 9 141m3 is required. Allowing for a 10% contingency this equates to 10 100m3 or 18 100T (1.8T/m3). HGV movements assume 20T/HGV. This can be considered worst case given that upgraded tracks will require less material than new tracks.	20T	905	1 810
	Geo-grid	Assuming geogrid is supplied in 50m rolls, for 4.51km of access track, 91 rolls are required.	10 rolls	10	20
Hardstandings		To provide a hard surface for turbine erection cranage, a hardstanding area of approximately 45m x 25m (1 125m2) is required. Assuming a fill depth of 0.45m *this equates to a volume of 506m3 of stone per* turbine and a total volume for six turbines of 3 040m3. For a density of 1.8T/m3 this equates to 5 470T of stone.	20T	274	548

ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Cable trenches	Cable	The onsite electrical cables will follow the access tracks to the substation. An overall cable length of 4.51km is assumed. Given three-phase generation (3 cables per trench), 13.5km of cable is required. It is assumed that cable is delivered in 500m drums, equating to 28 drums.	8 drums	4	8
	Backfill sand	The electrical cabling will be protected by up to 0.25m of sand, prior to backfill from previously excavated arisings. With a trench width of 0.45m this equates to a volume of 508m3 or 813T (1.6T/m3).	20T	41	82
Soil arisings		Assuming a typical REpower MM92 foundation a volume of approximately 557m3 of soil will need to be removed and disposed of for each turbine equating to 3 340m3. Assuming wet soil (weight will therefore predominate over volume) and a density of 2T/m3 this equates to 6 680T. Note: top soil will be retained by the landowner for use on the farm.	20T	334	668
Temporary construction compound	Construction	For the 40m x 30m construction compound, assuming a 0.45m fill depth, a total of 540m3 of stone will be required. For a density of 1.8T/m3 this equates to 972T of stone.	20T	49	98
	Reinstatement	Removal of above.	20T	49	98

ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Substation	Foundation (x2)	The substation foundation dimension 6m x 5m (depth 0.9m) would require 27m^3 of concrete (to include for a 0.6m plinth as specified through the Flood Risk Assessment).	8m^3	8	16
	Building (x2)	The specification for the substation has not been finalised as this will be designed to suit the grid connection option which is determined post-consent. It has been based on a conservative estimate that the substation (including equipment) will be delivered in fifteen loads.	-	30	60
Plant and equipment		General plant and equipment will be required to construct the wind farm. This will include diggers, earth movers, cable trench diggers, and site office, welfare and storage facilities and fencing associated with the temporary construction compound. A total of 30 deliveries have been assumed, and therefore 30 removals at the end of the construction process.	-	60	120

ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Turbine foundations	Rebar	The foundation for the REpower MM92 (80m hub) requires 35T of reinforcement steel. This equates to 210T for the six wind turbines.	20T	11	22
	Concrete	The foundation for the REpower MM92 (80m hub) requires 301m^3 concrete. This equates to 1 810m^3 for the six wind turbines. Each base needs to be poured in one day (38 single trips). Pouring days will be non-consecutive.	8m^3	228	456
	Foundation embedments	The foundation embedments which will provide the means to bolt the turbine to the foundation have a mass of 11.4T. Six sets of embedments are required.	20T	6	12
Crane		A leading and a secondary trailing mobile crane will be required to offload and undertake turbine erection. These will be delivered in up to 18 HGV loads, and removed from site in up to 18 HGV loads.	-	18	36

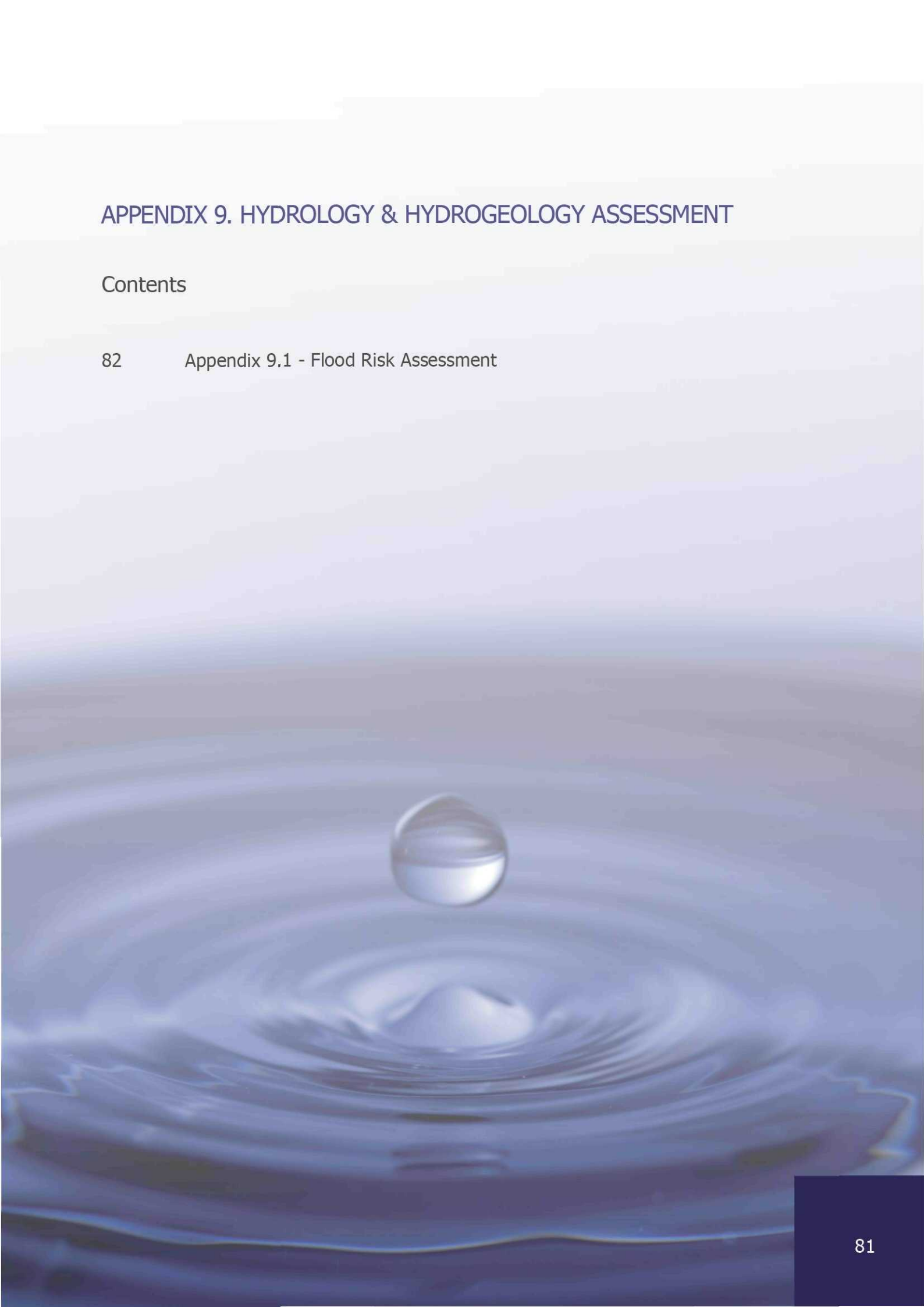
ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Meteorological Mast	Rebar	The foundation for a typical 80m fixed lattice mast (based upon Carl C Mast) requires 2.6T of reinforcement steel.	Included in turbine rebar deliveries		
	Concrete	The foundation for a typical 80m fixed lattice mast (based upon Carl C mast – 6.3m x 6.3m x 0.5m plus upstands) requires 19.85m^3 of concrete.	8m^3	3	6
	Mast	Including foundation embedments, 1 load is envisaged.	Up to 16T	1	2

ACTIVITY		DESCRIPTION	ASSUMED LOAD PER DELIVERY	APPROX SINGLE TRIPS	TOTAL MOVE-MENTS
Wind turbine components	Tower sections	Three tower sections are required per turbine. For six turbines this equates to 18 deliveries.	62.5T max	18	36
	Nacelles	Six nacelle deliveries are required.	72T	6	12
	Hubs	Six hubs are required.	18.9T	6	12
	Blades	Three blades per turbine are required, amounting to 18 deliveries.	8T	18	36
	Controllers	One controller is required per turbine, and it is assumed that three will be transported to site at a time on a standard HGV.	6T	2	4
	Transformers	One electrical transformer is required per turbine accompanied by its associated switchgear. This equates to 9.6T per turbine, and it is assumed that one HGV will deliver two transformers and associated equipment.	19.2T	3	6
TOTAL Road Deliveries				**2 088**	**4 176**

APPENDIX 9. HYDROLOGY & HYDROGEOLOGY ASSESSMENT

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Appendix 9.1 - Flood Risk Assessment

Treading Proposed Wind Farm

PPS25 Flood Risk Assessment

engena

December 2010
SLR Ref: 405.2350.00003

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DRAWINGS

Drawing No. 1	**Site Location and Local Hydrology with Proposed Layout**

APPENDICES

Appendix A	**Flood map provided by EA (scale as shown)**
Appendix B	**Model Node Locations provided by the EA (scale as shown)**
Appendix C	**Anglian Water Service Plans (scale as shown)**

1.0 INTRODUCTION

1.1 Context

SLR Consulting Limited (SLR) has been appointed by Engena to undertake a Flood Risk Assessment (FRA) with regards to the proposed wind farm development near Sutton St Edmund, Cambridgeshire.

This report has been prepared in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25)[1] to support a planning application for the proposed development.

This FRA draws upon recent dialogue and correspondence with staff at the Environment Agency (EA) Lincoln office and North Level District Internal Drainage Board.

1.2 Site Location and Features

The site is located at NGR TF 390 131, approximately 6km north-west of Wisbech, Cambridgeshire (as detailed in Drawing No.1). Situated on agricultural land approximately 800m east of Sutton St. Edmund, the site is dissected and bordered by a number of North Level Internal Drainage Board field drains. These include Treading Drain flowing west to east through the centre of the site. The North Level Main Drain lies approximately 300m south-east of the site. The majority of the site drains to the Poplars pumping station adjacent to Poplartree Farm near the eastern corner of the site which comprises two pumps with a capacity of 0.8m^3/sec each[2]. Water is pumped by the pumping station to the North Level Main Drain, which is then pumped a second time by the Tydd Pumping Station before finally outfalling into the River Neve at Foul Anchor, Wisbech, a tidally influenced section of the watercourse[3].

Ground levels are generally flat at an elevation of approximately 0mAOD (see Drawing No. 1.

1.3 Development Proposals

It is proposed to construct 6 turbines across the centre of the site and a substation and construction compound in the north east of the site. A number of site access road will be required, however, the scheme has been designed to minimise the construction of new roads and to use existing roads where possible. A number of upgrades are proposed to some roads. Access to the site will be as currently via Cross Drove along the north eastern site boundary. All access tracks will be constructed using inert hardcore placed over a semi-permeable membrane.

Full details of the proposed development are provided within Drawing No. 1.

---

[1] Planning Policy Statement 25 (PPS25): Development and Flood Risk, December 2006, Communities and Local Government

[2] http://www.northlevelidb.org/catchments.html , accessed April 2010.

[3] Written correspondence with North Level District Internal Drainage Board, Paul Sharman, 13 May 2010 (IDB Ref: PDS/KLJ)

1.4 Flood Zone Classification

Based on the Flood Zone Maps as replicated in Figure 1 below, published by the EA, the site is shown to lie within 'high risk' Flood Zone 3a (which represents an annual probability of 0.5% of a flood occurring in any one year). Further detailed assessment of the flood risk to the site is provided in Section 2.1.



Figure 1-1
EA Flood Zone Map (accessed May 2010)

1.5 Flood Risk Compatibility Flood Risk Vulnerability and Compatibility

Table D.2 of PPS25 sets out that the proposed development is designated as an 'Essential Infrastructure', appropriate in Flood Zone 3a when the Exception Test can be shown to be passed, as detailed in Table 1-1.

Table 1-1
Table D.3 of PPS25

Flood Risk Vulnerability Classification (PPS25 Table D.2)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (PPS25 Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	X	Exception Test Required	✓
	Zone 3b	Exception Test Required	✓	X	x	x

Key: ✓ Development is appropriate x Development should not be permitted

1.6 Sequential Test & Exception Tests

According to PPS25 the Sequential Test gives preference to locating new development in Flood Zone 1. If there are no reasonably available sites in Flood Zone 1, the flood vulnerability of the proposed development can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3.

The PPS25 Companion Guide[4] states that the Sequential Test should not be applied to proposals for new wind turbines (paragraph 4.39). Furthermore due to the requirements of PPS22[5], wind turbine developments should also not be subjected to the second part of the Exception Test. The remaining elements of the Exception Test (as detailed below from Annex D, paragraph D9 of PPS25) are required to be met for wind turbine developments within Flood Zone 3a:

a. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by the Strategic Flood Risk Assessment (SFRA) where one has been prepared. If the Development Plan Document (DPD) has reached the 'submission' stage – see Figure 4 of *PPS12: Local Development Frameworks* – the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal;

b. Not applicable to this development; and

c. A FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Parts a and c of the Exception Test are considered to have been passed as detailed below:

[4] Planning Policy Statement 25 Development and Flood Risk Practice Guide, Updated December 2009, Communities and Local Government

[5] Planning Policy Statement 22 (PPS22): Renewable Energy, August 2004, Office of the Deputy Prime Minister

Part a: With respect to the sustainability benefits, Chapter 17 of the Environmental Statement (ES) provides details of the Socio-Economic benefits of the proposed scheme. In summary:

- Diversity of supply reducing reliance on imported electricity and fossil fuels;
- Electricity Production: Based upon the parameters described in the ES, the development would generate 27 200MWh of electricity, meeting the equivalent average annual electricity needs of 5,540 Fenland homes.
- Energy Balance: After 9.6 months of operation, the Treading Wind Farm would be energy neutral – all of the energy used in its lifetime through development, manufacture, construction, operation, future operation and future decommissioning and disposal will have been offset.
- Air Pollutants: Treading Wind Farm will produce no emissions at source and the proposed wind farm will have no effect on local air quality.
- Offsetting Emissions: The generation of electricity from the wind farm will offset electricity generated from other sources, avoiding significant quantities of Carbon Dioxide emissions as well as other pollutants.
- Community Benefits: Whilst not a material consideration in the planning process, the development will bring significant benefit to the local community through a package of community benefits to be provided by the developer, Wind Ventures.
- Employment: Should the site be consented, the construction of Treading Wind Farm would have the potential to benefit the local economy through the award of construction contracts and associated sub-contracts.

Chapter 2 of the ES discusses the rationale behind the development of the proposed wind farm, not least the contribution the site will make to national targets for renewable energy - including the United Kingdoms EU obligations of 15% of energy to be derived from renewables by 2020, and the increase of the Renewables Obligation to deliver 30% renewable energy (from electricity) by 2020. Treading Wind Farm alone will contribute the equivalent average annual electricity needs of 15.7% of Fenland District's homes.

Part c: This report forms the Flood Risk Assessment for this development.

2.0 SOURCES OF INFORMATION

2.1 Flood Zone Map and Flood Defence Data

Information regarding the current flood risk at the application site and local flood defences has been obtained from the EA website[6] and directly from the EA Lincoln office[7].

2.1.1 Flood Zone Map

The EA internet-based Flood Zone Maps show the site to be within Flood Zone 3a.

The EA have also provided a more detailed flood map (see Appendix A) which confirms the site is located within Flood Zone 3a associated with the River Nene.

2.1.2 Tidal Flood Levels

The EA have confirmed the site is located within the tidal floodplain of the River Nene. Tidal flood levels have also been provided from an extract of the Northern Area Tidal Model Analysis carried out in 2006. These flood levels are replicated in Table 2-1 below with the model node locations detailed in Appendix B.

Table 2-1
Tidal Flood Level Data near Site

Model Node	Easting	Northing	Flood Annual Probability, % (flood water level, mAOD)							
			100	10	4	2	1	0.5	0.5 + CC	0.1
West Lighthouse	549150	325750	4.88	5.37	5.57	5.71	5.86	6.01	6.17	6.35
Wisbech	***546100***	***310000***	***4.83***	***5.25***	***5.41***	***5.53***	***5.66***	***5.78***	***5.94***	**-**
Dog in a Doublet	527300	599300	3.67	4.00	4.13	4.22	4.32	4.42	4.58	-

Notes
1. Climate change allowance has been calculated using Table B.2 of PPS25 assuming a development life span of 35yrs (including a planning and construction period of 5 yrs).
2. Node highlighted in bold italics is closest modelled location to the site.

2.1.3 Flood Defences

River Nene Tidal Flood Defences

The River Nene is shown to be contained by earth embankment flood defences. These are considered to be in a fair to good condition and provide protection against a 0.5% annual probability flood event. The EA have also confirmed the flood defences are inspected on a regular basis to ensure this level of protection is maintained.

[6] http://www.environment-agency.gov.uk/maps

[7] Letter correspondence with EA, John Ray, External Relations (EA Ref. CCN-2010-23882)

North Level Main Drain Fluvial Flood Defences

The North Level Main Drain is protected by defences maintained by the North Level District Internal Drainage Board (IDB) which offer protection up to a 2% annual probability flood event[3].

A site visit carried out on 7 June 2010 confirmed the watercourse is not protected behind raised defences as shown in Figure 2-1 below. Instead the near site land is defended by a series of pumping stations (Figure 3-1) and flow gauging stations (see Figure 2-2) which control water levels throughout the system.



Figure 2-1
Looking South West Along Main Drain from Poplars Pumping Station



Figure 2-2
Flow Gauging Station (near Chestnut House)

2.2 Historic Flooding

The EA and IDB have no records of historic flooding affecting the application site.

An internet search was conducted and did not find any instances of flooding in the area.

2.3 Strategic Flood Risk Assessment

Peterborough City Council have published a Stage 2[8] Strategic Flood Risk Assessment (SFRA) in 2005 and followed this with an updated Level 1[9] report in 2008. South Holland District Council has also undertaken a SFRA[10], updated in 2010. These SFRAs confirm the site is within land principally managed by the IDB and is shown to be within Flood Zone 3a.

2.4 Topographic Data

Topographic data is provided within Drawing No. 1. This data confirms ground levels are generally at 0mAOD and flat.

2.5 Geological Data

The 1:50,000 geological survey map[11] for the area indicates that the site is underlain by several metres of Flandrian marine alluvium, the Barroway Drove Beds. These deposits consist of mainly soft, silty clays with numerous root traces which were deposited as part of a salt marsh. These drift deposits overlie rocks of the Jurassic Corallian Group which comprise undifferentiated mudstones of the West Walton Beds and the Ampthill Clay.

2.6 Sewer and Water Main Records

Anglian Water (AW) service plans confirm that there are no sewer utilities within the area. AW has confirmed they are the service provider in this area.

Potable water utilities are owned and operated by AW. These pipes follow the Cross Drove road along the north-eastern site boundary and Broad Drove West along the northern site boundary. None of the services are within 100m of any turbine locations. Appendix C details the AW service plans.

[8] Peterborough SFRA Stage 2 Report, Royal Haskoning, November 2005

[9] Peterborough Strategic Flood Risk Assessment Update - Level 1 Report, Royal Haskoning, January 2008

[10] South Holland District Council Update if Strategic Flood Risk Assessment, Royal Haskoning, January 2010

[11] British Geological Survey Sheet 158: Peterborough, 1:50,000 scale

3.0 FLOOD RISK ASSESSMENT

3.1 Flood Risk Assessment Methodology & Objectives

It is recognised that developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk[12] identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- the development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;
- the development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, are threatened;
- normal operation of the development should not be susceptible to disruption as a result of flooding;
- safe access to and from the development should be possible during flood events;
- the development should not increase flood risk elsewhere;
- the development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- the development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- future users of the development should be made aware of any flood risk issues relating to the development;
- the development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- the development should not lead to degradation of the environment; and
- the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

This Flood Risk Assessment is undertaken with due consideration of these sustainability aims, and has been prepared to inform the proposed scheme.

3.2 Project Scope

In order to achieve the aims outlined above, a staged approach has been adopted in undertaking this Flood Risk Assessment, in accordance with current best-practice guidance (e.g. PPS25, the SuDS Manual etc.). A screening study has initially been undertaken to

[12] CIRIA, 2004, Funders Report CP/102 Development and Flood Risk – Guidance for the Construction Industry.

identify whether there are any potential sources of flooding at the site which may warrant further consideration. Any potential flooding issues identified in the screening study have subsequently been considered in a scoping study. The aim of the scoping study is to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere.

The report has been undertaken with due regard to the EA's National Standing Advice on Development and Flood Risk[13].

3.3 Level 1 – Screening Study

All potential sources of flooding must be considered for any proposed development. A summary of the potential sources of flooding and a review of the potential risk posed by each source at the application site is presented in Table 3-1.

Table 3-1
Potential Risk Posed by Flooding Sources

Potential Source	Potential Flood Risk to Application Site?	Reasoning for Decision
Fluvial/Tidal flooding	Yes	The site is located within Flood Zone 3a associated with the River Nene with the North Level Main Drain, a tributary of the watercourse, located approximately 300m south-east of the site.
Flood Defence Breach (Failure)	Yes	The River Nene is protected by structural flood defences.
Flooding from rising / high groundwater	No	The site is underlain by relatively impermeable silty clay drift deposits. Underlying solid geology is noted to be relatively impermeable also.
Overland flow flooding	No	Site is shown to be within a large flat plain.
Flooding from artificial drainage systems	No	Anglian Water distribution mains do not run underneath the site.
Flooding due to infrastructure failure	Yes	IDB Pumping Stations are operated near the site.

Further discussion of all sections shown in Table 3-1 to be a potential risk to the application site are provided in Section 3.7 below.

3.4 Level 2 – Scoping Study

Following the Level 1 screening study additional information has been gathered in order for an experienced SLR hydrologist to further assess the flood risk at site.

[13] Environment Agency, February 2009, Flood Risk Standing Advice to Local Planning Authorities - PPS25 (national) version 2.

3.5 Technical Assessment of Flood Risk

3.5.1 Tidal Flooding

The primary flood risk to this site is associated with the River Nene which is tidally influenced within the region of the site. Information provided by the EA has confirmed that the River Nene is protected by flood defences which provide protection against flood events up to a 0.5% annual probability, or 5.78mAOD within the Wisbech area. Any flood event greater than this would result in the flood defences being overtopped, therefore when the effect of climate change is incorporated these flood defences could be overtopped by 0.16m of flood water. Due to the distance of the site from the River Nene, in excess of 5km, the encroachment of floodwater following overtopping of the defences is unlikely to pose a significant risk to the site as the resultant flood depth would be very shallow, if flood waters reached the site at all.

3.5.2 Fluvial Flooding

The North Level Main Drain flows easterly approximately 400m south of the site. This watercourse is noted to provide protection for events up to a 2% annual probability flood event. Several IDB drains also cross the application site. Some localised flooding may occur during extreme flood events from any of the drainage channels within the vicinity of the site. In the event that the design capacity of the drains at site is exceeded then shallow flooding may occur near to the drains.

3.5.3 Infrastructure Failure

Water is moved around the IDB drainage network via a combination of gravity fed drainage channels and pumping stations. The application site is within the catchment of the Poplars Pumping Station (see Figure 3-1) which has two pumps with a combined capacity of 1.6m^3/s. This pumping station was constructed in 1979 and refurbished in 2006. Water is then pumped a second time by the Tydd Pumping Station, which has six pumps with a combined capacity of 20.17m^3/s, before flowing under gravity to the River Nene.

Both pumping stations use multiple pumps and so in the event a pump breaks down, although the capacity would be reduced, the pumping stations would still be operating and therefore the likelihood of substantial flooding is significantly reduced. In the extreme event that all pumps at each pumping station completely fail there is the possibility that extensive shallow flooding could occur. The likelihood of this extent occurring is considered very small.



Figure 3-1
Inflow from Treading Drain to Poplars Pumping Station

3.5.4 Offsite Impact: Floodplain Displacement

The site is located within the tidal flood risk area (defended by raised defences east of the site) and as such floodplain compensation is not required.

3.5.5 Off-Site Impact: Surface Water Runoff

At present surface water runoff naturally drains into the ground or into field drains onsite. Without mitigation increased surface water runoff from the proposed development may pose an increased flood risk to off-site areas. Mitigation measures are set out in Section 4.

3.6 Residual Risks

3.6.1 Flood Defence Breach: River Nene Tidal Flood Defences

The primary residual flood risk associated with the site is a breach (failure) of the existing River Nene flood defences or North Level Main Drain flood pumping infrastructure coinciding with significant storm conditions.

Following a breach of the defences the depth of flooding at the site has the potential to be significant as current ground levels (approx 0mAOD) are approximately 6m below the 0.5% annual probability tidal flood level at the flood defences including the impacts of climate change (5.94mAOD).

It should be noted, however, that in reality, 'post-breach' water levels at the site would be significantly lower than tidal flood levels at the defences due to:

- distance of the site from the defences (in excess of 5km inland);
- rates of ingress through the defences being limited by the size of the breach in the flood defences;

- due to the lowering effect on 'post-breach' water levels from the large volume of flood storage available behind the defences on adjacent low lying land; and

- temporary repair of the breach.

It is noted that the site will be unmanned after construction and therefore the risk to life is not deemed to be significant.

Shallow surface flooding could occur in areas of the site should the IDB pumping infrastructure fail.

4.0 PROPOSED MITIGATION MEASURES

The proposed development will not alter the hydraulic characteristics of the local watercourses and the site topography will not be lowered, therefore the flood risk to the site will remain unchanged pre- and post-development. It is recognised that construction of the turbine bases requires excavation into the soils and superficial drift deposits.

The following measures have been taken into account during evolution of the development proposals in order to manage flood risks at the site (subject to IDB and EA approval).

4.1 Flood Resilience Measures

In order to mitigate the risk of vulnerable equipment being damaged during a flood event the following measures would be incorporated into the proposed scheme:

- the electricity substation should be raised upon a concrete plinth. The proposed plinth platform level should be set at a minimum of 600mm above existing local ground levels;
- all concrete foundations associated with wind turbines should be located underground to ensure surface flow paths are not impeded in the event of a flood;
- appropriate flood proofing / water proofing measures should be incorporated to the bottom 600mm (minimum) of the wind turbines to ensure electrical safety; and
- any new access tracks required should be constructed to existing ground levels and of permeable material.

4.2 Siting of Built Development

The IDB have specified minimum stand-offs for development from local watercourses to ensure long-term access is available for maintenance of watercourses of 9m from all IDB owned and maintained drains and watercourses.

A number of the marsh drain watercourses could potentially be affected by the construction of access tracks across the drains. Prior to any construction works being undertaken it is confirmed that appropriate consent would be obtained from the IDB, and EA where appropriate, to ensure that the crossings do not locally increase flood risk.

4.3 Flood Warning System & Evacuation Plan

Due to the nature of the proposed development, (electricity generation) to maintain safe working practices it is proposed that the site operator subscribes to the EA 'Floodline' and Automatic Voice Messaging (AVM) services. This will help to act as an early warning system in the event of potential flood conditions arising. These proposals are in line with the Defra/EA document entitled Flood Warning Dissemination Technologies[14].

A temporary construction compound will be provided during the construction and decommissioning phases. In consultation with the EA and LPA it is proposed that prior to any construction works on site a site evacuation/flood management plan is agreed.

[14] Flood Warning Dissemination Technologies R&D Technical Report – FD2202/TR, Defra/Environment Agency Flood and Coastal Defence R&D Programme, May 2004

4.4 Safe Route of Access / Egress

This development does not increase the number of occupants in the floodplain as the site will be unmanned after construction. Consequently, safe access and egress is not required. It is noted, the site is defended by tidal and fluvial flood defences thus safe access/egress would be available for all but the most severe conditions.

4.5 Hydrostatic and Hydrodynamic Resistance

To assess the durability and robustness of the proposed development, hydro-static and hydro-dynamic calculations should be undertaken by a qualified Structural Engineer in conjunction with a qualified hydrologist to establish the external forces the proposed turbines would have to withstand in the event of a flood defence breach occurring.

Structural loadings fall outside the remit of a FRA and details should be agreed with the local authorities prior to commencement of construction.

4.6 Site Drainage

PPS25 recognises that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through development can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the development site.

Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage. This section considers the existing drainage system at the application site and potential impacts resulting from the proposed re-development.

4.6.1 Existing Drainage System

The application site currently comprises agricultural land drained by a network of artificial land drains many of which are maintained by the IDB which drain to the North Levels Main Drain from where they are pumped via the Poplars and Tydd Pumping Stations to the River Nene.

4.6.2 Additional Runoff

It is recognised that the development of the application site could increase the impermeable area coverage and in turn, both the total and the peak flow of surface water runoff from the site. The potential impacts of development on the surface water runoff regime of an area can be summarised as:

- increased runoff from reduced permeability surfaces;
- decreased baseflow because of reduced recharge to groundwater;
- reduced times to peak flow, changing the timing and regime of runoff from the catchment, making the catchment more sensitive to short duration storms; and
- changes in critical season – rural catchments tend to flood after long winter storms whilst urban sites tend to be more at risk from short, heavy storms which generally occur in summer.

Review of the proposed development plans confirms that changes in land use as a result of the development are limited to the following:

- permeable new site tracks, formed of granular material, linking proposed infrastructure; and
- impermeable surfaces associated with turbine and met mast foundations, site compound buildings (temporary) and the sub-station foundation.

It is recognised that the replacement of the superficial deposits with permeable granular material used in access track construction will not affect the proportion of incident rainfall that forms surface water runoff. Due to the flat topography at the site the tracks (and underground cables) will not act as preferential drains. Therefore, it is considered that these features will not have a detrimental impact on surface water runoff or increase flood risk elsewhere and are consistent with the sustainable drainage development aims detailed in the SuDS Manual[15].

The area of proposed roof/hardstanding associated with the substation is very small. It is therefore considered that runoff from these areas can be effectively managed by drainage of water to local soakaway.

[15] CIRIA, 2007, The SUDS Manual, CIRIA Report C697

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary

This appendix represents a FRA in support of the proposed wind farm, near Sutton St Edmund.

Based upon the EA's Flood Zone Maps, the entire site is shown to lie within 'high probability' Flood Zone 3a which represents an annual probability of 0.5% or less of a tidal flood occurring in any one year, without taking into account the presence of flood defences for the River Nene. The site is also noted to be approximately 300m north of the North Levels Main Drain

The primary flood risk associated with the site is the fluvial flood risk relating to drains falling to the North Levels Main Drain coinciding with significant storm conditions. Appropriate mitigation measures have been proposed.

Floodplain compensation is not required due to the tidal nature of the flood risk.

At present surface water runoff naturally drains into the ground or into marsh drains within the vicinity of the site. Without mitigation increased surface water runoff from the proposed development may pose an increased risk to off-site areas.

Review of the proposed development plans confirms that changes in land use as a result of the development are limited to the following:

- permeable new site tracks, formed of granular material, linking proposed infrastructure; and
- impermeable surfaces associated with turbine foundations, site compound buildings (temporary), and sub-station foundation.

It is considered that the new site tracks will not affect the proportion of incident rainfall that forms surface water runoff and therefore will not have a detrimental affect on surface water runoff or offsite flood risk.

The area of proposed roof/hardstanding associated with the substation and site compound is very small. It is considered that runoff from these areas can be effectively managed by drainage of water to local soakaway.

5.2 Conclusions

The nature of the land use has been shown to provide wider sustainability benefits to the community that outweigh flood risk and the FRA demonstrates that flood risk issues at this site are manageable and that future site occupants can be safeguarded for the lifetime of the development. Therefore it is considered the requirements of the Exception Test as detailed in Section 1.6 are met.

The site is duly presented as being sustainable in terms of flood risk, subject to proposed mitigation measures (see Section 4.0) being implemented.

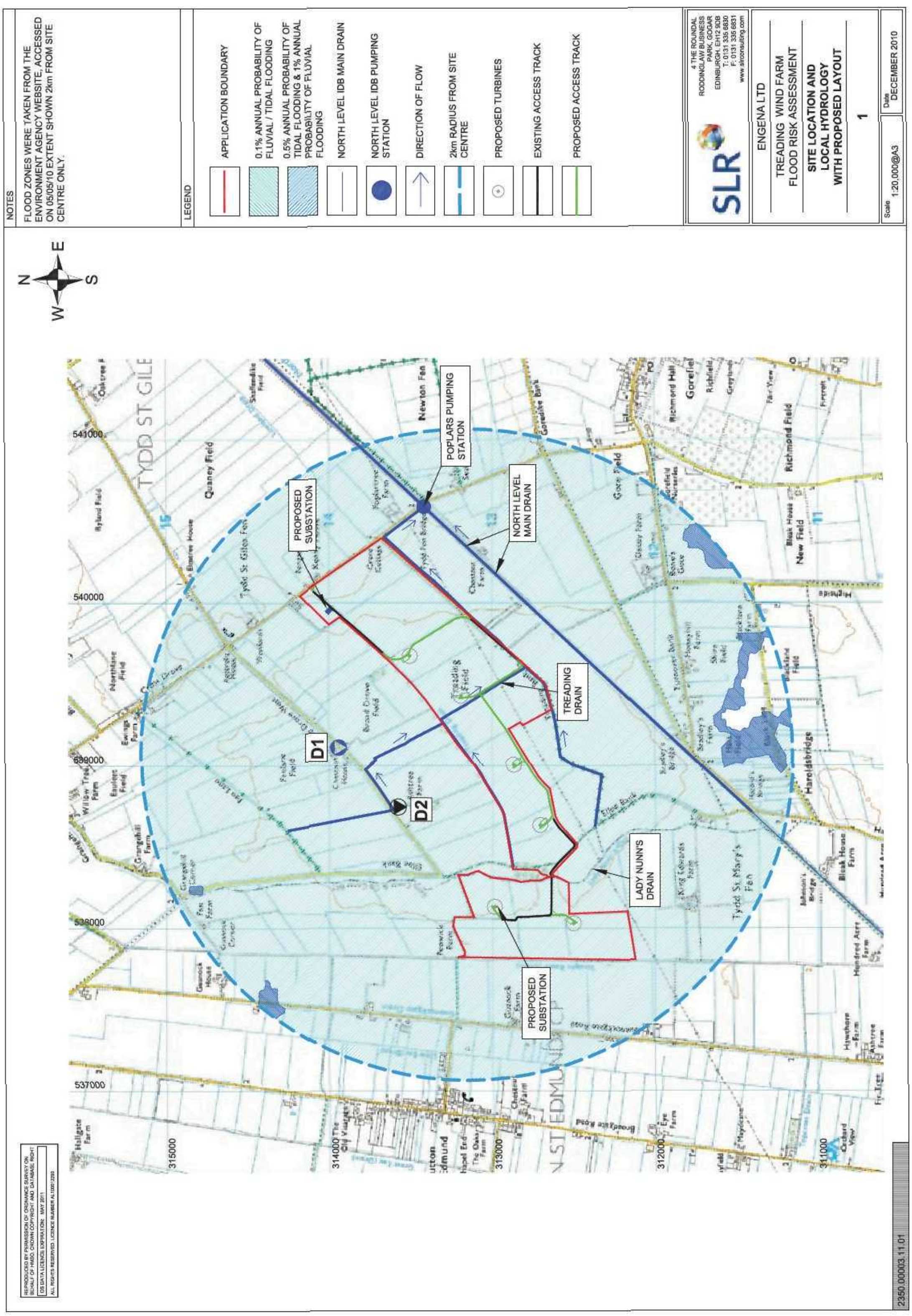
6.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Engena; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

DRAWINGS


NOTES
FLOOD ZONES WERE TAKEN FROM THE ENVIRONMENT AGENCY WEBSITE, ACCESSED ON 05/05/10 EXTENT SHOWN 2km FROM SITE CENTRE ONLY.
LEGEND
APPLICATION BOUNDARY
0.1% ANNUAL PROBABILITY OF FLUVIAL / TIDAL FLOODING
0.5% ANNUAL PROBABILITY OF TIDAL FLOODING & 1% ANNUAL PROBABILITY OF FLUVIAL FLOODING
NORTH LEVEL IDB MAIN DRAIN
NORTH LEVEL IDB PUMPING STATION
DIRECTION OF FLOW
2km RADIUS FROM SITE CENTRE
PROPOSED TURBINES
EXISTING ACCESS TRACK
PROPOSED ACCESS TRACK
SLR
4 THE ROUNDAL, RODDINGLAW BUSINESS PARK, GOGAR EDINBURGH, EH12 9DB
T: 0131 335 6830
F: 0131 335 6831
www.slrconsulting.com
ENGENA LTD
TREADING WIND FARM FLOOD RISK ASSESSMENT
SITE LOCATION AND LOCAL HYDROLOGY WITH PROPOSED LAYOUT
1
Scale 1:20,000@A3
Date DECEMBER 2010
PROPOSED SUBSTATION
POPLARS PUMPING STATION
NORTH LEVEL MAIN DRAIN
TREADING DRAIN
LADY NUNN'S DRAIN
D1
D2
TYDD ST GILES
541000
540000
539000
538000
537000
315000
314000
313000
312000
311000
2350.00003.11.01

APPENDIX A

Flood Map

Map centred on Broad Drove West, Sutton St Edmund - created May 2010 [Ref CCN-2010-23882]



Environment Agency

Scale 1:20,000

- Main River
- Raised Defences
- Flood Storage Areas
- Area at Risk of Flooding from Rivers or The Sea
- Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.

- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

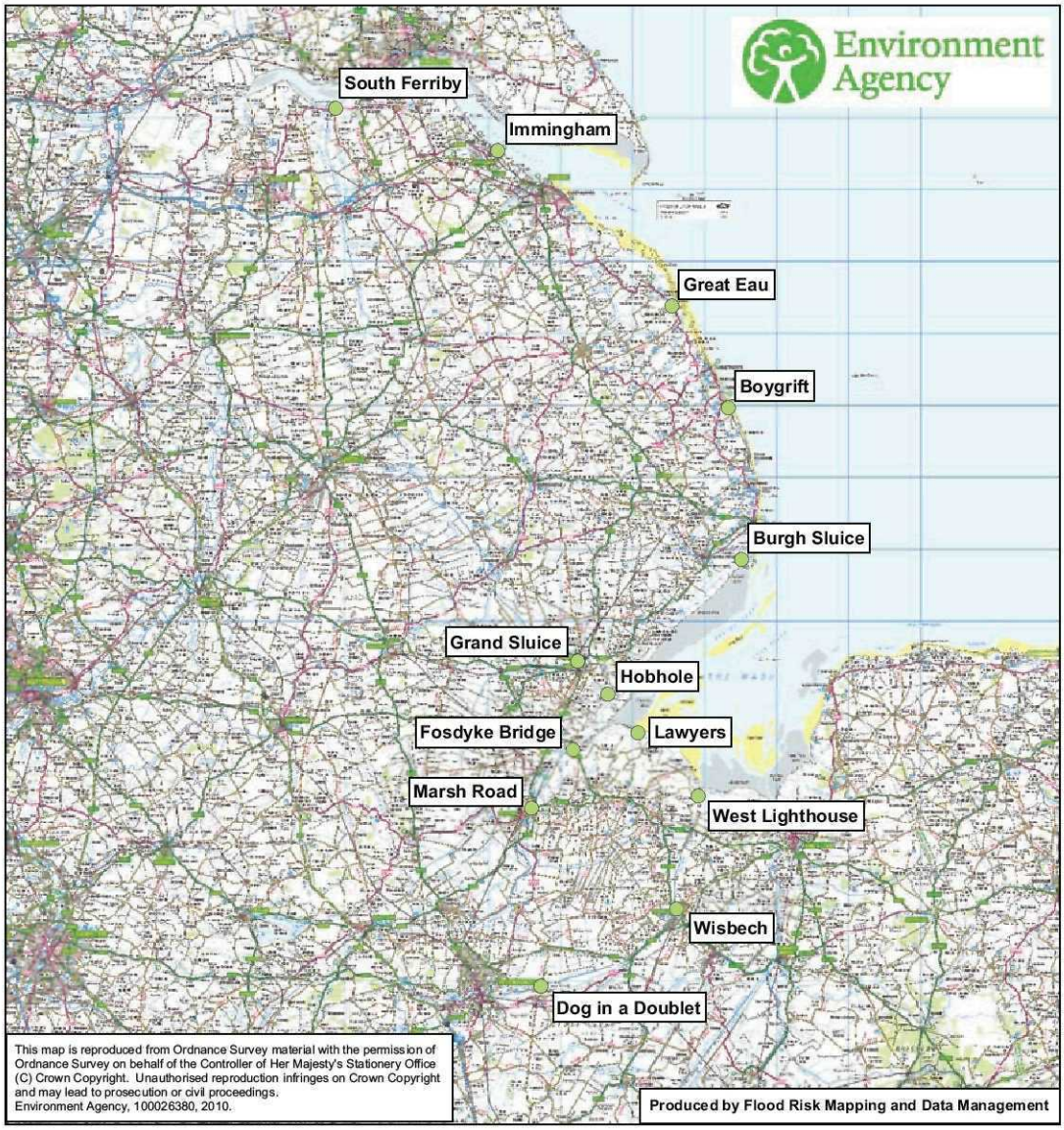
These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Flood Risk Mapping & Data Management Team, Lincoln

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

APPENDIX B



Tidal Levels mODN - based Northern Area Tidal Model Analysis 2006

Location	Easting	Northing	100% (1 in 1)	10% (1 in 10)	4% (1 in 25)	2% (1 in 50)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)
South Ferriby	498772	421418	4.90	5.29	5.45	~	~	5.55	5.63
Immingham	521381	415464	4.08	4.49	4.65	4.76	4.88	5.05	5.34
Great Eau	545500	393800	3.80	4.19	4.34	4.46	4.57	4.69	4.96
Boygrift	553300	379800	3.84	4.24	4.41	4.53	4.65	4.77	5.05
Burgh Sluice	555190	358620	4.26	4.45	4.63	4.76	4.90	5.03	5.34
Hobhole	536610	339940	4.82	5.30	5.49	5.64	5.78	5.93	6.27
Lawyers	540750	334550	4.84	5.32	5.51	5.66	5.80	5.95	6.29
West Lighthouse	549150	325750	4.88	5.37	5.57	5.71	5.86	6.01	6.35
Grand Sluice	532400	344500	4.88	5.33	5.51	5.65	5.78	5.93	~
Fosdyke Bridge	531700	332200	4.91	5.38	5.56	5.71	5.85	5.99	~
Marsh Road	526000	324000	5.04	5.44	5.60	5.73	5.85	5.98	~
Wisbech	546100	310000	4.83	5.25	5.41	5.53	5.66	5.78	~
Dog in a Doublet	527300	299300	3.67	4.00	4.13	4.22	4.32	4.42	~

APPENDIX C


Tydd St Giles Fen
Broad Drove Field
Fenlake Field
Tydd St Giles Fen
Broad Drove Field
Tydd St Giles Fen
Fenlake Field
Tydd St Giles Fen
Eskdale Field
Fenlake Field


Fingate Field
Broad Drove Field

APPENDIX 10. LANDSCAPE AND VISUAL ASSESSMENT

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Appendix 10.1 - Methodology and Glossary

Appendix 10.1:

Glossary & Abbreviations and Methodology

E4environment Ltd
December 2010

Glossary

For documents referred to below, see list of references at the end of Appendix.

Term	Definition
Additional cumulative effects	Predicted incremental changes to the landscape and visual baseline as a result of a proposed development(s) in the context of operational, and/or permitted developments.
Array width	The horizontal width of the view (in degrees) occupied by the turbine array (calculated from the far right turbine to the far left turbine visible).
Combined cumulative effects	Predicted changes to the landscape and visual baseline as a result of two or more proposed developments, where the effects are the result of more than one of the proposed developments. Effects that arise as a result of one of the proposed developments only would not be cumulative.
Cumulative landscape and visual impact assessment (CLVIA)	An assessment of likely significant cumulative effects on landscape and visual amenity arising as a result of a development(s) in the context of existing, permitted and/or other proposed developments, undertaken in accordance with the GLVIA (LI/IEMA 2002) and other emerging guidance on CLVIA.
Cumulative landscape effects	There is the potential for cumulative landscape effects where two or more developments would result in: • Changes to the physical fabric of the landscape. • Changes to landscape character. • Changes to the special characteristics of designated landscapes such that this would undermine their purpose.
Cumulative visual effects	There is the potential for cumulative visual effects where two or more developments would be visible: • In the same sector of the view at a viewpoint location, ie with both developments within a field of view of up to 90°, which would enable an observer to see both developments without moving their head (**simultaneous visibility**). • In different sectors of the view at a viewpoint location, ie with the developments > 90° apart, so that an observer has to move their head in order to see both developments (**successive visibility**). • One at a time at a series of locations along a linear route (**sequential visibility**). Based on: (SNH 2005, Appendix 5, pp 25-26).
Digital terrain model (DTM)	A three dimensional map of the landform of a study area, using digital height data, such as the OS Landform Panorama data (with height data at 50m centres) or OS Landform Profile data (with height data at 10m intervals). Each height datum provides an easting, a northing and an elevation in mAOD. (See also Method of Assessment for further details).
Effects	Predicted changes in the environmental baseline as a result of the proposed development. Effects can be direct or indirect, secondary, cumulative, short, medium or long-term, permanent or temporary, positive (beneficial), negative (adverse) or a change that cannot be defined as beneficial or adverse.
Environmental (landscape and visual)	The existing (pre-development) landscape and visual context of a study area, including landscape fabric, landscape character, landscape

Term	Definition
baseline	designations and existing views.
Environmental Impact Assessment (EIA)	An assessment of the likely significant effects (direct and indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of a development(s) on the environment (population, fauna, flora, soil, water, air, climatic factors, material assets including the architectural and archaeological heritage, and landscape), undertaken in accordance with the EIA Regulations 1999 (as amended). Based on Schedule 4 of the EIA Regulations 1999 (as amended).
Environmental Statement (ES)	The environmental information provided in association with a planning application that describes the environmental baseline, methodology and findings of the EIA undertaken on the proposals.
Field pattern	The pattern of hedges, walls, ditches, etc that define fields in farmed landscapes. From: GLVIA (LI/IEMA 2002, Glossary, p119).
Intervisibility	Two points on the ground or two features are described as "intervisible" when they are visible from each other.
Landscape	Landscape results from the way that different aspects of our environment (physical, social, aesthetic and perceptual) interact together and are perceived by us: • Physical elements – eg geology, landform, soils, flora and fauna. • Social elements – eg land use, enclosure patterns, and the patterns, form and scale of settlements and other built development. • Aesthetic factors – eg colour, form, visual texture and pattern, sounds, smells and touch. • Perceptual factors – eg memories, associations, stimuli and preferences.
Landscape character	Landscape character arises from a distinct, recognisable and consistent pattern of physical and social elements, aesthetic factors and perceptual aspects in the landscape.
Landscape character areas (LCAs)	Single unique areas that are discrete geographical areas containing one or more landscape types.
Landscape character types (LCTs)	Generic units of landscape that display a distinct, consistent and recognisable landscape character.
Landscape element	Physical components (natural and manmade) of the landscape.
Landscape fabric	Elements and features that constitute the physical components of the landscape, including ground vegetation, hedgerows, trees, shrubs, walls, fences, and vernacular structures.
Landscape feature	A prominent eye-catching element, eg a wooded hilltop.
Landscape quality (or condition)	Based on judgements about the physical state of the landscape, and about 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 of any one place.

Term	Definition
	From: GLVIA (LI/IEMA 2002, Glossary, p120).
Landscape units	An umbrella term for LCAs and LCTs.
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 wildness, cultural associations or other conservation issues. From: GLVIA (LI/IEMA 2002, Glossary, p120).
Landscape and visual impact assessment (LVIA)	An assessment of likely significant effects on landscape and visual amenity arising as a result of a development(s), undertaken in accordance with the GLVIA (LI/IEMA 2002).
Mitigation	Measures, including any process, activity or design that will prevent/avoid, reduce, remedy or offset/compensate for the predicted significant effects of a development.
Photomontage	Computer-generated 3D image of a development(s) accurately located and overlaid onto the panoramic photograph of an existing view to illustrate the location and scale of a proposed development in the context of its setting. A photomontage does not illustrate movement and so may not, therefore, illustrate the full effects of a development on a view (see also **methodology**).
Oppressive	Where a proposed development would dominate a view, eg the main views from a property, to the extent that the development would be oppressive. This depends on the scale, number and relative elevation of the turbines in the view, the array width and the proportion of the overall view(s) that the turbines will occupy.
Overbearing	Where one or more proposed wind turbines would be so close and of such a size as to be likely to make the observer uncomfortable and want to move further away.
Public access	Land with public access includes: **Access Land** – areas of mountain, moor, heath, down, common land and coastal foreshore that have been designated under Section 2 of the *Countryside and Rights of Way Act 2000* (CRoW Act). The right of access is for walkers, and the public can undertake most recreational activities that are carried out on foot, including walking, sightseeing, bird watching, climbing, running and (subject to certain restrictions) dog walking. The use of mobility scooters and buggies is also permitted. However, the right of access does not extend to cycling, horse riding or driving a vehicle, nor does the right of access apply to developed land, gardens or cultivated land. Under the CRoW Act, there was a process of consultation that allowed the right of appeal for those with a legal interest in the land, and for sensitive ecological or archaeological sites to be excluded. Conclusive maps showing areas designated as open access land (Registered Common Land and Open Country) are available from Natural England (for England) and the Countryside Council for Wales (for Wales) although, as noted on the maps, *"owing to the exceptions and restrictions, some areas shown on this map are not access land"* which means that the public do not currently have access to some of

Term	Definition
	the areas shown on the Conclusive maps. The Natural England and CCW websites[1] show accessible land (in yellow) and land subject to exclusions or restrictions (in red, cerise or red hatch). Access Land is also shown in yellow on the OS Explorer (1:25,000) maps. **S15 Access Land** – some areas of land mapped under the CRoW Act, such as urban commons, already have rights of access on foot and/or higher rights, such as horse riding, set up under enactments preceding the CRoW Act, eg s193 of the Law of Property Act 1925. Under s15 of the CRoW Act, these existing rights of access continue to apply and the rights of access, restrictions and exclusions under CRoW do not apply. S15 access land is also shown in yellow on the Natural England and CCW websites. **Definitive rights of way** – public footpaths, bridleways, cycle routes, byways open to all traffic (BOATS), roads used as a public path and highways. Shown on Definitive Rights of Way maps held by the Local Authority. Most routes are also shown on Ordnance Survey maps. **Public open space** – areas designated for specified public uses, usually in the ownership of the Local Authority. Includes parks and recreation grounds. Shown on Local Development Plans. **Beaches** – the public have permitted access to much of the foreshore (intertidal zone - between mean high and mean low tide marks) owned by the Crown Estate (more than 55% of the UK foreshore[2]), and on land above high water mark owned by the Local Authority. Some beaches above high tide mark are privately owned and some beaches and foreshore have restricted access for military purposes. **Permissive access land** - land where public access is currently permitted with the permission of landowners. Includes land outlined in purple on the OS Explorer (1:25,000) sheets. **Permissive paths and bridleways** – routes where there is public access with the permission of the landowner. Such routes are usually closed at least one day a year to prevent the establishment of a definitive right of way. ***De facto* access land** – land where there is no definitive or permissive right of way but where the public have access with the knowledge and tolerance (but not legal permission) of the landowner. This includes land in the ownership of the Local Authority and private landowners and is not shown on OS maps.
Sector of a view	The horizontal field of view that can be scanned by the human eyes without moving the head. The human eyes can comfortably scan and focus across a horizontal field of view of about 45° but, taking peripheral vision into account, this can be extended to around 90°. Therefore, for the purposes of this assessment, a sector of a view is taken to be 90°.
Significant beneficial effects on landscape fabric	Are likely to occur where the proposed development(s) would result in the addition, reinstatement or improvement of important/ mature/diverse/distinctive components, which had previously been lost or degraded as the result of agricultural operations or other development.

[1] www.countrysideaccess.gov.uk and www.ccw.gov.uk/interactive-maps/countryside-access-map.aspx
[2] www.thecrownestate.co.uk/our_portfolio.htm

Term	Definition
Significant adverse effects on landscape fabric	Are likely to occur where the proposed development(s) would result in the permanent loss (or long term temporary loss) of important/ mature/diverse/distinctive components and the effects cannot be adequately mitigated.
Significant effect on landscape character	Is likely to occur where the proposed development(s) would become one of the key characteristics of the landscape, and would contrast with the existing character, and/or where existing key characteristics would be lost or changed, such that there would be a significant change in landscape character. Effects on landscape character can result in the creation of a new landscape character type.
Significant beneficial (or adverse) effects on a landscape designation	Are likely to occur where the development(s) would bring about a significant change in the special characteristics that underpin the purpose/objectives of the designation, and that change would significantly enhance (or compromise) the ability of the designation to fulfil those purposes/objectives.
Significant effect on visual amenity	Is likely to occur where the proposed development: • would bring about a clearly visible change (eg by the addition of new elements, the removal of distinctive elements or by the obscuring of a distinctive part of the view) in the primary view(s) at a location or along a route, and • would become or would remove one of the key characteristics of the view(s), and • would contrast with the existing landscape and built elements, and • the view(s) is one that is valued and can be appreciated by receptors who are or could be at that location for the purposes of appreciating the view.
Threshold of acceptable change	An upper limit of acceptable change to the landscape and/or visual baseline. Such thresholds should be: • Clearly defined – in terms of acceptable limits to change (not in terms of turbine sizes, numbers or power output). • Well considered and justified – in terms of landscape objectives, an analysis of landscape sensitivities, a wind farm capacity study or other strategic perspective. • Adopted – in local development plans and/or documents. (Adapted from SNH 2005, para 53).
Viewing distance	The distance that a viewpoint illustration should be held from the eye in order for the illustration to match the scale of the actual view when used in the field to identify the location and scale of the proposed development(s).
View width and depth	The horizontal and vertical extent of the landscape visible in the view from a viewpoint. Views can be described as: • Framed – where the width of a distant view is confined by nearby features, such as buildings or vegetation, to less than 45º.

Term	Definition
	• Narrow – where the width of a distant view is confined by nearby features to 45° – 90°. • Wide – where the width of a distant view is 90° – 180°. • Panoramic – where the width of a distant view is 180° – 360°. • Deep – where the foreground to the skyline occupies a large proportion of the vertical extent/depth of a view, the remainder being occupied by sky. • Shallow – where the foreground to skyline occupies a small proportion of the vertical extent/depth of a view, the remainder being occupied by sky.
Visibility	Visibility used to be measured at official weather stations by manual observations (by reference to landmarks at different distances) and so was a measure of the distance that could be seen by the human eye at any one time. Daylight visibility measured by manual observations depends on several factors, including: • Atmospheric transparency (governed by the solid and liquid particles held in suspension in the atmosphere). • Degree of contrast between an object and the background against which it is observed. • Position of the sun. • Observer's visual acuity. Routine meteorological observing aims to eliminate as far as possible the factors other than atmospheric transparency. Visibility is now more commonly measured automatically by a visibility recorder (light of a known output transmitted over prescribed distances and received by a calibrated photocell)[3]. Accordingly, visibility is now defined in terms of the distance (meteorological optical range) at which transmitted light is reduced to 5% or 0.05 of the light emitted[4]. At most official weather stations visibility measurements are made approx once per hour throughout the day and night, (22 measurements every 24 hours).
Visibility descriptors	In this assessment, the following terms have been used to describe visibility conditions. These are based on the terms used by the Met Office:

Descriptor	Target distance	Permissible variation	Range
Very poor	at least 1000m	± 0.1km	0.9 – 1.79km
Poor	at least 2km	± 0.2km	1.8 – 3.59km
Moderate	at least 4km	± 0.4km	3.6 – 6.29km
Moderate	at least 7km	± 0.7km	6.3 – 8.99km
Good	at least 10km	± 1km	9.0 – 17.99km
Very good	at least 20km	± 2km	18.0 – 26.99km
Very good	at least 30km	± 3km	27.0 – 35.99km
Excellent	at least 40km	± 4km	36.0km +

[3] Meteorological Office (1969) Observer's Handbook, 3rd Edition.
[4] New Zealand Nautical Almanac 2008-09

Visual amenity	Arises from a visual receptor's experience of the visual world around them and the value they place on particular views. Theoretically, it is possible for a development(s) to result in a significant change in the view from a particular location without resulting in a significant effect on visual amenity, if the location is not accessible to receptors or the view is acknowledged as having limited value.
Visual receptor(s)	An individual observer or group of observers who are capable of experiencing a change in the view.
Visualisation	A computer-generated wireframe, photomontage or other technique used to illustrate the location, scale and/or appearance of a proposed development(s). (See definitions for wireframes and photomontages and also **methodology** for more details).
Wireframe	A computer generated view of the terrain and proposed development from a specified viewpoint location. As with ZTVs (see below), wireframes are usually based on the bare-ground DTM only and do not show movement or the screening effects of surface features. (See also Method of Assessment for further details).
Zone of theoretical visibility (ZTV) and cumulative zones of theoretical visibility (cZTVs)	A computer generated intervisibility map showing the zones within which a proposed development may be visible. Most ZTVs for wind farms are based on bare-ground digital terrain models (DTMs) and use the wind turbine hubs or blade tips in the upright position as the targets, so do not take into account the screening effects of surface features (eg walls, trees, buildings, etc) and, whilst they indicate the number of turbines (hubs or tips) that may be visible, usually do not illustrate how much of each turbine may be visible. Cumulative ZTVs for wind farms are ZTVs as above, but show the zones where one or more wind turbines (hubs or tips) from two or more wind farms under consideration may be visible. (See also Method of Assessment for further details).

Abbreviations

Term	Definition
agl	Above ground level
AGLV	Area of Great Landscape Value
AHLV	Area of High Landscape Value
ASHLI	Area o f Special Historic Interest
ASLV	Area of Special Landscape Value
AONB	Area of Outstanding Natural Beauty
BERR	Department for Business, Enterprise & Regulatory Reform
CCW	Countryside Council for Wales - the government advisor on natural heritage matters in Wales.
CLVIA	Cumulative landscape and visual impact assessment (see Glossary)
CPRE	Campaign for the Protection of Rural England (previously Council for the Protection of Rural England)
CPRW	Campaign for the Protection of Rural Wales
DECC	Department of Energy and Climate Change
DTI	Department of Trade and Industry
DTM	Digital terrain model (see Glossary)
E4e	E4environment Ltd
EH	English Heritage
EIA	Environmental Impact Assessment (see Glossary)
EIP	Examination in Public
ES	Environmental Statement (see Glossary)
EU	European Union
FC	Forestry Commission
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPG	Good Practice Guide
JCA	Joint Character Area (now called NCA)
km	kilometre
LCA	Landscape Character Area (see Glossary)

Term	Definition
LCT	Landscape Character Type (see Glossary)
LDD	Local Development Document
LDF	Local Development Framework
LPA	Local planning authority
LVIA	Landscape and visual impact assessment (see Glossary)
mAOD	Metres above Ordnance Datum
NCA	National Character Area (previously called JCA)
NE	Natural England - the government advisor on natural heritage matters in England.
NM	Nautical mile
NT	National Trust
ODPM	Office of the Deputy Prime Minister
OS	Ordnance Survey
PI	Public inquiry
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
RfR	Reason for Refusal
RRES	Regional Renewable Energy Strategy
RSS	Regional Spatial Strategy
SEI	Supplementary Environmental Information
SLA	Special Landscape Area
SNH	Scottish Natural Heritage - the government advisor on natural heritage matters in Scotland.
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
WAG	Welsh Assembly Government
ZTV	Zone of theoretical visibility (see Glossary)

Method of Assessment

Introduction

1 This Appendix describes the method of assessment used to determine the likely significant effects of the proposed wind energy development on landscape and visual amenity (in conjunction with other wind energy generation schemes, operational, permitted and/or proposed). It describes the legislation and guidance documents on which the methodology is based, explains the scope and approach to the assessment, the iterative assessment process and the assessment tools and illustrative material used.

2 In accordance with the EIA Regulations (DETR 1999 as amended) and in common with environmental impact assessment (EIA) generally, the purposes of landscape and visual impact assessment (LVIA) and cumulative landscape and visual impact assessment (CLVIA) are to describe the baseline(s), to identify the likely significant effects and mitigation measures, and to identify any significant residual environmental effects. Further to this, in order to inform the consideration of the overall planning merits of a proposal (which is outside the scope of an ES), it is of assistance to consider the acceptability of the predicted significant residual landscape and visual effects. Wherever possible, the analysis should be objective, the residual effects should be quantified and any subjective judgements should be described in clearly defined terms.

3 The nature of landscape and visual impact assessment (LVIA) requires both objective analysis and subjective professional judgement, so it is important that a structured and consistent approach is adopted and that it is explained in clearly defined terms. Therefore, in accordance with relevant legislation, published guidance and accepted good practice, this assessment follows a structured and consistent method of assessment that is based on clearly defined terms (see Glossary, **Appendix 1**), uses published information and recognised data analysis techniques, uses quantifiable factors wherever possible and subjective professional judgement as necessary.

Current Guidance

Legislation and Planning Policy Guidance

4 The following assessment process takes account of the requirements of the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999* (DETR 1999) (as amended), which define the requirements of the EIA process and contents of an Environmental Statement (ES), and advice provided in *PPS22: Renewable Energy* (ODPM 2004a) and its companion guide (ODPM 2004b).

5 It also takes account of emerging UK government guidance for England including *Environmental Impact Assessment: A guide to good practice and procedures* – Consultation Paper (DCLG 2006a) and *Amended Circular on Environmental Impact Assessment* – Consultation paper (DCLG 2006b).

Landscape Character Assessment Guidance

6 Guidance on the characterisation and evaluation of landscape character units in England and Scotland is provided in *Landscape Character Assessment – Guidance for England and Scotland* (Swanwick & LUC 2002)

produced on behalf of the Countryside Agency and Scottish Natural Heritage. The landscape character baseline for this assessment is based on fieldwork observations and published landscape character assessments, as identified in Chapter 5 of the ES.

Landscape and Visual Impact Assessment Guidance

7 The assessment of impacts on the landscape and visual amenity of the study area has been undertaken in accordance with the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA 2nd edition) (LI/IEMA 2002). The GLVIA (together with the 1st edition) has been the primary source of advice on landscape and visual assessment methodology in the UK since 1995.

8 The GLVIA describes an approach to landscape and visual assessment for development projects generally but the guidance is not specific to wind energy projects and provides only a limited amount of guidance on the assessment of cumulative effects (paras 7.12 – 7.13).

Cumulative Impact Assessment Guidance

9 A comprehensive review of current guidance on the assessment of cumulative impacts of onshore wind energy proposals was commissioned by the DTI/BERR. DECC has now commissioned ENTEC to prepare a Good Practice Guide to cumulative impact assessment but this is not expected to be available until sometime this year.

10 Therefore, this method of assessment has drawn on the guidance for landscape, visual and cumulative impacts in general, in the GLVIA (LI/IEMA 2002) and on guidance for the assessment of cumulative impacts of onshore wind energy schemes in:

- England - the draft EIA guide to good practice (DCLG 2006, paras 121 – 126), the Companion Guide to PPS22 (ODPM 2004b, paras 5.21 – 5.24), and *Cumulative Effects of Wind Turbines: A Guide to Assessing the Cumulative Effects of Wind Energy Development* (DTI 2000).
- Scotland – *Cumulative Effect of Windfarms* (SNH 2005).
- Wales - TAN 8 (WAG 2005a, Annex D, Sections 6 and 8) and the Ministerial Interim Planning Policy Statement (PPS 01/2005) (WAG 2005b, paras 12.8.10 – 12.8.11).

Visual Representation of Wind Farms Guidance

11 A comprehensive good practice guide (GPG) for the production of computer-generated tools and illustrative material for wind farm LVIAs has been produced in Scotland on behalf of Scottish Natural Heritage, The Scottish Renewables Forum and The Scottish Society of Directors of Planning (H + M and Envision 2006). This GPG does not apply to England and Wales but, as it is a recent document and was subjected to a comprehensive consultation and peer review process, the computer-generated tools and illustrative material for the LVIA have been produced in accordance with the recommendations in this GPG. The GPG does not currently advise on the production of visuals for CLVIAs but many of the principles are similar.

Designing Windfarms in the Landscape

12 A document providing guidance on the design of wind farms has been drafted by SNH (SNH 2008). This was the subject of a consultation exercise

during 2008. It does not apply directly to landscapes in England and Wales but, once finalised, may provide some useful generic advice on the design of wind farms in various types of landscapes.

Scope and approach

Introduction

13 Under the EIA regulations, an LVIA is required where there are likely to be significant effects as a result of a proposed development. Where there are operational, permitted and/or other proposed wind energy schemes in the locality of a site there is the potential for significant effects to arise as a result of the proposal and for significant cumulative effects in conjunction with the other schemes. In the case of this proposal, there is currently one operational wind farm, five permitted schemes and one other proposed wind energy scheme within 15km of the site so there is the potential for cumulative effects to arise as a result of the proposed development.

14 Taken together, the various legislation, planning and assessment guidance noted above establish the principle of the need to consider likely significant impacts (including cumulative impacts) in applications for wind energy development proposals, discuss the various circumstances and status of projects that should be taken into account, provide definitions of terms and, in some cases, provide guidance on the matters to be covered and the illustrative material that should be provided.

15 However, guidance on LVIA and CLVIA has been evolving during the last seven years (since DTI 2000) and these documents are not entirely consistent in their recommendations. Therefore, in order to undertake LVIAs and CLVIAs, it has been necessary to review the current guidance and devise a structured and consistent method of assessment that takes account of the available guidance but which provides clarity in areas where the guidance is inconsistent or incomplete, so that the method is structured, consistent and repeatable and the findings are robust.

Critique of Current Guidance

Definitions of significant effects

16 Whilst the EIA Regulations (DETR 1999) require "likely significant effects" to be described, no definitions of "significance" or "significant effects" are provided in the Regulations. However, it is generally accepted that a significant effect is one that would result in a change to the baseline resources and/or receptors of sufficient magnitude that it should be taken into account by the relevant decision maker.

17 Definitions of "significant effects" in relation to the various baseline resources and receptors considered in this assessment are provided in the Glossary (**Appendix 1**) and at various points in this Appendix.

Definitions of cumulative effects

18 The concept of "cumulative effects" is recognised but not defined in the EIA Directive (EU 1985) and EIA Regulations (DETR 1999).

19 The draft EIA good practice guide quotes a dictionary definition – "increasing by one addition after another" (DCLG 2006, para 121) and states that, "in the context of EIA, cumulative effects could refer to the combined effects of different development activities within the vicinity or those of different

aspects of a single development on a particular receptor" (DCLG 2006, para 122).

20 As acknowledged in the draft EIA good practice guide, these two definitions/ approaches to cumulative effects are not entirely consistent as the dictionary definition refers to the "additional effects" of each additional development/ activity whilst the second definition refers to the "combined effects" of all the developments/ activities under consideration. As a result, the draft EIA good practice guide (DCLG 2006, para 123) advises that "*the key is to focus on the receptor and consider capacity cumulatively to accommodate the changes that are occurring and proposed, rather than just calculating the contribution associated with a particular development*".

21 Unfortunately, whilst this approach may be appropriate for issues such as noise and air quality (where firm thresholds or upper limits of acceptable change are often defined in standards and can be measured), it is more difficult to apply to landscape and visual issues where firm thresholds or upper limits of acceptable change are difficult to quantify and rarely defined.

22 The GLVIA (LI/IEMA 2002) is equally inconsistent when defining cumulative landscape and visual effects as it also provides two different definitions, one referring to additional changes and one to the summation of effects:

*"Cumulative landscape and visual effects result from **additional changes** to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future." (GLVIA, para 7.12)*

and

*"Cumulative effects - **the summation of effects** that result from changes caused by development in conjunction with other past, present or reasonably foreseeable actions." (GLVIA Glossary, p119)*

23 The guidance on cumulative effects of wind farms in Scotland (SNH 2005) states that it is preferable to refer to " *'an additional cumulative effect', that is additional to the impact to be expected from the developments taken individually*". However, this is slightly different to the "*additional changes*" referred to in the GLVIA as it is referring to changes that are additional to the effects predicted for the proposed development on its own, rather than changes that are additional to the effects of the developments that are already in the landscape.

24 TAN 8 defines cumulative effects as "*those which occur, or may occur, as a result of more than one wind farm project being constructed*". However, whilst this definition describes "when" cumulative effects can occur, it does not define "what" cumulative effects are.

25 In considering the various definitions of cumulative effects, and whether it is appropriate to consider additional and/or combined effects, there are three parameters that need to be explored in more detail. These are:

- The baseline.
- Thresholds of acceptable change.
- Types and status of developments.

The baseline

26 The GLVIA is very clear about how one should define the landscape and visual baseline:

"The initial step in any landscape and visual impact assessment is to review the existing landscape and visual resource – that is, the baseline landscape and visual conditions" (LI/IEMA 2002, para 6.1).

"For schemes which seek to extend an existing development the assessment will be considering those changes in the landscape likely to occur as a result of the extension, because the baseline landscape already includes the existing development. … the emphasis of the assessment process is on the changes the proposal would bring to the existing landscape, to inform the development process" (LI/IEMA 2002, Box 7.1).

27 Whilst the GLVIA (LI/IEMA 2002, Box 7.1) refers to extensions to existing developments, the principle applies equally to cumulative effects arising from one or more proposed wind energy developments in a study area where there is already an existing wind farm.

28 The guidelines acknowledge that some people may object to the inclusion of existing development in the baseline but notes that to do otherwise would require an impact assessment of the existing development and information about the pre-development landscape. Furthermore, landscapes are an ever evolving resource and all landscapes in England contain various forms and scales of development so to do otherwise would also require agreement on which existing developments should be included in the baseline and which should be included in the assessment.

29 The GLVIA (LI/IEMA 2002, Box 7.1) goes on to say, "nevertheless, extensions or additions to existing developments do need to take into account changes of scale and the potential for the receiving landscape to accommodate the larger composite feature". At first reading, this may appear to contradict the extract in para 26 above. However, what is being recommended is that, where there is an extension to an existing development, it is necessary to consider the ability of the landscape to accommodate the increase in the scale of that development, ie against a threshold of acceptable change.

30 In planning terms, all permitted developments (including operational wind farms and schemes that have been permitted but not yet built) have passed the "planning test" (ie conformance with the development plan) and have, therefore, been judged to be acceptable in landscape and visual terms.

31 On this basis it is appropriate to include all operational wind energy developments as part of the existing landscape and visual baseline (and to consider permitted and not yet built wind energy developments as part of a potential future baseline), enabling the cumulative assessment to concentrate on the additional effects of the proposed development (plus other proposed wind energy schemes) as one or more development scenarios (see paras 41 - 53 below).

32 Then, if no significant additional cumulative effects are identified, it can be concluded that the proposed development scenario(s) would not result in a significant change to the baseline and should therefore, be considered acceptable. However, if significant additional cumulative effects are identified, it may then be necessary to consider the extent to which these approach or exceed recognised thresholds of acceptable change.

Thresholds of acceptable change

33 Whilst it is not feasible to compare the combined effects of past and future development with a previous "pre-development baseline", it may be feasible to examine the additional effects of a proposed development against an agreed upper limit or threshold of acceptable change, particularly if such thresholds are defined in the development plan.

34 In England, Government advice in relation to thresholds is provided in PPS22 (para 21) where it states:

"Planning authorities should also take into account the cumulative impact of wind generation projects in particular areas. Such impacts should be considered at the planning application stage and authorities should not set arbitrary limits in local development documents on the numbers of turbines that will be acceptable in particular locations".

35 In Scotland, thresholds are also considered in some detail in the guidance on cumulative effects (SNH 2005, paras 53), where it states:

"A crucial element in identifying the potential for adverse cumulative impact is the concept of a "threshold" beyond which wind farms in a particular area become unacceptable. In other words the effect of the present proposal is limited, but when added to the effect of what has already been allowed or to new proposals which have been submitted for planning permission, it becomes unacceptable in planning terms.

The principal difficulty in applying such an argument will be the identification and then justification for that threshold – particularly in the case of the cumulative impact on the landscape. … In the case of windfarms, assertion of a capacity or limiting threshold for windfarm development is more likely to be based on a well-considered judgment, informed by an analysis of landscape sensitivities, or a wind farm capacity study or other strategic perspective, on the limits in extent, scale and distribution of wind farm development which would be accepted within an area. It is unlikely that such thresholds or capacities can be simply expressed in terms of turbine numbers or power output; they are more likely to be expressed in terms of acceptable limits to change."

36 The guidance then states, in para 54:

"In order to justify a threshold based on natural heritage factors, there needs to be clarity over natural heritage objectives. Without such clarity, there is little value in seeking cumulative impact assessment in the first place. Thus, for example, in relation to cumulative landscape impacts, one needs to be clear whether the landscape objective in the area is:

- *To maintain the integrity and quality of the landscape (as may be appropriate within a designated landscape);*
- *To maintain the landscape character; or*
- *To accept landscape change."*

37 This text is also provided in TAN 8 (WAG 2005a, Annex D, para 8.3).

38 Therefore, in relation to thresholds, the various guidance suggests that it is necessary to work to clear objectives and, where the objective is to accept a certain degree of change, the degree of acceptable change should be based on a well-considered judgement on the limits in extent, scale and

distribution of wind farm development, informed by an analysis of landscape sensitivities, or a wind farm capacity study or other strategic perspective, and should be expressed in terms of acceptable limits to change. Furthermore, planning authorities should not set "arbitrary limits" in terms of turbine numbers or power output in local development documents.

39 In some Regions of the UK, this has been taken a step further by defining appropriate locations (called, for example, "*wind resource areas*", "*preferred areas*" or "*areas of least constraint*") for various scales of wind energy development, based on targets, in local plans or in separately commissioned research reports.

40 In some cases, thresholds of acceptable change for landscape resources and visual amenity are defined and/or guidance is provided on the scale and location of wind farm developments to meet the targets. By defining preferred areas, a degree of landscape and visual change must be considered acceptable in these areas as it would be impossible to site a commercial wind farm in the UK without some changes to landscape and/or visual amenity.

Types and status of developments

41 The various definitions of cumulative effects suggest that guidance on the types and status of developments that should be taken into account when undertaking CLVIAs has been evolving.

42 It is suggested in some of the guidance (DTI 2000, SNH 2005) that other types of development should to be considered, eg if they have the potential to significantly affect the same sensitive resources and receptors. However, it can be very difficult to assess the cumulative effects of different types of development on landscape and visual amenity as the nature/types of effect of different developments tend to be different, and neither of these guidance documents provides any guidance on how this should be done.

43 The companion guide to PPS22 (ODPM 2004b, para 5.23) considers that cumulative effects may arise where there are "*two or more of the same type of renewable energy development*". More recently, TAN 8 (WAG 2005a, para 8.2) refers to cumulative effects "*as a result of more than one wind farm project being built*".

44 Regarding the status of wind energy schemes to be considered, in 2000 it was recommended that cumulative assessment should consider operational and permitted wind energy schemes plus those in the planning process and, in some cases, potential future developments (DTI 2000, section 1.3.4):

"Given that the planning system is aimed at providing certainty, CA [cumulative assessment] should include only built and permitted developments and those already in the planning process under determination for which design information is in the public domain. … More speculative proposals … might be included by agreement with the planning authority but this will clearly render the assessment less certain. It may be the case that less certain potential future developments might be usefully considered in the context of some resources, but not others.

45 In 2002, the GLVIA (LI/IEMA 2002, Glossary p 119) was still defining cumulative effects as "changes caused by development in conjunction with other past, present or reasonably foreseeable actions."

46 However, the emerging guidance on EIA (DCLG 2006, para 124) states that, in most cases, the effects to be considered cumulatively will be limited to operational and permitted developments only:

"In most cases, detailed consideration of the combined effects of the development proposed together with other developments will be limited to those others that are already begun or constructed or those that have not been commenced but have a valid planning permission."

47 Emerging guidance that is specific to cumulative effects of onshore wind farms (Entec 2009, Executive Summary and section 2.3.2) suggests that, in addition to schemes that are operational and permitted, cumulative assessments should include those schemes that are in the planning process but not those for which an application has not yet been submitted as there is decreasing certainty about such proposals both because of possible design changes and because sometimes a decision is taken not to proceed with the application. Accordingly, this emerging guidance currently recommends that:

"As a general rule only those schemes that are in the formal planning process should be considered in the cumulative assessment, although developers will need to make themselves aware of any other proposals that are at the pre-application stage and which are likely to be lodged at or around the same time as their own application, and to take such account of them in their cumulative impact assessments as is necessary."

48 In Scotland, the guidance on cumulative effects (SNH 2005, para 18) recommends that a CLVIA should be limited to the assessment of potentially significant cumulative effects associated with a specific development proposal in combination with:

- Existing development, either built or under construction;
- Approved development, awaiting implementation; and
- Proposals awaiting determination within the planning process.

49 TAN 8 (WAG 2005a, Annex D para 6.2) refers to the SNH guidance and appreciates the impracticality of considering potential future developments when it states that, *"it would be unreasonable for a developer to consider the effects of other wind turbines within those (as yet) undeveloped parts of an SSA"*.

50 In reality, planning authorities are required to determine each planning application on its own merits and in accordance with the development plan, taking into account all material considerations. Such material considerations would include cumulative effects with operational schemes and may also include potential cumulative effects with permitted schemes plus those in the planning process (other proposed schemes). Potential future developments not yet in the planning process are less likely to be considered as a material consideration in view of the lack of information on such schemes and the low level of certainty.

51 However, many permitted schemes have never been built and those in the planning process may not gain planning consent. Therefore, such schemes should not be considered as part of the existing baseline. It is more appropriate to consider permitted schemes as part of a potential future baseline, and to consider the additional effects of one or more proposed schemes, in one or more separate development scenario(s), each reflecting a different level of certainty.

52 CLVIA can be a complex process, particularly where development activity in a locality gives rise to several potential baselines and several different development scenarios, each with different levels of certainty. Therefore, it is recognised in the guidance that "*a pragmatic approach should be adopted to the potential complexity of CA (cumulative assessment) to ensure that decision makers are provided with information which is meaningful and significant, rather than unnecessarily comprehensive*" (DTI 2000, para 1.1).

53 It is also recognised that "the effects to be considered cumulatively in an ES will be project specific and should be agreed with the LPA during the scoping stage" (DCLG 2006, para 124) or, for applications that have already been submitted, as and when new proposals enter the planning system, although "it would be unreasonable to defer determination of an outstanding application as successive new applications are submitted" (SNH 2005, para 26).

Key parameters

54 Therefore, in order to carry out an LVIA and/or a CLVIA for a proposed development that it is meaningful without being unnecessarily complex, there are several key parameters that need to be considered and, preferably, agreed with the LPA at the scoping stage, in particular:

- Geographical/spatial limits – the distances/areas within which significant effects (including cumulative effects) are likely, in order to define the size of the study area(s) and the other developments to be taken into account. With regards to the latter, the draft EIA good practice guide (DCLG 2006) refers to "within the vicinity" but does not provide any advice on what this means in terms of distances. In reality, distances will depend on the type of development and the resources and receptors under consideration.
- Temporal limits – the time period over which the potential for significant cumulative effects should be assessed – usually the 25 year operational/permitted life of the proposed wind farm.
- Baseline – usually defined as the existing landscape and visual resource (LI/IEMA 2002, para 6.1) including all existing development (LI/IEMA 2002, Box 7.1).
- Resources and receptors – the particularly sensitive resources and/or receptors in the study area(s) that are likely to experience significant effects and/or cumulative effects. This informs the selection of viewpoints and the scope of the landscape and visual assessments.
- Types of development to be considered – usually only the same types of development (ie other wind farms where a wind farm is being proposed).
- Status of projects to be considered – usually limited to operational and under construction (as part of the baseline) plus permitted but not yet built (as part of a potential future baseline), and those in the planning process awaiting determination (ie submitted or appealed), as one or more development scenarios.
- Aspects of the projects to be considered – those aspects that are likely to give rise to significant cumulative effects, which may be construction activities, operational elements and/or decommissioning activities.
- Development scenarios – where development activity in a locality gives rise to several potential development scenarios, each with different levels

of certainty, and which would require an extremely complex CLVIA in order to consider all possible scenarios, it may be necessary to define those scenarios that are the more likely (eg by reference to strategic guidance) or of more concern (in terms of potential impacts on particularly sensitive resources and/or receptors), in order for the assessment to be meaningful without being unnecessarily comprehensive.

- Types of effect – different types of significant effects, including different types of significant cumulative effects, need to be defined and examined (see Glossary, **Appendix 1** for definitions of terms used in this LVIA and/or CLVIA).
- Thresholds of acceptable change – as defined in local development plan documents, ideally based on a wind farm capacity study or other strategic perspective and expressed in terms of acceptable limits to change.

55 The key parameters used for the LVIA and CLVIA are provided in my proof of evidence (**GWFL/KFH2**).

Assessment Process

56 The GLVIA (LI/IEMA 2002) is specifically referred to in the Companion Guide to PPS22 (ODPM 2004b, para 5.17) in relation to landscape and visual impact assessment, although not in relation to cumulative impact assessment. However, the Companion Guide does refer to good practice guidance on cumulative effects prepared by SNH and SNH guidance recommends that CLVIAs should be carried out in accordance with the methodology outlined in the GLVIA (SNH 2005, Appendix 5, Section 2).

57 Accordingly, this methodology follows the assessment process advocated in the GLVIA guidelines (LI/IEMA 2002) and involves information review, consultations, fieldwork observations and photography, computer-based data processing and analysis, objective measurements and subjective professional judgements.

58 It is an iterative process of assessment that examines the baseline landscape and visual conditions and the characteristics of the proposed development, in order to identify mitigation measures and the potential residual effects. It then predicts the **significance** of changes to the baseline as the result of the residual effects of the development, and taking into account the **magnitude** of the changes and the **sensitivity** of the landscape resources and visual receptors.

59 This iterative process involves several stages:

- **Stage 1: Potential effects and mitigation** – a summary of the national context, particular location requirements and characteristics of current commercial onshore wind farm developments that have implications for landscape and visual amenity and a review of the development proposals and mitigation measures to identify the potential residual effects, in particular, those elements with the potential to significantly affect the landscape and visual baseline.
- **Stage 2: Landscape and visual context** – the characterisation and evaluation of the site and study area to identify the baseline landscape fabric and character, the extent and purposes of landscape designations, the locations of recreational areas and routes, the

locations of visual receptors and the locations of existing operational wind farms (the existing landscape and visual baseline).

- **Stage 3: Visibility analysis** – computer-generated zones of theoretical visibility (ZTVs), based on topographical data only, to identify the locations where views of the turbines (operational, permitted and/or proposed) may be possible, and fieldwork and information review to establish the actual zones of visibility and the types and locations of receptors in those zones.
- **Stage 4: Viewpoint analysis** – an analysis of the predicted changes in views as a result of the proposed development(s), from a selection of viewpoint locations that represent the main visual receptor types in the study area.
- **Stage 5: Assessment of effects on landscape** – an assessment to identify the likely significant effects on landscape fabric, the character of the landscape units and the special characteristics and purposes of the landscape designations, as a result of the proposed development(s) in the context of the existing baseline.
- **Stage 6: Assessment of effects on visual amenity** – an assessment of the likely significant effects on the visual amenity of a range of visual receptors in the study area, as a result of the proposed development(s) in the context of the existing baseline.
- **Stage 7: Cumulative appraisal** – a review of any further potentially significant effects on landscape and visual amenity as the result of the proposed development in combination with permitted and other proposed wind farm schemes in the study area.
- **Stage 8: Acceptability of the predicted significant effects** – a review of the intensity/extent of the predicted significant effects in the context of adopted, published and/or proposed thresholds of acceptable change (where available or inferred), in order to determine whether the development(s) should be considered acceptable in landscape and visual terms.

Stage 1: Potential Effects and Mitigation

60 When undertaking LVIAs and CLVIAs, it is important to appreciate the national context, the particular locational requirements and the characteristics of the type of development under consideration, in order to understand and put into context the potential effects that may arise, the potential mitigation measures that can be achieved to minimise these and the extent to which the residual significant effects may or may not be considered acceptable in landscape, visual and planning terms.

61 The national context for renewable energy in general and commercial onshore wind energy development in particular, is discussed in detail in the evidence of Mr Peter Newland (PN/1, etc). In his evidence, Mr Newland explains how national government is encouraging the development of renewable energy projects as one of the ways to reduce CO2 emissions and tackle climate change.

62 All commercial onshore wind farms are major renewable energy developments with particular locational requirements and characteristics (explained in more detail in my proof, **RW/P/2**). As a result, it would be impossible to site large, moving structures such as wind turbines in the UK landscape without some significant effects on landscape and/or visual

amenity. Therefore, the issue is not whether wind turbines in the landscape will or will not result in significant landscape and/or visual effects but the extent to which these effects have been minimised such that this development can be accommodated in this location without unacceptable effects in landscape and visual terms.

63 With the particular locational requirements and characteristics of wind turbines in mind, the visual characteristics of the elements and activities of the construction, operational and decommissioning phases of the proposed wind energy development, and the mitigation measures that have been incorporated into the design in order to mitigate the potential effects of these on landscape and visual amenity, are examined to identify those aspects with the potential to cause a significant effect on landscape and visual amenity.

Stage 2: Landscape and Visual Context

64 This stage involves defining the study area(s), and within these, characterising the landscape, and identifying the extent, purposes and special characteristics of the landscape and recreational designations.

Defining the study area(s)

65 Study areas are normally defined in accordance with the following:

- EIA Regulations 1999 – which require "a description of the aspects of the environment likely to be significantly affected by the development" (Schedule 4, Part 1, clause 3, DETR 1999).
- Guidance provided in the GLVIA 2nd edition (LI/IEMA 2002), which advises that:
  - The study area for a landscape assessment needs to cover, "*the site itself and its wider landscape context, within which the proposed development may influence landscape character*" (p72, para 6.24).
  - The study area for a visual assessment, "*may extend to the whole of the area from which the development is visible (the visual envelope)*" but in practice, the extent "*may be limited by agreement with the regulatory authority on the distance from the proposed development within which the view is expected to be of interest or concern*" (p71. para 6.24).
- Consultations with officers from the Local Planning Authority, the County Council, neighbouring authorities (if applicable) and Natural England, the Countryside Council for Wales (CCW) or SNH (as appropriate) regarding appropriate study area sizes and locations of interest or concern.

Landscape characterisation

66 The landscapes of England have been characterised as part of a national programme of landscape character assessment, commissioned by the Countryside Commission and its successor, the Countryside Agency, and English Nature (now combined as Natural England), together with assistance from English Heritage. This was called the Countryside Character Initiative and resulted in *The Character of England Landscape, Wildlife and Cultural Features* map.

67 The work was undertaken in the late 1990s and published in 8 volumes[5]. It subdivides England into 159 character areas, each of which is described in terms of its key characteristics, landscape character, physical, historical and cultural influences, buildings and settlement, land cover, the changing countryside, and shaping the future. The maps and accompanying descriptions are also available on the Natural England website[6].

68 The aim of the Countryside Character Initiative was to develop "*a consistent national framework within which more detailed local landscape assessments would sit*" (p9, CA 1998). These character areas were originally called Joint Character Areas (JCAs) and are now called National Character Areas (NCAs). NCAs provide the top tier of the hierarchy of landscape character assessments in England and are drawn upon in Regional Spatial Strategies (RSSs).

69 It was the Countryside Agency's intention that local planning authorities would produce the local landscape character assessments as part of the local plan review process and many of the local planning authorities in England have since commissioned and published landscape character assessments. Some of these assessments have been adopted as Supplementary Planning Guidance (SPGs) or Supplementary Planning Documents (SPDs), some are topic papers which have guided the development of policies in Local Development Frameworks (LDFs), Unitary, Structure or Local Plans and some are stand alone commissioned reports which have less weight in planning terms, but are available to advise developers and planning authorities on the appropriateness of development in the context of landscape character. Some local authorities already had landscape character assessments that pre-dated the Countryside Character Initiative and continue to rely on these, even though they do not necessarily correlate well with the NCAs.

70 In accordance with recommendations in the Companion Guide to PPS22 (ODPM 2004b, para 5.15), where a study area has already been characterised in one or more published landscape character assessments, the landscape units defined in the published study are examined in accordance with the methodology described in the landscape character guidance (Swanwick & LUC 2002) and, as long as the fieldwork observations and information concur with the characterisation in the published studies, then these are used as the basis of the landscape characterisation.

71 With relatively large study areas that cross several local authority boundaries, it can be the case that parts of the study area have been characterised in local landscape character assessments and parts have not. In such cases, the NCAs are usually used as the basis of the landscape character baseline.

Landscape and recreational designations

72 Landscape designations are an indication of landscape value, as they are areas that have been recognised for the scenic beauty. They are also usually landscapes within which a higher level of development control is in place for the purpose of protecting those qualities.

73 Statutory national landscape designations in England are Areas of Outstanding Natural Beauty (AONBs). National Parks are also statutory national designations which are designated partly for their landscape and partly for their wildlife, cultural heritage and recreational value. AONB

[5] Countryside Agency (1998-99) Countryside Character: Volumes 1 – 8.
[6] http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/default.aspx

boundaries are shown on the proposals maps of Local or Unitary Development Plans whilst National Park boundaries are shown on Ordnance Survey maps. Information on these designations is also provided on websites such as those of the relevant National Park Authorities, Natural England[7] and the relevant AONB Management Bodies.

74 The purposes of National Parks were originally defined in Part II, Section 5 of the National Parks and Access to the Countryside Act 1949 and subsequently amended by the Environment Act 1995. These purposes relate to landscape, wildlife, cultural heritage and recreation, and are:

- To conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park.
- To promote opportunities for public enjoyment and understanding of the special qualities of the National Park.

75 The special qualities of each National Park are usually identified and described in the relevant National Park development plan, management plan and/or on the relevant National Park website.

76 Under Section 87 of the National Parks and Access to the Countryside Act 1949, as amended by Part IV, Sections 82 - 93 of the CRoW Act 2000, Natural England (in England) or CCW (in Wales) can designate an area which is not in a National Park as an AONB if it appears to them to be of such outstanding natural beauty that it is desirable that the provisions of Part IV of the CRoW Act should apply.

77 It is also mentioned within the CRoW Act (eg Section 84(4)) that the purpose of AONBs is to conserve and enhance the natural beauty of the area. This is similar to part of the first purpose of National Parks. However, AONBs differ from National Parks in that they are not designated for the purpose conserving and enhancing their wildlife and cultural heritage or for promoting opportunities for public enjoyment and understanding of their special qualities by the public.

78 Non-statutory national landscape designations are Heritage Coasts. These are designated by Local Authorities in conjunction with Natural England and are shown on Local Development Plans and the Natural England website[8]. The purposes of this designation include landscape, wildlife, cultural heritage, recreational, environmental quality and socio-economic objectives. These are described on the Natural England website as:

- To conserve, protect and enhance the natural beauty of the coasts, their marine flora and fauna, and their heritage features.
- To facilitate and enhance their enjoyment, understanding and appreciation by the public.
- To maintain and improve the health of inshore waters affecting Heritage Coasts and their beaches through appropriate environmental management measures.
- To take account of the needs of agriculture, forestry and fishing, and of the economic and social needs of the small communities on these coasts.

79 There are 31 Heritage Coasts around the coastline of England and the special characteristics of each of these are defined on the Natural England

[7] www.naturalengland.org.uk
[8] www.naturalengland.org.uk

website[7]. The boundaries of some of these Heritage Coasts have been defined in detail but, for some, although the lateral/coastal extent has been defined, the inland extent has not.

80 Borough or local landscape designations are designated by Local Authorities. Their locations and extents are shown on the proposals maps of Local or Unitary Development Plans and their purposes are usually defined in policies within the development plan. Various names are given to them, such as Special Landscape Areas (SLAs), Areas of Great Landscape Value (AGLVs) and Areas of High Landscape Value (AHLVs). Some local plan designations are supported by published landscape character assessments and the special characteristics of the landscapes in these designations are described in these assessments. Over time, these designations are being defined, refined or deleted as a result of landscape character assessments (in accordance with PPS7 (ODPM 2004c)).

81 Where local landscape designations have been defined/refined by way of landscape character assessments, these studies provide the information on the special characteristics of the landscapes in these designations. However, currently, many local plan designations are not supported by such studies and the purposes need to be deduced from the associated policies and preambles in the Local Plans and the special characteristics from fieldwork observations.

Recreational areas and routes

82 Access Land is now a statutory national recreational designation, with the access land shown on new editions of the Ordnance Survey 1:25,000 Explorer maps. This is land identified in accordance with the Countryside and Rights of Way Act 2000 (CRoW Act) and, subject to exceptions and restrictions, is land over which the public have a right of access on foot and using disabled scooters and buggies. The right of access does not extend to camping, cycling, horse riding or driving a vehicle, nor does it apply to developed land, gardens or cultivated land.

83 Some areas of land mapped under the CRoW Act, such as urban commons, already have rights of access on foot and/or higher rights, such as horse riding, set up under earlier enactments and these existing rights of access continue to apply (see Glossary, **Appendix 1** for more details).

84 The UK is criss-crossed by public rights of way (PRoW) which include footpaths, bridleways, roads used as public paths (RUPPs) and byways open to all traffic (BOATs). These are shown on local authority definitive rights of way maps and the routes are indicated on OS maps.

85 There are also recreational routes for non-vehicular traffic, routed mainly along these public rights of way (but using stretches of minor roads in places) which have been defined for the purpose of providing and encouraging recreational opportunities. These include:

- National and Regional recreational routes - including National Trails (15 long distance routes in England and Wales and 4 in Scotland, suitable for walkers and with sections that can be used by horse riders and cyclists (see National Trails website[9]); the National and Regional Bridleroute Network (see British Horse Society website[10]); the National and Regional

[9] www.nationaltrail.co.uk
[10] www.ride-uk.org.uk

cycle network (see SUSTRANs website[11]); and the National Byway leisure cycling route (see National Byway website[12]).

- Long distance recreational paths (shown on OS maps and/or in guide books).
- Local footpath and bridleway networks – definitive rights of way (shown on definitive rights of way maps managed by the Rights of Way Officers in County or Unitary Authorities) and permissive routes.
- Locally promoted routes including footpaths, bridleways and cycle routes promoted by the local planning authority (shown on the proposals maps of local development plans and/or on the LPA websites) or in guide books. These usually follow definitive rights of way.

86 In addition, there are areas of permissive access land and permissive routes open to the public with the permission of the landowner, for example, under the Environmental Stewardship Scheme. These are not shown on definitive maps or on OS maps but information on these areas and routes is available on the Defra/Natural England website[13].

87 The locations of recreational areas and routes inform the identification of visual receptor locations.

Stage 3: Visibility Analysis

Zones of theoretical visibility (ZTVs)

88 The visibility analysis uses computer-generated zones of theoretical visibility (ZTVs) to ascertain the general locations and extent of the study area where, theoretically, topography would permit lines of sight to all or parts of the wind turbines (see **Assessment Tools** at the end of this Appendix for details). As ZTVs are based on topography alone and do not take account of the screening effects of surface features such as hedgerows, woodlands and buildings, they can present an over-representation of visibility in the study area.

89 Landform is a major influence on the visibility of wind energy developments in the landscape but surface features can also have a very marked influence on the availability of views in a study area.

90 In relatively flat or gently undulating terrain, the majority of the development would be visible in near views, but intervening surface features (hedgerows and built development) then become very effective at screening the development in many middle and distant views. In contrast, hilly terrain tends to permit open views of the development from high points in the study area, but effectively screens the development from all the valleys and slopes on the far side of hills.

91 As a result, a ZTV based on topography alone can provide a fair representation of actual visibility in open or hilly terrain (unless it has extensive areas of woodland), but is much less representative of actual visibility in flat, well-vegetated and/or developed locations. However, ZTVs are a useful tool for establishing the potential zones of "no visibility", enabling the zones of "potential visibility" to be examined in more detail in the viewpoint analysis.

[11] www.sustrans.org.uk
[12] www.thenationalbyway.org
[13] www.cwr.naturalengland.org.uk

Visual receptors

92 The locations and types of visual receptors within these zones of theoretical visibility are identified from Ordnance Survey maps and other published information (such as walking guides), from fieldwork observations and from local knowledge provided during the consultation process.

93 A typical range of receptors and the locations and activities that they may be undertaking are provided in **Table A2/1** below. These are grouped into two main receptor groups (zone and linear route receptors) whose location and activities influence the way that they experience the landscape and views.

- Zone receptors – in locations defined by boundaries within which they are able to roam (eg residents within property boundaries, walkers on open access areas, visitors to scenic viewpoints, golfers on golf courses, recreational sea users in inshore waters). They can be stationary at a viewpoint or moving slowly over a defined area with relatively constant view or views and, as a consequence, zone receptors can be exposed to a long-term change in a view for an appreciable duration.
- Linear route receptors – in locations that are linear routes along which they travel (eg motorists on roads, train passengers on railway lines, walkers on footpaths, horse riders on bridleways, ferry passengers on a ferry route). They are already experiencing a constantly changing series of views and, as a consequence, linear route receptors may be exposed to long-term changes in any one view for only a momentary or relatively short period in time but may be exposed to a series of such views of the development.

Table A2/1: Visual receptors

	Receptor type	Typical locations	Activities
Zone receptors:	Residents	Residential properties, farmsteads, settlements and towns	Experiencing views from within the curtilage of their properties, from windows, driveways and gardens
	Walkers, cyclists, horse riders	Open access areas	For exercise and to enjoy the landscape and views
	Motorists, walkers, cyclists and horse riders	Scenic vantage points	Stopping a journey to enjoy the view
	People at leisure (outdoors) eg golfers, fishermen, campers, bathers	Golf courses, fishing lakes, picnic sites, camping and caravan sites, holiday villages, beaches	Playing golf, fishing or other outdoor sports, picnicking, camping and caravan holidays
	People at work (outdoors)	Farms, mineral extraction sites, waste disposal sites	Working but with views of surroundings
	People at leisure (indoors)	Indoor recreational centres, cinemas	Indoor sports and leisure activities with few views of surroundings
	People at work (indoors)	Offices, business parks, industrial estates	Working with few views of surroundings
	Ferry, rail and air travellers	At ferry terminals, railway stations and airports	Waiting to catch their chosen mode of transport
	Recreational water users, eg swimmers, surfers, sailors	Moving around the inshore waters	Swimming, surfing, skiing, sailing, fishing, with views
Linear route receptors:	Walkers, cyclists and horse riders	On footpaths, cycle routes, bridleways and other public rights of way	Travelling at a steady pace with ample opportunity to enjoy the specific qualities of the landscape
	Motorcyclists, motorists and passengers	On motorways, A – C class roads, minor roads and tracks	Travelling at various speeds, depending on the class of road and driver, with various views
	Rail and air travellers	On trains and aeroplanes	Travelling at various speeds and with various views
	Passengers, eg ferry and cruise ships	On ferry and shipping routes	Passage-making, with views
	Commercial shipping and fishing	On shipping routes	Passage-making, limited views

Stage 4: Viewpoint Analysis

94 The viewpoint analysis examines a selection of viewpoint locations that represent the main landscape units and visual receptor types and locations in the zones of theoretical visibility in the study area. Where possible, the locations of these viewpoints are discussed and agreed with officers from the Local Planning Authority and other consultees during the scoping and consultation stages of the ES and LVIA.

95 At each location, the various receptor types are identified, the sensitivity of the location for each receptor type is judged, the magnitude of change in the view that would arise as the result of the proposed development is predicted and the sensitivity and magnitude are combined in order to determine whether the predicted change in the view would be significant for each receptor type.

Visual receptor sensitivity

96 All visual receptors are people and assumed to be equally sensitive to change. Accordingly, visual receptor sensitivity is determined in terms of the sensitivity of each location for each type of receptor (rather than the sensitivity of the receptors *per se*), taking into account:

- Receptor activities – for example, relaxing at home, undertaking leisure, recreational and sporting activities, at work, etc.
- Movement and duration- whether receptors are likely to be stationary or moving, which influences how long they will be exposed to the change at any one time.
- Frequency – whether receptors will be exposed to the change daily, frequently, occasionally or rarely.
- Orientation/direction – of receptors in relation to the development.
- Purpose/expectation – of receptors at that location.
- Importance of the view/location – popularity of location as indicated by designations, inclusion in guidebooks, and visitor facilities provided.

97 Accordingly, a location may have different levels of sensitivity according to the types of receptors at that location, the sensitivity may vary depending on the direction of the view, and any one receptor type may be accorded different levels of sensitivity at different locations. Some typical location sensitivities are provided in **Table A2/2**.

98 However, these are only examples which take into account some of the combinations of factors that may influence the judgement of location sensitivity for any one receptor at any one location. Wherever location sensitivity is judged, the specific combination of factors that have influenced that judgement are described.

Table A2/2: Location sensitivity

Receptor type	Location sensitivity
Residents	***High*** where they would be able to view the development in the primary views from their property (eg front/back windows), would be stationary or moving slowly about their property, would see the development on a daily basis, could be orientated towards the development, and would value these views.
	High/medium where they would be able to view the development in the secondary views from their property (eg driveway, gardens), would be stationary or moving slowly at these locations, would see the development on a daily basis, could be orientated towards the development, and would value these views.
	Medium where they would be able to view the development from very limited locations on their property (eg single attic window), would be stationary or moving slowly at these locations, would see the development on a daily basis, could be orientated towards the development, and would value these views.
Recreational receptors	***High*** where they are stationery or moving slowly (eg walking, cycling or horse riding), can be orientated towards the development, are at that location primarily in order to enjoy the view, and on a nationally designated route or regional long distance route and/or in a landscape nationally designated for its scenic value.
	High/medium where they are stationery or moving slowly (eg walking, cycling or horse riding), can be orientated towards the development, are at that location primarily in order to enjoy the view but also for other purposes, at scenic vantage points, on access land, on locally promoted route and/or local right of way.
	Medium where they are stationery or moving slowly, can be orientated towards the development, may be at that location in order to enjoy the view but may have other purposes (eg playing sport), or where the main view is not in the direction of the wind farm, and are on a local right of way, beach, sports field or other leisure/ recreational facility.
Road and rail users (motorists, passengers, bus and train travellers)	***High/medium*** in locations where they are moving steadily/swiftly, can be orientated towards the development, are likely to be at that location in order to enjoy the view, in a landscape that is nationally designated and/or on a nationally recognised scenic route.
	Medium in locations where they are moving steadily/swiftly, can be orientated towards the development, may be at that location in order to enjoy the view but may also have other purposes (eg journey to work), in a landscape that is not nationally designated for its scenic value and/or not on a nationally recognised scenic route.
	Medium/low in locations where they are moving swiftly, with a direction of travel that is oblique or side on to the development, are likely to be travelling for a purpose other than in order to enjoy the view (eg journey to work), in a landscape that is not designated.
Outdoor workers and school children	***Medium*** for outdoor workers and school children in locations where they may be moving slowly, can be orientated towards the development, may experience the view on a daily basis, may be at that location in order to enjoy the view but will have other purposes.
	Medium/low for outdoor workers in locations where they may be moving slowly, can be orientated towards the development, may experience the view on a daily basis, but are at that location primarily to undertake activities unconnected with the view.
Indoor workers	***Low*** for indoor receptors with limited views in this direction, who are in that location primarily to undertake activities unconnected with the view.

Magnitude of the change

99 The magnitude of the change in a view is a judgement based on a series of measured parameters, which assumes that the visual receptors are being exposed to the change for the first time and in excellent visibility (see definition of visibility in Glossary, **Appendix 1**).

100 Computer-generated wireframes (see the section on **Assessment Tools** at the end of this Appendix for details), a viewpoint analysis, fieldwork observations and professional judgement are used to identify a largely quantifiable set of parameters, which include:

- Distance and direction of the viewpoint from the development.
- Location and extent of the development visible from the viewpoint (number and parts of turbines visible).
- Field of view occupied by the development (horizontal and vertical angles of view measured in degrees).
- Context of the view and degree of contrast with the existing landscape and built elements (background, form, composition, pattern, scale and mass, line, movement, colour, texture, etc).
- Scale of change with respect to the loss or addition of features in the view. For the addition of wind turbines, this includes the relative scale of the turbines and whether the development would be overwhelming, overbearing, dominant, prominent, visible, noticeable, discernible or barely discernible.
- Duration and nature of the effect, eg temporary/permanent, short term/long term, intermittent/continuous, reversible/irreversible, etc (as related to the nature of the development, not the receptor activity).

101 For each viewpoint location, the parameters in para 100 above are examined, the findings combined and the assessment of magnitude judged using a scale of: very substantial, substantial, moderate, slight and negligible and, where necessary, the intermediate levels of very substantial/substantial, substantial/moderate, moderate/slight and slight/negligible. It should be appreciated that the magnitude of change is a continuum and these levels are used to describe bands along that continuum.

102 In reality, the prominence of the wind turbines and, therefore, the magnitude of change in each view will vary with the time of day and year, different weather, lighting and visibility conditions and different wind directions (eg the turbines are much less noticeable when the rotors are side-on to the observer). Also, receptors tend to become accustomed to change over time. These factors are not taken into account at this stage, but are considered in relation to the acceptability of the predicted significant effects.

Significance of effects on views

103 For each receptor type, the **sensitivity of the location** is combined with the predicted **magnitude of change** to determine the overall change in the view and whether there is likely to be a significant change in the view at that location. Having taken such a wide range of factors into account when assessing sensitivity and magnitude at each location, in most cases, the overall change in the view can be derived by combining the sensitivity and magnitude in accordance with the matrix in **Table A2/3** below.

104 In the following table, where overall effects are predicted to be major/moderate or higher (shaded dark grey), there are likely to be significant changes in the view. Overall effects of moderate+ (shaded mid grey) may be significant if experienced over a sustained length of a route or over most of a zone, area or location, and overall effects of moderate (shaded light grey) may contribute to significance if combined with greater changes at the same location, whereas moderate/minor+ or lower changes are unlikely to result in significant changes to views.

Table A2/3: Assessment of overall effects for visual receptors

LOCATION SENSITIVITY	MAGNITUDE OF CHANGE								
	V sub	**V sub/ sub**	**Sub**	**Sub/ mod**	**Mod**	**Mod/ slight**	**Slight**	**Slight/ neg**	**Neg**
High	Major++	Major+	Major	Maj/ mod+	Maj/ mod	Mod+	Mod	Mod/ min+	Mod/ min
High/ medium	Major+	Major	Maj/ mod+	Maj/ mod	Mod+	Mod	Mod/ min+	Mod/ min	Minor+
Medium	Major	Maj/ mod+	Maj/ mod	Mod+	Mod	Mod/ min+	Mod/ min	Minor+	Minor
Medium/ low	Maj/ mod+	Maj/ mod	Mod+	Mod	Mod/ min+	Mod/ min	Minor+	Minor	Min/ neg+
Low	Maj/ mod	Mod+	Mod	Mod/ min+	Mod/ min	Minor+	Minor	Minor/ neg+	Min/ neg

105 In certain cases, where additional factors may arise, a further degree of professional judgement may be applied when determining whether the overall change in the view will be significant and, where this occurs, this is explained in the assessment.

106 The polarisation of public opinion on wind energy is such that it is difficult to define significant changes to views as definitely beneficial or definitely adverse. Those who consider wind turbines to be aesthetically pleasing and symbols of clean, renewable energy may see the addition of turbines to their view as a positive/beneficial effect, whilst those who consider them to be an industrialisation of the countryside are likely to see them as a negative/ adverse addition to their view.

107 Public perception surveys suggest that the majority of people are supportive of wind energy. However, even within this majority, there is not a consensus on the appropriate locations of wind turbines (ie where their addition is beneficial to a view, and where adverse), as some people would prefer to see wind turbines in remote places, away from centres of population, whilst others would prefer turbines to be on the fringes of settlements or along transport routes where the view is already characterised by built development.

108 Accordingly, at this stage, the assessment identifies whether the overall change in the view will be significant for each receptor type at each viewpoint and the acceptability of the predicted significant changes to views for each of the main receptor groups and locations is considered in the final stage of the assessment.

Stage 5: Assessment of Effects on Landscape

109 The assessment of effects on landscape draws on the predicted effects of the development, the landscape context and the visibility and viewpoint analyses and considers whether the proposed development is likely to have a significant effect on landscape fabric, on the character of the landscape units, and on the special characteristics and purposes of the landscape designations in the study area.

Effects on landscape fabric

110 Landscape fabric is composed of the physical components of the landscape (eg landform, land cover and landscape elements/features). Developments can bring about both direct and indirect effects on landscape fabric. Direct effects occur where changes to the fabric of the landscape arise as the result of physical disturbance, for example, the loss of landscape elements such as hedgerows, walls and trees. Indirect effects are consequential changes that are separated from the source of the change in a temporal or spatial manner, for example changes in vegetation downstream as the result of modifications to surface water patterns in a catchment area.

111 The assessment of effects on landscape fabric considers the existing landscape fabric of the site and surrounding area and the predicted effects of the development, and makes a judgement as to whether there is likely to be a significant beneficial or adverse effect on landscape fabric.

112 As defined in the Glossary (**Appendix 1**), significant beneficial effects on landscape fabric could occur where important/mature/diverse/distinctive components, which had previously been lost or degraded as the result of agricultural operations or other development, would be added, reinstated or improved and significant adverse effects on landscape fabric could occur where important/mature/diverse/distinctive components would be permanently lost (or long term temporarily lost) and the effect cannot be adequately mitigated.

Effects on landscape character

113 Landscape character is composed of physical, biological and social components (such as landform, flora, land use, land cover, landscape elements, field and settlement patterns), combined with aesthetic and perceptual factors (such as colour, form, texture and pattern, sounds, smells, memories, associations, stimuli and preferences).

114 In addition to landscape character, the cultural, historical and intellectual dimensions of landscape influence our broader appreciation of our environment. These include our cultural background, our awareness of historical and contemporary influences, and our personal and professional interests. Our experience and, therefore, appreciation of landscape will also vary depending on other factors such as time of day, season, weather conditions and lighting. However, these influences will vary from person to person and from day to day. Cultural, historical and intellectual dimensions are issues which have not been considered within this assessment in relation to contemporary landscape character.

115 However, it is acknowledged that all landscapes are locally valued by the people who live and work in them and this is taken into account in this assessment.

116 The addition of a wind energy development into a landscape that is not currently characterised by wind turbines will usually have an appreciable effect on the character of at least a localised area within that landscape.

117 As defined in the Glossary (**Appendix 1**), a significant effect on landscape character is likely to occur where the proposed development would become one of the key characteristics of the landscape and would contrast with the existing character, and/or where existing key characteristics would be lost or changed.

118 This will depend on the following aspects of the landscape unit (the factors affecting the **sensitivity of the landscape resource**, see GLVIA p87, LI/IEMA 2002):

- The key characteristics of the landscape (including land use, pattern and scale).
- Nature of views (visual enclosure/openness of views, and extent to which views contribute to landscape character).
- Landscape designations (as an indication of value over and above local value).

119 It will also depend on the scale or degree of change to the landscape resource and the nature, extent and duration of the effects that will be brought about by the proposed development (the factors affecting the **scale or magnitude of landscape effects**, see GLVIA p87, LI/IEMA 2002).

120 The influence of all these factors on significance is different depending on whether one is assessing the effects on the landscape unit in which the development is proposed, or on landscape units further afield.

Significance of effects on landscape unit in which development is proposed

121 For landscape units in which a development is proposed, all the above factors are taken into account in order to determine whether the predicted changes in landscape character will be significant. However, the spatial extent of that effect and the significance of the change in the character of the landscape unit as a whole will depend on the size of the landscape unit, the scale of the development and the extent of the actual zones of visibility.

122 For example, a large-scale landscape unit may more readily accommodate a large-scale development. However, if the unit has little built development or surface screening features (such as woodland, etc), the proposed development would be visible over a wide area and, as a result, there may be a significant change in landscape character over a large part of the unit.

123 Conversely, in a small-scale and enclosed landscape (such as a landscape of small fields with hedgerows, trees and woodlands), there would be a significant change in landscape character in the vicinity of the proposed development. However, the screening effects of surface features may result in very few medium and long distance views, so a much smaller part of the unit would be affected. In such cases, if the landscape unit is extensive, and/or the development is on the edge of the unit, then such localised changes may not result in a significant change in the character of the unit as a whole.

Significance of effects on landscape units which are further afield

124 For landscape units beyond the site, the nature of views, the extent to which views contribute to the character of the landscape and the predicted

changes to those views are the main factors that determine whether the predicted changes in landscape character are likely to be significant.

125 Where particular views are an essential characteristic of a landscape unit, the wind farm will become a key characteristic of those views and those views are not already characterised by built development, then a significant change may result, whereas for a landscape unit whose character is derived mainly from its component features, views of the wind farm may not result in a significant change in landscape character.

126 Where significant effects on landscape character are predicted, this usually results in the creation of a new landscape character area/type or sub-area/type, which may have slightly different sensitivity, capacity, quality and/or value ratings than the original character area/type from which it was derived. If there are clear policy/management objectives or thresholds of acceptable change defined in planning policy or associated documents for the original landscape character area/type, then a judgement can be made as to whether the predicted significant effects would be within these thresholds and/or in accordance with the objectives for this landscape. However, for landscapes outside of designations, this is rarely the case.

127 Furthermore, as with visual amenity, the polarisation of public opinion on wind energy is such that there is not consensus on the appropriate locations for wind turbines and, in particular, where a change in landscape character would be beneficial or adverse.

128 Therefore, at this stage in the assessment, the change in landscape character has been described as significant or not significant, and the acceptability of the predicted significant effects is considered in the final stage of the assessment.

Effects on landscape designations

129 As noted in para 115 above, all landscapes are locally valued by the people who live and work in them. However, formal landscape designations provide an indication of value over and above local value and such landscapes are usually designated for the purpose of protecting the special characteristics for which that landscape is valued.

130 With regards to the national and local landscape designations in the study area, the assessment examines whether the proposed development is likely to significantly affect the ability of the designations to fulfil their purposes/ objectives, by examining the extent to which the development would affect the special characteristics that underpin the purposes/objectives of each designation.

131 As defined in the Glossary (**Appendix 1**), significant beneficial (or adverse) effects on landscape designations could occur where the development would bring about a change in the special characteristics that underpin the purpose/objectives of the designation, and that change would enhance (or compromise) the ability of the designation to fulfil those purposes/objectives.

132 Where a development is proposed outwith any designated landscapes, the assessment examines the extent to which particular views into and out of the designated areas are a special characteristic of the designations, whether the development would significantly change those views, and whether any significant changes in those views would enhance (or compromise) the ability of the designations to fulfil their purposes/objectives.

133 As noted above, significant effects on landscape designations can be either beneficial or adverse, and this will depend on the special characteristics of

the designation and the type of development proposed. Significant landscape and visual effects can be acceptable if these do not compromise the purposes of the designation and the acceptability of the predicted significant effects is discussed in the final stage of the assessment.

Stage 6: Assessment of Effects on Visual Amenity

134 The assessment of effects on visual amenity draws on the predicted effects of the development, the landscape and visual context, and the visibility and viewpoint analyses, and considers the significance of the overall effects of the proposed development on the visual amenity of the main visual receptor types in the study area.

135 As defined in the Glossary (**Appendix 1**), a significant effect on visual amenity can occur where a proposal:

- Would bring about a clearly visible change (eg by the addition of new elements, the removal of distinctive elements or by the obscuring of a distinctive part of the view) in the primary view(s) at a location or along a route; and
- Would become or would remove one of the key characteristics of the view(s); and
- Would contrast with the existing landscape and built developments; and
- The view(s) is one that is valued and can be appreciated by receptors that are at that location for purposes that include the appreciation of the view.

136 In accordance with the GLVIA 2nd edition (LI/IEMA 2002), large scale visual changes are likely to be more significant than small changes and changes from more sensitive locations are likely to be more significant than those from less sensitive locations.

137 Effects on visual amenity can be beneficial or adverse. However, the polarisation of public opinion on wind energy is such that there is not a consensus on the aesthetic merits or otherwise of wind turbines, or on the appropriate locations for wind turbines, so it is difficult to define significant changes in the view as having a significant beneficial or adverse effect on visual amenity. Furthermore, there is not a consensus of opinion regarding the extent to which any significant adverse effects on visual amenity should be considered acceptable or unacceptable.

138 Accordingly, at this stage in the assessment, the overall visual effects have been described as significant or not significant, and the acceptability of the predicted significant effects is considered in the final stage of the assessment.

Stage 7: Cumulative Appraisal

139 The cumulative assessment has examined whether there are likely to be any potentially significant cumulative effects on landscape and visual amenity as the result of the proposed development in combination with the permitted and/or other proposed wind energy scheme in the study area. The assessment has drawn on cumulative ZTVs, a cumulative viewpoint analysis and wireframes, fieldwork observations and professional judgement.

140 In this case, a cumulative appraisal has also been undertaken with a recently constructed wind energy scheme in the locality.

Stage 8: Acceptability of the Predicted Significant Effects

141 All wind energy schemes in the UK will result in some significant effects on landscape character and/or visual amenity.

142 Public perception surveys suggest that the majority of people are supportive of wind energy. However, even within this majority, there is not a consensus on the appropriate locations of wind turbines, as some people would prefer to see wind turbines in remote places, away from centres of population and other built structures (eg as suggested in SNH guidance[14, 15]), whilst others would prefer turbines to be on the fringes of settlements or along transport routes, rather than in more rural locations (as previously promoted by the Countryside Agency[16]).

143 Therefore, there is almost always an internal tension between landscape and visual amenity when a wind energy scheme is proposed, that is, if schemes are located in remote locations, they will inevitably result in significant changes in landscape character but may affect the visual amenity of very few receptors. In contrast, if schemes are located on the fringes of settlements or along transport routes, where the landscape is already characterised by built development, the significant changes in landscape character may be very limited, but there may be significant effects on the visual amenity of considerable numbers of receptors.

144 As a result, there is not a consensus of opinion on the appropriate locations for wind turbines and the circumstances under which significant effects on landscape character and visual amenity should be considered acceptable or unacceptable.

145 In some regions of the UK, strategic planning guidance for the location of wind farm developments, based on landscape capacity studies, have been prepared[17]. These provide a high level/strategic view of the locations where significant changes to landscape character and significant effects on visual amenity would be considered acceptable in planning terms and, therefore, effectively define thresholds of acceptability.

146 Accordingly, this final stage of the assessment discusses whether the development should be considered acceptable in landscape and visual terms by reference to:

- The geographical extent of the significant effects.
- The proportion of the time when these significant effects will be evident (as influenced by time of day and year, different weather, lighting and visibility conditions and different wind directions).
- Numbers of people who will be exposed to the significant effects.
- Proportion of receptors who are likely to consider the significant effects acceptable prior to and post construction (based on public perception surveys).

[14] Scottish Natural Heritage (2001) Guidelines on the Environmental Impact of Wind Farms and Small Scale Hydroelectric Schemes.
[15] Scottish Natural Heritage (2002) Strategic Locational Guidance for Onshore Windfarms in Respect of the Natural Heritage. Policy Statement 02/02.
[16] Countryside Agency (2002) Visualising Renewable Energy in the Landscape of 2050.
[17] In Wales – TAN8 (WAG 2005a) and boundary refinement studies being undertaken on behalf of the planning authorities. In Northumberland – the RSS and Capacity Studies.

- The degree to which the intensity/extent of any significant adverse effects would be in accordance with thresholds of acceptability in strategic planning guidance (if available).

Assessment Tools

147 The assessment tools include field survey sheets and photography to record fieldwork observations and computer programmes to generate the ZTVs, wireframes and photomontages.

Fieldwork Observations

Landscape fabric

148 For landscape fabric, the observations include the landform and hydrological features, land use, land cover and landscape elements on the site and along the access route, particularly in the locations of any proposed off-site works.

Landscape character

149 For landscape character, the observations include the landform and hydrological features, land use and land cover, landscape elements, landscape patterns, aesthetic and perceptual factors. An example checklist is shown in **Table A2/4** below.

Views and visual amenity

150 For views and visual amenity, the fieldwork observations include:

- Influence of surface features on the terrain based ZTV – locations of forests, hedgerows, woodlands, built development, etc.
- The visibility of other structures in the landscape.
- Locations and types of receptors in theoretical and actual zones of visibility.
- At viewpoint locations – the types of receptors and the factors affecting the sensitivity of the location (including receptor activities, movement/ duration, frequency, orientation, purpose/expectation and the importance of the view/location).
- At viewpoint and other locations – the parameters affecting the magnitude of change in the view (including the distance of the viewpoint from the development, the location and extent of the development visible from the viewpoint, the field and proportion of view occupied by the development, the context and degree of contrast with the existing landscape and built development, the scale of change and the duration and nature of the effects arising from the development).
- The way the view changes around a zone or along a route.
- Other factors that will affect the visibility of the wind turbines and, therefore, the proportion of time when these changes will be evident (including latitude, direction of view, time of day and year, different weather, lighting and visibility conditions and different wind directions).

151 Computer-generated wireframes assist with this process.

Table A2/4: Landscape Character Field Survey Checklist

Geology				
Igneous	**Metamorphic**	**Sedimentary**	**Drift geology**	**Soils**
Basalt	Gneiss	Chalk, flints	Boulder clay	Clay
Dolerite	Marble	Limestone	Glacial gill	Silt
Granite	Quartzite	Sandstone	Sand and gravels	Sand
Rhyolite	Schist	Siltstone	Marls, clays	Loam
Gabbro	Slate	Mudstone, shale		
Pumice, tuffs, lavas	Anthracite	Coal measures		Peat
		Conglomerates		
Landform				
Form	**Lowland**	**Upland**	**Valley**	**Features**
Flat	Plain	Plateau	Broad U valley	Rock outcrop
Undulating	Lowland	Ridge	Narrow V valley	
Rolling	Drumlin	Knoll	Deep gorge	
Steep sloping	Dip slope	Rounded hilltop	Gully	
Vertical	Escarpment	Peak		
Hydrological and coastal features				
Water bodies	**Watercourses**	**Features**	**Coastal**	**Coastal**
Pond	Stream	Spring/well	Beach	Cliffs
Ox bow lake	River	Marsh/bog/source	Dunes	Headland
Lake	Canal	Waterfall	Mudflats	Estuary
Reservoir	Ditches	Weir/dam	Salt marsh	Island
	Island	Ford/bridge		
Land use/cover				
Agriculture	**Forestry/woodland**	**Industry**	**Open land uses**	**Other**
Arable	Orchard/horticulture	Mineral extraction	Moor/heathland	Village green
Ley/improved	Parkland	Waste disposal	Urban common	Recreation ground
Semi-improved	Deciduous woodland	Light industrial	Horseculture	Country Park
Permanent pasture	Mixed woodland	Heavy industrial	MoD	Golf course
Rough grazing	Coniferous plantation	Energy generation	Airfield	Fishery
Scrub/bracken	Commercial forestry	Oil refinery/storage	Airport	Water park
Rights of Common		Gas storage/ terminal	Access Land	Sewage/water works
Landscape elements/features				
Built elements	**Vertical elements**	**Transport routes**	**Other elements**	**Leisure facilities**
Farm building	Wind turbine	Motorway	Hedgerows	Scenic viewpoint
Church	Windmill/wind pump	Main A/trunk road	Hedgerow tree	Picnic site
Castle	Communication mast	B roads	Tree clump	Camping site
Stately home	Electricity pylons	Minor roads/lanes	Copse	Caravan site
Hamlet	11/33kV poles/wires	Tracks	Shelter belt	Riding stable
Village	Telegraph poles	Bridleway	Stone walls	Sports/leisure centre
Town	Chimneys	Cycle way	Brick walls	Miniature railway
City	Cooling towers	Footpath	Post/wire fences	Canal/boat trips
Housing estate	Flare stacks	Railway station /line	Earth banks	Museum
Industrial estate	Lighthouse/beacon	Airport	Cattle grids	Historic building
Hospital		Ferry terminal/ route		Visitor centre
Glasshouse		Viaduct/aqueduct		

Landscape patterns				
Settlement	**Field patterns**	**Roads**	**Woodlands**	**Key:**
Dispersed	Unenclosed	Grid	Follow contours	v = vernacular
Nucleated	Small/medium/large	Follow contours	In valleys	p = period
Linear	Irregular/regular	In valleys	Plantation blocks	m = modern
	Orientation:	On ridges	Linear shelterbelts	
		Random/winding	Random/scattered	
Historical features				
Sites/remains	**Agricultural**	**Industrial**	**Routes**	**Earthworks**
Castle (remains)	Field pattern	Quarry (dis)	Green lane	Hill forts/ settlements
Motte & Bailey	Field boundaries	Pits (dis)	Droving route	Earthworks
Battle (site of)	Ridge and furrow	Tips (dis)	Trackway	Tumuli
Moats	Fish pond	Dismantled railway		Standing stones
Roman fort/villa	Marl pit/pond	De-watered canal		Cairns
Views				
Distance	**Elevation**	**Width**	**Depth**	**Orientation**
Long distance	Elevated/high level	Panoramic (360°)	Deep	Downwards
Medium distance	Medium level	Wide (180°)	Shallow	Horizontal
Short distance	Low level	Framed (90°)		Upwards
		Confined (45°)		
		Fragmented		

Landscape evaluation (based on *LANDMAP* method, CCW 2003)					
	Outstanding	**High**	**Moderate**	**Low**	**Very low**
Scenic quality:	Stunning	Beautiful	Pleasant	Poor	Very poor
Detractors:	None	A few	Some	Several	Many
Attractors:	Many	Several	Some	A few	None
Distinctiveness:	Bold	Distinct	Obvious	Indistinct	Obscure
Intactness:	Highly unified	Unified	Interrupted	Fragmented	Remnant
Sense of place	Very strong	Strong	Good	Weak	Very weak
Rarity:	Rare	Occasional	Frequent	Common	Very common
Condition:	Prime	Very good	Good	Fair	Poor
Other aesthetic and perceptual factors					
Scale:	Intimate	Small	Medium	Large	Vast
Diversity:	Uniform	Simple	Varied	Diverse	Complex
Enclosure:	Confined	Enclosed	Semi-enclosed	Open	Exposed
Pattern:	Formal	Organised	Regular	Random	Chaotic
Colour	Monochrome	Muted	Pastel	Colourful	Vibrant
Texture:	Smooth	Grainy	Textured	Rough	Very rough
Line:	Straight	Sinuous	Curved	Angular	Tortuous
Balance	V harmonious	Harmonious	Balanced	Discordant	Chaotic
Movement:	Still	Calm	Gentle	Busy	Very busy
Naturalness:	Wilderness	Natural	Semi-natural	Managed	Disturbed
Remoteness:	Inaccessible	Remote	Secluded	Accessible	Close by
Tranquillity:	Silent	Serene/quiet	Peaceful	Active	Noisy
Security:	Secure	Safe	Unsettling	Inhospitable	Hostile
Stimulus:	Awe inspiring	Invigorating	Interesting	Bland	Dull

Photography

152 During the fieldwork, photographs are taken to record fieldwork observations and also to capture the "existing view" from each viewpoint location. These are used in the viewpoint figures to illustrate the existing view and as the basis of the photomontages.

153 For the existing view, several overlapping frames are taken from each viewpoint location, using a film or digital SLR camera with the equivalent of a 50mm or 75mm lens. The camera is mounted onto a tripod with a rotating head and the frames are taken at set intervals.

154 When taking the photographs in the field, various parameters are noted, such as the date and time of day, the precise location of the viewpoint, magnetic bearings to or GPS locations of distinctive elements in the view, camera settings and weather conditions. These assist with the construction of the photomontages and allow the sun direction and weather conditions to be taken into account when representing the wind turbines in the photomontages.

155 The series of film negatives for each viewpoint are scanned to create digital images and these (or the digital frames taken with the digital SLR camera) are spliced together and cylindrically projected, using a proprietary software product, to create a panoramic image of the existing view. The appropriate viewing distance of these images is stated on each viewpoint figure.

Computer-based Tools

156 In addition to fieldwork observations and photography, computer-based tools are used for the assessment, including:

- Digital terrain model (DTM) - a three dimensional map of the landform of the study area, using the Ordnance Survey Landform Panorama digital terrain data (with height data at 50m centres) and/or the Ordnance Survey Landform Profile digital terrain data (with height data at 10m intervals). Each height datum provides an easting, a northing and an elevation in metres above Ordnance Datum (mAOD). With the 50m data, each grid intersection is accurate to within approximately 3m, whereas the 10m data is accurate to within approximately 1m. The DTM extrapolates between data points, so is not able to allow for localised topographical features between data points. Therefore, the 10m data provides both greater accuracy and more detail than the 50m data, but is more expensive and requires more data processing power. Also, the denser grid derived from the 10m data tends to turn distant landform solid in wireframes. Therefore, it can be appropriate to construct a DTM from the 10m data re-sampled at 50m intervals (which is still more accurate than the OS Landform Panorama data) or to construct a composite DTM that consists of the 10m data for the central part of the study area and the 50m data for the periphery. Finally, this DTM is manipulated to take account of the curvature of the earth and the effects of light refraction.
- Digital model of the wind turbines - the X, Y and Z co-ordinates of each turbine are located on the DTM, and a digital model of the proposed wind turbine size and design is located at each turbine location.
- Zone of theoretical visibility (ZTV) – a visibility map that illustrates the locations in the study area where landform may permit views of the wind turbines. This is generated using a computer-based intervisibility

package, the DTM and the model of the wind turbines. ZTVs can be configured to analyse the data in various ways to show, for example, the number of wind turbines that will be visible, the parts of the turbines that will be visible, or the angle of view occupied by the turbines in any one view. However, the ZTVs are based on landform only and do not show the screening effects of surface features such as trees, hedgerows or buildings.

- Wireframes – computer-generated wireframe perspectives of the landform and wind turbines to illustrate the predicted views from each viewpoint location. As with the ZTVs, the wireframes are based on the DTM only and do not show the screening effects of surface features. However, they do illustrate how much of the turbines would be screened by topographical features and, therefore, how much could be visible. These are taken into the field as an aid to identifying the location and scale of the development when viewed from each viewpoint location.
- Photomontages – computer-generated images of the wind turbines accurately located and overlaid onto the panoramic photographs of the existing view. These are not normally used as part of the assessment process but, where included in an assessment, are provided to illustrate a photo-realistic image of the predicted view from a selection of the viewpoint locations.

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LANDMAP data - www.landmap.ccw.gov.uk

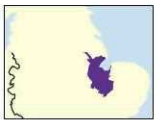
National bridle routes - www.ride-uk.org

National cycle network - www.sustrans.org.uk

National trails - www.nationaltrail.co.uk

Appendix 10.2 - National Character Area Description

Character Area
46



The Fens

Key Characteristics

- Large-scale, flat, open landscape with extensive vistas to level horizons and huge skies.
- A hierarchy of rivers, drains and ditches provide a strong influence throughout the area. Embanked rivers and roddons create local enclosure and elevation. Banks provide good grazing and grassland habitats.
- Modestly elevated 'islands' within fens provide isolated higher ground for most settlement. A higher proportion of grassland, tree cover and hedgerows are associated with these areas.
- Settled Fens or 'Townlands', in arc set back from the Wash, exhibit an ancient medieval and irregular field pattern. Typically smaller-scale with scattered farmsteads and dispersed ribbon settlements along the main arterial routes.
- Peaty Fens drained in 17th century comprise large rectilinear fields of black soil. A geometric road and drainage pattern with major high-level drains, washes and associated pumping stations. Roads and rail links often on elevated banks.
- Area south of Lincolnshire Wolds most recently drained with Wolds providing marked 'Upland' horizon to north.
- Woodland cover sparse. Occasional avenues to roads, elsewhere isolated field trees have marked significance. Shelter belts including poplar, willow and leylandii hedges around farmsteads. Numerous orchards in Wisbech area.
- Fragments of relic wet fen areas at Wicken, Woodwalton and Holme.
- Built forms exhibit strong influence ranging from historic cathedrals and churches, like Ely and Boston to large agricultural and industrial structures. Domestic architecture displays combination of elegant Georgian brick houses and bland 20th century bungalows.
- Marshes directly adjacent to the Wash exhibit an exceptionally open aspect, broken only by a series of sea walls. Associated river outfall structures, tidal saltmarshes and mudflats.
- Rich and varied intensive agricultural land use including wide range of arable, root crops, bulbs, vegetables and livestock. Field labourers prevalent at harvesting. Horticultural glasshouses and general agricultural clutter a significant feature.
- Bronze Age, Iron Age and Roman landscapes emerging from below the falling peat. Very rich archaeology especially on fen margins.



NATIONAL TRUST

The once vast expanse of wetland that had existed prior to the extensive drainage of the Fens is now confined to a few remnants, such as here at Wicken Fen. Though fragmented, and often surrounded by a sea of intensive farming, these areas are an intrinsic part of the Fens character, offering a glimpse of the area's origins as well as important wildlife and recreational resources for today.

Landscape Character

The Fens is a large area which slowly drains towards the Wash, England's largest tidal estuary. The area abuts a number of other character areas. To the east lies North West Norfolk and the Breckland. To the south-east rises the gently rolling East Anglian Chalk and to the south-west are the undulating Bedfordshire and Cambridgeshire Claylands. To the west, rise




Character Area 46
The Fens
Area 46 boundary
Adjacent Area
A Road
B Road
Railway and Station
County boundary
District boundary
45
43
44
42
47
47
75
76
92
88
85
87
THE WASH
BOSTON
Stickney
Wainfleet All Saints
Wrangle
Kirton
Donington
Gosberton
Holbeach
SPALDING
Long Sutton
Terrington St Clement
KING'S LYNN
Heacham
Market Deeping
WISBECH
Outwell
Downham Market
Wretton
March
Whittlesey
Chatteris
Littleport
ELY
Soham
Waterbeach
0-200'
height above sea-level in feet
0
10km

60

the gently shelving slopes of the Kesteven Uplands and the southern Lincolnshire Edge. To the north-west, the woods and gravel workings of the Central Lincolnshire Clay Vale gradually slope down to the Lincolnshire Fens, while due north the Lincolnshire Wolds rise to create a dominant 'Upland' horizon. The Steeping river marks the quieter north-east boundary to the Lincolnshire Coast and Marshes. The land boundary of the Fens is typically drawn along a series of catchwater drains, dykes, canalized rivers and lodes.

The single obvious factor uniting the Fens is the low-lying, level terrain. With the exception of the Isle of Ely, which reaches above 20 m, levels rarely pass the 10 m contour, and typically vary by little more than one or two metres over many miles. Much of the land is below sea level, relying on pumped drainage and the control of sluices at high and low tides to maintain its agricultural viability. The level horizons and the huge scale of the landscape create a strong sense of isolation. There are, typically, large open panoramas and enormous skies, whose changing weather patterns have a strong influence on the observer. The large fields and strong seasonal changes of colour, created by varied and multiple cropping in the rich soils, forms a landscape which can, at one and the same time, be intimidating and yet uplifting. It is a landscape which represents man's dominance over the environment and often results in a strong rectilinear pattern of drainage to drain inland fens or reclaim coastal marshes.



DAVID BURTON/COUNTRYSIDE AGENCY

The Fens is characterised by its rich and varied intensive agriculture, including a wide range of arable, root crops, bulbs, vegetables and livestock. This view of strip vegetable growing is typical of the area around Spalding.

Although at first acquaintance the Fens can seem monotonous, there are marked variations and graduations as one moves from fen to fen and, more noticeably, between areas with differing lengths of settlement history. There are four broad distinctions within the Fens. Firstly, the 'Settled fens' or 'Townlands', which run in a broad arc inland from the Wash, between Kings Lynn and Boston. This is a more ancient small-scale landscape of sinuous lanes and relative intimacy with a higher density of settlements, some fine churches and remnant grasslands.

Secondly, the extensive 'Peaty Fens' or 'Black Fens' which were finally comprehensively drained in the 17th to 19th centuries. This area comprises broad rectilinear fields and straight roads. The only consistent relief to the level landform are the 'negative' notches of the drainage ditches and the raised berms and banks of the artificial drainage channels. Within the broad area of peat fens are a few isolated islands of higher ground, most notably the Isle of Ely.

Thirdly, the fens of south-east Lincolnshire between the Townlands and the Wolds. This was the last area to be drained. Works were complete by 1820, having been accelerated in the agricultural and industrial revolution. The drainage here was so thorough that scarcely a vestige remains of what had been one of Britain's richest wildlife habitats. This is an open productive landscape with a strongly rectilinear form.

Finally, the band of Wash Marshes reclaimed from the Wash by the construction of a series of sea wall defences begun in the 17th century. Here, extensive fields of vegetable crops stand alone against the sky. Beyond the defensive walls, saltmarshes and tidal mudflats, often abundant with wildfowl, stretch out into the Wash.

Physical Influences

The Fens is a complex landscape which drains to the tidal basin of the Wash. As sea level has changed since the last Ice Age, the balance of saltmarsh, fen, bog and woodland has altered. The underlying geology is a combination of post-glacial alluvium and freshwater clays and post-Roman marine clays. The exception being elevated islands of Jurassic clay at the inner margins of the area, for example at Ely.

The soils over the central and coastal fens comprise rich, fertile, stoneless, calcareous, silty soils while inland are swathes of dark, friable, fen peat. The original courses of the rivers meandered slowly across the level fens causing widespread seasonal waterlogging by river water and high tides. Four major rivers drain into the Wash: the Witham, Welland, Nene and Great Ouse. All rivers now have artificial canalized courses which run straight for miles and are bounded by high banks to contain the watercourse from the lower adjacent fields. In some locations 'roddons', inland silt banks, mark the former course of old river beds and now lie like stranded sea serpents up to 2-3 m above the dark peat soils which have subsequently shrunk due to continuous cultivation, drainage and wind erosion of the peat. This irreversible shrinkage creates an ever greater demand for artificial drainage of the land.

Historical and Cultural Influences

The human history of the Fens has been a battle of man against the forces of nature to bring out the full agricultural potential of the land. Much of the early archaeological

evidence is now becoming apparent with shrinking peat levels exposing well-preserved remains for the first time since the Bronze Age.

The Romans were the first to attempt to control the water levels by building a sea wall along the inner Fen margin and cutting channels. At this time settlement comprised farms clinging to the higher ground along the banks of the new and improved drainage channels. Pastoral farming for wool and leather was the principal agricultural activity. Livestock were probably transported along the dykes, such as Car Dyke which ran from Lincoln to Peterborough along the western fen edge. Salt production from tidal salt water was one of the main economic activities. These artificial waterways fell into disuse after the Romans left.



DAVID BURTON/COUNTRYSIDE AGENCY

Long straight roads reflect the geometric drainage and field patterns of the drained fens, with isolated farm buildings often the only settlement in intensively farmed areas, such as here at Holland Fen, Lincolnshire.

In the Dark Ages the monks began to play an important role in the evolution of the area. Fen edge monasteries developed in Lincolnshire, such as on the gravel island at Crowland, and in Cambridgeshire, with a monastery preceding the great Cathedral at Ely. Lands on the clay island were granted to the monks to tend. The swamps of the Black Fen, veined with watercourses, provided refuge for the Saxon folk hero, Hereward the Wake, in his resistance to the Norman authorities. From the 13th century there were sporadic attempts to set up comprehensive drainage systems. One of these included the 14-mile cut between Peterborough and Guyhirn called Mortons Leam which still functions today. Fenland was drained through 'assarting' - the process by which common land was enclosed piecemeal by private landowners. On the 'Settled' Fen in the medieval period, grazing was prevalent and a pattern of radiating drove lines known as 'The Smeeth' developed between the coast and the inland grazing on the fen. Salt making, at Bicker Haven, was also characteristic in the medieval period. Residual mounds or 'salterns' remain in many places as evidence.

The most influential stage in changing the character of the area came in the 17th century when the 4th Earl of Bedford gained a Royal Charter to turn the 'wastelands' into good summer grazing. The Dutch engineer Vermuyden, who was chief designer, straightened the wayward rivers by creating new linear links and sluicing them against tidal inflow. Washes between parallel watercourses were created, for example The Hundred Foot or Ouse Washes, to enable temporary controlled flooding at high tides and high river levels. This process created the North, Middle and South 'Bedford' Levels. This vast agro-engineering project was not without its conflict. The local and fiercely independent 'Fen Tigers' fought against Bedford's 'Adventurers'. Initially it was hoped the Levels would naturally drain across the more coastal silty land. However the peat soils shrank and oxidised as they dried out, thereby necessitating the artificial pumping of the land, first by windmills, later by steam and now by diesel and electric pumps. The drainage was so advantageous to the productivity of the land that the former pastoral areas were converted to Grade I soils suitable for intensive arable, vegetable and horticultural production. The wealth created by the drainage of the area also came from new sources such as seed and bulb cultivation. The last areas to be drained were the East, West and Wildmore Fens of south-east Lincolnshire. Besides the draining of the inland Fens the reclamation of the coastal salt marshes has been significant. New sea walls were built to further extend the rich agricultural land into the Wash which resulted in the loss of estuary habitats.

The Fens have attracted literary attention over the centuries. John Clare wrote in the 19th century of the undrained fen:

> 'Here tempests howl
> Around each flaggy plot
> Where they who dread man's sight the water fowl
> Hide and are frighted not.'

In the same century, Charles Kingsley wrote:-

> 'Gone are the ruffs and reeves, spoonbills, bitterns and avocets ... Ah well at least we shall have meat and mutton instead, and no more typhus and ague.'

This commentary noted how the marshy lands had gone and, with them, the dank, disease-bearing conditions. Traditional activities such as ice skating on frozen marshes, eeling and punting through reed beds have become even more marginalised through the 20th century. Graham Swift's 1980s novel *Waterland* keenly identifies the changing lifestyles of Fenland people.

Buildings and Settlement

The settlement pattern follows the historical development of the area. The Townlands comprise medium to large clusters around Boston, Spalding, Holbeach and Wisbech

with many villages having fine medieval churches, eg. West Walton. In this Settled Fen a small plot of 40 acres of productive land can support a viable farm unit. Vegetable and horticultural industries can still be highly labour intensive and consequential support a good-sized local population. The medieval pattern of north-south drove lines, between parent and daughter settlements on coast and fen edge respectively, was crossed in the 19th century by the A17 and A47. Since then the settlements in these Townlands have spread along these principal routes to create ribbon developments of smallholdings, modern bungalows, large agricultural barns and food processing buildings, eg. Sutton Bridge.

The 'Peaty Fens' inland are, by contrast, very sparsely settled with isolated farmsteads and houses on local areas of raised land being the only built elements for miles. Due to the shrinkage of the peat soils, many buildings are now derelict, either standing at alarming angles or shored up, while the linear roads have likewise suffered showing significant undulations.

Cambridge, which lies on the southern edge of the Fens and also at the junction with the Claylands and Chalklands, contains a mosaic of colleges which have long reflected the best in architecture. The idyllic 'Backs' down to the dreamy Grantchester Meadows beloved by Rupert Brooke mark the romantic yet controlled end of the Fens. Peterborough with its fine cathedral marks the western boundary of the Fens although the sprawling New Town sits uneasily on the Fen edge.

Ely, Boston, Wisbech, Spalding and Kings Lynn provide the major historic settlements within the Fens. Ely Cathedral dominates the skyline for miles 'like a great ship tugging at its moorings' (Betjeman). At Boston, once England's largest port, the 83 m high Octagonal tower known as the 'Boston Stump' is a marker across the open fen. At Wisbech, once a coastal port, elegant 18th century merchants' houses line the river Nene at North Brink, notably Peckover House (National Trust). Kings Lynn, which developed as a port and trading centre, possesses in part a notable town centre with intimate courtyards and alleys reflecting the Dutch influence. The quayside Custom House is a fine 17th century building.

Due to the lack of natural building materials, most materials were imported, except for reed and clay for bricks. For the fine ecclesiastical and collegiate buildings stone came from the quarries of Lincolnshire, Northamptonshire, Rutland and Yorkshire including Ancaster and Barnack Stone. Brick is the ubiquitous material with variations in colour and texture. It is found in the use of red bricks in the Wisbech merchants' houses and yellow gault clay brickwork in the Bedford Estate cottages at Thorney. In the rural areas, thatch is now the exception due to the disappearing reed beds.

Land Cover

The Fens are now predominantly cultivated. There is little semi-natural land left. Remnants of original fen, like that at Wicken Fen, are rare exceptions and stand stranded above the shrunken peat. There is negligible woodland, with the majority of trees found lining roads or clustering around villages and the fen estates, as at Thorney. Exceptions include Woodwalton to the west and small ex-decoy woodlands such as in the Eastern Fens. Extensive orchards and associated windbreaks are located in the Wisbech area to create a distinctive though dwindling landscape cover. Within the Townlands the varied vegetable and horticultural cropping is most typical on the more ancient irregular pattern of medium-sized fields. Around Spalding the bulb fields provide a strong seasonal feature popular with visiting tourists.

Much of the Peaty Fens comprise field vegetables, root and cereal crops. Here field sizes are large and rectilinear with dykes and crop demarcation providing the subdivision of units. Pollard willows also feature in some areas, as at Whittlesey. The 'Washes', between the Old and New Bedford rivers and the Nene Washes, provide a man-made yet valuable wildlife resource of international significance for wildfowl.

The saltmarsh and mudflats beyond the sea walls, which extend towards the Wash, are also valuable habitats for wildfowl, wading birds and other wildlife.

Around the low clay hills, most notably the Isle of Ely, the landscape is one of mature trees and hedgerows containing small arable fields and occasional remnant ridge and furrow pasture.

The Changing Countryside

- Past and continuing shrinkage, oxidation and wind erosion of peaty fens due to drainage and cultivation. Falling land levels and reduction in fertility, particularly on gravels. An increased reliance on pumping which, combined with rising sea levels, creates an ever more artificial and perilous balance.
- Reclamation of saltmarsh for agriculture and consequential squeezing of intertidal mudflats (now largely halted). Some re-introduction of grazing to salt marshes.
- Loss of grazing banks and grasslands around settlements by ploughing and move to cropping. Subsequent loss of livestock.
- Dyke and embankment upgrading to aid flood protection. Some overmanagement of ditches, reducing aquatic and marginal vegetation. Some limited loss of dykes and banks in Suffolk, where now redundant.



DAVID BURTON/COUNTRYSIDE AGENCY

Ely Cathedral dominates the skyline for miles around 'like a great ship tugging at its moorings' (Betjeman). Like Ely, most settlement in the drained fens is restricted to the higher ground formed by 'islands of clay'.

- To satisfy market forces for top quality vegetables, development of multiple cropping, irrigation and associated reservoirs.
- Gravel extraction to north of Peterborough at Langtoft and Baston.
- Loss of individual trees including pollards. Recent tree planting predominantly of leylandii to create shelter.
- Loss of orchards, eg around the Wisbech and Cottenham area.
- Proliferation of new large-scale agricultural buildings and dereliction of older farm buildings due to peat shrinkage or changing land use. Shrinkage damage to minor roads.
- Visually intrusive development to settlement margins including road schemes, power lines, industrial and residential.
- Light pollution resulting from intensive agriculture and growth of settlements - particularly apparent in the flat terrain.

Shaping the Future

- The retention of the distinctive large-scale vistas is important.
- Clumped tree planting is needed to soften the impact of isolated farmsteads and buildings and, occasionally, along roads or ditchlines where already a local feature. The pollarding of existing willows needs to be addressed.
- On clay islands, the introduction of new woodlands and hedgerow reinstatement would enhance sub-area distinctiveness.
- Linking Fen villages and settlements to their surrounding landscape should be considered, using grassland, wetland, shelter belts and hedgerow planting with the mix dependent on local patterns.
- Drainage dykes and embankments need managing by reprofiling watercourses, re-creating herb-rich grassland to embankments and reintroduction of grazing. Wetland and grassland buffer strips alongside field margins would benefit wildlife.
- The re-creation of sizeable areas of wet swamp fenland and wash grasslands by management of rivers and drains should be considered. The use of washlands for winter water storage and the protection of retained areas eg Wicken Fen and Ouse and Nene Washes are important.
- The re-introduction of grazing to marshes and sea wall defences and the protection of tidal mudflats and marshes would be beneficial.
- The retention of old orchards and fruit varieties around Wisbech and other areas of Settled Fen are important as is new orchard planting.
- The conservation of archaeological sites at risk from peat erosion and cultivation should be addressed.

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Glossary

berm: a flat strip of land, raised bank or terrace bordering a river

roddons: inland silt banks



DAVID BURTON/COUNTRYSIDE AGENCY

The Middle-level drain, in Norfolk, constructed in 1848. The hierarchy of embanked rivers and drains provide a strong influence throughout the area, often elevated above the low lying farmland, the level of which is falling due to drainage and farming practice.

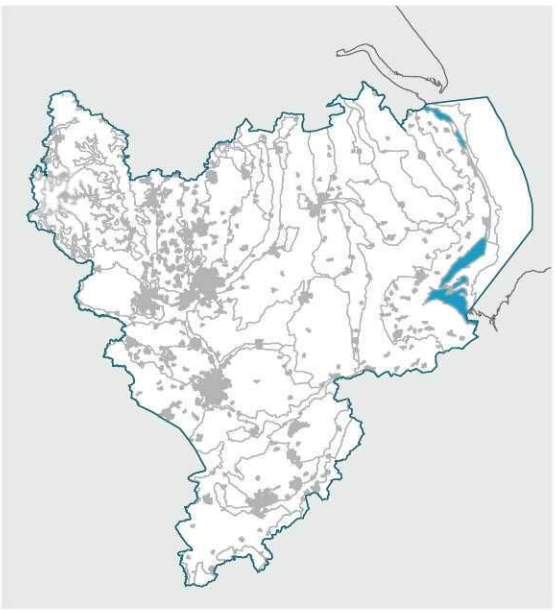
Appendix 10.3 - South Holland LCTs

1A:

COASTAL SALTMARSHES AND MUDFLATS



Extensive landscape with wide panoramic views out to sea (© J Watson)



KEY CHARACTERISTICS

- Dynamic landscape formed by natural processes of deposition, inundation and ecological succession;
- Extensive low lying landscape with wide panoramic views out to sea, notably in The Wash albeit limited in some places by sea banks;
- More intimate and varied saltmarsh landscapes on the North Lincolnshire Coast where views inland and out to sea are often obscured by dunes or sea banks.
- Complex networks of brackish pools, tidal creeks and inlets;
- Temporal landscape influenced by tides;
- Generally inaccessible in The Wash with little or no built development evident. Greater access provision to areas of saltmarsh along the North Lincolnshire Coast;
- Rich mosaic of saltmarsh plant communities offer important habitats for waterfowl and invertebrates, and form part of complex and protected coastal ecosystems; and
- Dramatic and evocative landscape offering views of wild places little influenced by human activities.

LANDSCAPE CHARACTER

The Coastal Saltmarshes and Mudflats Landscape Character Type is a simple and visually unified landscape of low lying salt tolerant plant communities, tidal creeks and wide open areas of intertidal mud. The landscape generally retains a wild, remote character and is highly valued for its nature conservation interest as part of extensive maritime habitats extending around the fringes of The Wash and along the North Lincolnshire Coast.

Expansive views from the seabanks and dunes that mark the inland extent of the saltmarshes are possible across large areas characterised by low vegetation, level horizons, and vast skies, particularly in The Wash area. The ebb and flow of tides can also be observed, adding a dynamic quality to otherwise undisturbed landscapes.

The natural character of the landscape prevails. However, mooring along creeks in The Wash and at Gibraltar Point, grazing and occasional evidence of military uses, demonstrates that human influences are at play even in what seem to be undisturbed landscapes.



Coastal Saltmarshes and Mudflats
(© Natural England)

PHYSICAL INFLUENCES

Saltmarsh forms through natural processes in areas between the mean high water level of spring and neap tides on sheltered coasts. They are intimately related to the intertidal flats which form in front of them. The movement of sediment between saltmarsh and flats are a normal part of the functioning of both habitats.

Saltmarsh is characterised by an intricate network of tidal creeks and open areas consisting of various saltmarsh habitats, the most common being pioneer and lower marsh characterised by salt tolerant glasswort, common saltmarsh grass and sea purslane communities. At one time significant areas of higher and middle saltmarsh communities would have existed. In The Wash saltmarshes have been lost to centuries of coastal drainage and agricultural reclamation. However, overall they are accreting. Saltmarsh and mudflat habitats are very important to a number of marine and terrestrial wildlife species, some of which are rare. Indeed, the matrix of wet and dry areas and different plant communities are home to many specialised invertebrates such as spiders, moths, beetles and flies. Many areas of saltmarsh also provide grazing for large flocks of wintering duck and geese and shelter for breeding birds such as redshank. As a consequence the saltmarshes in the region mark the landward limits of important nature conservation designations including The Wash and Humber Estuary Special Protection Areas and Special Areas of Conservation and Ramsar status.

Whilst appearing natural, areas of saltmarsh within The Wash are managed by grazing. Although light grazing can be advantageous, high grazing pressure can reduce conservation interest.

In addition to providing important habitats, many areas of saltmarsh also protect inland areas from flooding by dissipating and reducing the amount of tidal energy reaching the shoreline.

With the flat landscape and no geological exposures within the Coastal Saltmarshes and Mudflats, there is very limited potential for the application of practices for the care, maintenance and management of features of geodiversity interest and the promotion of their educational and interpretational interest. However, the former river channels beneath the fenland deposits often produce raised ground and form excellent geomorphological features worthy of preservation.

CULTURAL INFLUENCES

The Coastal Saltmarshes and Mudflats Landscape Character Type retains a strong sense of wilderness with few visible indicators of human intervention. Exceptions include the seabanks, which define the landward edge of the saltmarshes, visitor facilities such as at Gibraltar Point and the boats that moor in sheltered creeks in The Wash. Some areas also form part of military ranges, and contain infrastructure and buildings such as watchtowers and metalled tracks.



Coastal Saltmarshes and Mudflats (© Natural England)

AESTHETIC AND PERCEPTUAL QUALITIES

The Coastal Saltmarshes and Mudflats is one of the most remote Landscape Character Types in the East Midlands and marks the transition between land and sea. It has a strong character and sense of place, defined by a limited number of landscape features; intertidal mudflats, low lying salt tolerant vegetation and dendritic patterns of creeks which allow tidal waters to flow in and out.

Whilst views inland and out to sea are sometimes restricted by sea banks and dunes, occasional views can be wide and expansive, adding to the landscape's remote and natural character. Where grazing occurs and where boats are moored in tidal creeks in The Wash the landscape can appear less wild and remote. However, generally wide areas show few signs of human intervention and retain a tranquil character.

LANDSCAPE CHANGE AND MANAGEMENT

INFRASTRUCTURE

Forces for Change

In places, and notably within The Wash, land reclamation for agriculture has historically reduced the proportion of saltmarsh. Whilst the process of land reclamation has eased in recent decades, incremental development such as car parks and viewpoints, flood defence works and infrastructure associated with military ranges have created visual intrusions and reduced the sense of tranquillity in some locations. In some locations the area of saltmarsh has grown as a result of land use change and/or marine sediment deposition.

Shaping the Future Landscape

The strategy should be to protect the simple character of the landscape and consider the visual impact of any new structures or facilities. Fishing, Agriculture and Land Management

AGRICULTURE, LAND MANAGEMENT AND FISHING

Forces for Change

Grazing is important for the vegetation structure and the overall ecology of the saltmarshes and mudflats, notably in The Wash. However, change in agricultural practices has led to a reduction in grazing in recent decades.

Shaping the Future Landscape

The aim should be to manage new and existing saltmarsh through grazing where appropriate, ensuring landscape and biodiversity character is enhanced or restored. The frequency and intensity of grazing should be considered on a site by site basis.



Saltmarsh east of Seaview, Saltfleetby
(© Natural England)

TOURISM AND FISHING

Forces for Change

The Wash section of the Coastal Saltmarshes and Mudflats is generally inaccessible although boat moorings are evident in some of the creeks. A greater level of access is available to the areas of saltmarsh along the North Lincolnshire Coast with visitor facilities, notably at Gibraltar Point. Visitor levels are low and mainly confined to those seeking the enjoyment of the wild, remote character and nature conservation interest. Nevertheless, at the car parks and principal viewpoints, there is potential to affect the tranquillity and simplicity of the landscape and the provision of further facilities could further detract from an area where there is little evidence of human activity.

Shaping the Future Landscape

The aim should be to manage this landscape to limit the long term impacts of human activity and ensure that existing and any future facilities and access to the saltmarshes are carefully controlled in order to retain the wild and remote character.

ENVIRONMENTAL PROCESSES AND CLIMATE CHANGE

Forces for Change

Climate change could present a major threat to coastal landscapes where the intertidal zones become 'squeezed' between rising sea levels and sea defences. If the defences stay where they currently are, the size and nature of the defences will change significantly, probably to the detriment of landscape quality.

Shaping the Future Landscape

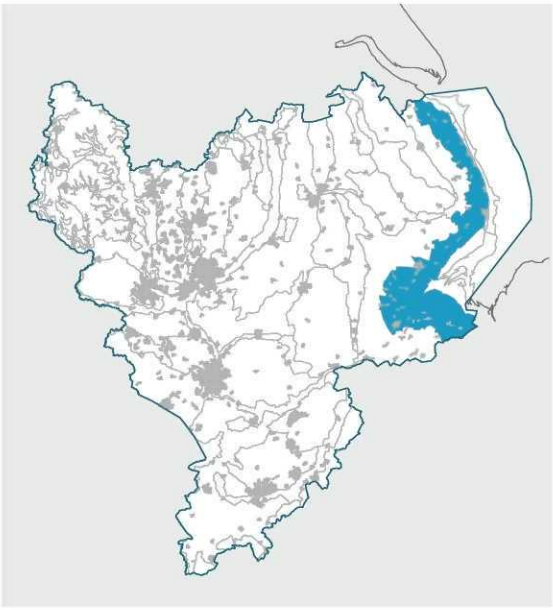
Flood defence work (both new construction and maintenance) should be planned to seek to avoid damage to existing saltmarsh.

2A:

SETTLED FENS AND MARSHES



Fertile soils support arable farming and horticulture (© Wash Estuary Strategy Group/A Lambert)



KEY CHARACTERISTICS

- Low lying, flat and open landscape with wide horizons and panoramas encompassing vast skies;
- Fertile soils supporting highly productive arable farming with limited biodiversity interest;
- Successive periods of enclosure creating local variations in character from organic late Saxon enclosures to rigid 19th and 20th century geometric field systems towards the coast;
- Field boundaries predominantly defined by wet dykes, sea walls, roads and canalised rivers; few hedgerows, hedgerow trees and woodlands;
- Large farm buildings and glass houses often associated with industrial scale agricultural and horticultural operations; and
- Coastal seaside resorts with large areas of static caravans and associated facilities contrast to productive farmland and remote countryside elsewhere.

SECTION 4

LANDSCAPE CHARACTER

The Settled Fens and Marshes is a complex Landscape Character Type that has been strongly influenced by various episodes of enclosure and settlement of former saltmarsh and fen.

Lying beyond the limits of the Roman's first sea defences that ran between Peterborough and Lincoln further to the west, the area was first drained and settled by the Saxons. The organic pattern of enclosure boundaries and roads of the 'Townlands' provide a tangible link to the origins of the well settled agricultural landscape. Here, ancient villages and outlying hamlets mark the first of several successive waves of drainage, enclosure and settlement, culminating in the more geometric patterns associated with 19th and 20th century enclosures towards the coast.

Land use is typically arable, the area being particularly fertile and productive. This has resulted in only small areas of land being noted for their habitat value. Wide areas are well settled and busy, notably coastal resorts during the summer months. Elsewhere, the scarcity of settlement and access means that wide areas are remote and isolated, with perceptions enhanced by featureless horizons and vast skies.



Grazing Marshes and Pasture, Saltfleetby, Settled Fens and Marshes. (© Neil Pike, Natural England)

PHYSICAL INFLUENCES

The underlying geology is largely Quaternary tidal flat deposits of clay and silt, which give rise to naturally wet, fertile loamy and clayey soils. Landform is generally flat and low lying, typically between sea level and 5m AOD, although some areas lie below sea level.

From the 4th century rising sea levels led to the deposition of a band of marine silts which in turn led to the creation of intertidal salt marshes with localised areas of slightly higher ground. Prior to improvement, the river systems, along with tidal inundations, caused widespread seasonal waterlogging of the area. Centuries of drainage and water management have created artificial, canalized river channels which run straight for several kilometres and are flanked by high embankments to protect the adjacent lower lying fields. Elsewhere smaller streams appear to occupy more natural winding courses. However, these too are part of a highly managed water management system to maintain the viability of agricultural areas.

With the flat landscape and no geological exposures, there is very limited potential for the application of practices for the care, maintenance and management of features of geodiversity interest and the promotion of their educational and interpretational interest. However, the former river channels beneath the fenland deposits often produce raised ground and form excellent geomorphological features worthy of preservation.

Land cover is dominated by productive agriculture comprising predominantly wheat, barley, legumes and brassicas. However, some pasture is evident in smaller hedged fields close to villages and along seabanks. Bulb growing is also notable, with fields of flowers providing seasonal colour and visual interest. Intensive agriculture has resulted in only limited retention of semi-natural habitats, but with the close proximity of internationally important coastal and marine habitat, this highlights the importance of good agricultural practices across the landscape.

Woodland cover is generally sparse. However, some areas fringing the Lincolnshire Wolds retain higher levels of woodland cover, a significant proportion of which is ancient woodland. The predominant pattern across the Settled Fens and Marshes is of small plantations of young trees, often arranged in geometric shelter belts and plantations close to farms or along field boundaries in an otherwise open, agricultural landscape. Hedgerows are also largely absent, giving visual prominence to trees found along roadsides, in belts around farms and clustering on the fringes of villages.

CULTURAL INFLUENCES

The Settled Fens and Marshes display a complex history of land drainage, settlement and agriculture. In a landscape that displays a simple unity in the underlying physical influences of geology, soils, landform and land use, the local variations in landscape character are significantly influenced by the age and type of land reclamation and more recent patterns of settlement and agricultural land management.



River Eau at Saltfleetby, Settled Fens and Marshes (© Neil Pike, Natural England)

During the prehistoric and Roman period the landscape would have been coastal in character characterised by intertidal salt marsh and areas of marginally higher ground. However, rather than being beyond settlement and practical use, the landscape would have been a rich wetland environment exploited by local communities for wildfowl and an important base for salt manufacture.

In the mid Saxon period, cattle ranches were set up on the higher ground, linked to inland areas by drove roads. However, it was during the medieval period that the coastal fens and marshes began to be comprehensively drained and settled. The 'Townlands', located in a broad arc inland from The Wash form the historic core of the landscape and represent a period of drainage and enclosure from at least the late Saxon period. A string of nucleated medieval market towns and villages lie along winding arterial routes running parallel to the coastline, with several having outlying satellite settlements, often sharing the name of the parent community. The villages and towns of the Townlands are characterised by ancient stone churches and post medieval brick structures, set within a framework of winding rural roads and sinuous enclosures.

The seaward edge of the Townlands is defined by the Roman Bank, constructed around 1300, beyond which lay areas of coastal saltmarsh that were reclaimed in later centuries. The land was initially used for wildfowling and seasonal grazing, with livestock being driven between extensive areas of common saltmarsh and drier areas inland close to the villages. During the post medieval period (between 1660 and early 19th century) the common saltmarsh was drained for farming with field patterns becoming more regular and geometric as time progressed. Here, settlement tends to be dispersed, strung out along roads with older properties tending to be of red brick and dating from the 1750s onwards, interspersed with modern agricultural buildings, some of which are on an industrial scale. Windmills remain a common sight, which along with church towers, are iconic

and prominent landmarks in an otherwise flat, open landscape. A fine example can be seen at Moulton, where the early 19th century tower mill mirrors the scale of the nearby medieval church spire.

Further towards the coast, a network of active and relict earthen sea banks is evident, along with continuation of agricultural land uses, associated with 19th and 20th century reclamation and enclosure. When compared to inland areas, the coastal enclosures display a more rigid and geometric character and a lower settlement density, with large areas retaining a remote and inaccessible character.

Boundaries throughout the Settled Fens and Marshes generally comprise narrow, shallow wet dykes interspersed with modified river channels. The characteristic organic pattern of roads and enclosures is a dramatic contrast to the rigidly geometric patterns evident across the neighbouring fens. These variations are often a good indication of the period of time that the land was reclaimed and settled. However, even within the organic framework of Saxon and medieval boundaries, reorganisation has occurred including field amalgamation and sub divisions, often as a result of post 1950s agricultural reform.

Several towns served as coastal ports during the medieval and post medieval period. As rivers and havens became silted up and coastal sand bars grew, a number of ports such as the historical settlement of Boston, which was associated with the European wool trade, could only function as navigations after rivers were straightened and widened to decrease upstream flooding. Other settlements such as Wainfleet, which was important for the herring and salt industries, could no longer function as ports.

During the 19th century several coastal settlements benefited from a significant influx of people and money. One example is Skegness, a former fishing village which grew rapidly in the late 19th century. Initially its prosperity was a result of the local middle classes indulging in the new fashion for sea bathing. However, in the later 19th century the railway arrived, bringing day trippers from the industrial cities. The subsequent decades saw planned growth and expansion, including the construction of piers, promenades and parks. The continued popularity of coastal resorts has resulted in their expansion throughout the 20th century, with recent decades seeing the growth of large static caravan parks.

The Lincolnshire Coastal Grazing Marshes Project has undertaken a detailed study of the 'outmarsh' that forms part of this landscape type. The area is rich in archaeological remains that contribute to the landscape character of the area, including prehistoric archaeology, ridge and furrow and abandoned settlements.



Settled Fens and Marshes (© Carol Paterson, Natural England)

AESTHETIC AND PERCEPTUAL QUALITIES

Whilst superficially there is a great unity of character across the Settled Fens and Marshes, largely as a result of its simple landform and intensive arable land use, there is great contrast in the way the landscape is perceived at local level. The sinuous and ancient character of the Townlands is evocative of a long and continuous settlement history stretching back over a thousand years, whereas elsewhere the geometric field patterns and industrial scale farm complexes creates an altogether more modern character.

Similarly, wide areas appear remote and tranquil, particularly in inaccessible areas around the coastal fringe, where the vast skies and broad, sometimes featureless horizons add to their isolated character. By contrast, in close proximity to the Townlands villages and arterial roads, tranquillity is all but lost and the landscape is perceived as well settled, busy and active. Across much of the landscape, many long views are foreshortened by tree belts. Whilst not extensive, these merge in views at ground level to form a backdrop to many panoramic views to the wide horizon.

Whilst there is a strong, simple unity of land cover features, great variation in colour and texture is created by various agricultural regimes, the absence of hedgerows allowing wide vistas across a geometric pattern of contrasting colour and texture.

LANDSCAPE CHANGE AND MANAGEMENT

BUILT DEVELOPMENT

Forces for Change

Modern built development is affecting the Townlands villages, eroding their architectural and historic character. Development on settlement margins can be particularly damaging, creating visual intrusion, resulting in the loss of surrounding landscape features and increasing the risk of coalescence. Proliferation of smaller, unplanned residential development along arterial roads is also changing the landscape, reducing the sense of remoteness and enclosing views.

Rising sea levels associated with climate change, and future changes to the coastal morphology is likely to affect the availability of land for future development with severe restrictions on growth and the longer term prospects for settlements, such as the historic settlement of Boston.

Shaping the Future Landscape

The aim should be to protect the distinctive character of settlements throughout the landscape and consider the visual impact of any new development. Specific mechanisms include Village and Town Design Statements, guiding the design of new development and ensuring the appropriate use of vernacular styles and building materials; and planning guidance for settlement coalescence, ensuring strategic gaps between settlements are maintained. As well as Village and Town Design Statements, Conservation Area Appraisals can also be important tools.

Best practice innovative architectural ideas and planning solutions utilising eco-friendly and high quality design that minimise impact on local landscape and townscape character should also be encouraged, along with limited tree planting around settlement fringes to help integrate new development into the landscape.

INFRASTRUCTURE

Forces for Change

Road improvements are commonplace, including straightening of existing routes and new 'by-pass' schemes designed to alleviate congestion within the Townlands villages. This has an urbanising effect and brings a degree on standardisation to the countryside.

Windmills are a common feature of this landscape, acting as distinctive local landmarks. However, while no new windmills are being built, some existing windmills are in poor condition. This can affect scenic quality and create an impression of disrepair.

Shaping the Future Landscape

The aim should be to protect the existing character of the rural road network, whilst having regard to safety requirements. Any new roads should be carefully planned and designed to provide positive environmental and landscape enhancements and strengthen prevailing character.

The aim should be to protect existing windmills, ensuring they positively contribute to the landscape character and enhance legibility in an area. Opportunities should be explored to manage and promote deteriorating windmills, providing recreational and educational benefits.

ENERGY PROVISION

Forces for Change

Wind energy schemes are a common feature of this landscape due to the strength of prevailing winds off the North Sea. Given the Government's commitment to increasing energy from renewable sources, there is likely to be continued pressure to accommodate new wind energy schemes. Indeed, further schemes are under construction, consented or in planning. New wind energy schemes will create visual landmarks in this predominantly flat landscape and reduce the sense of remoteness and isolation.

Shaping the Future Landscape

The aim should be to protect the historic character of villages and the open character of the surrounding landscape by siting wind energy schemes away from visually prominent locations. The impact on long distance views from the coast and areas inland should also be considered. There is potential for strategic regional and sub regional guidance on commercial wind energy schemes, including cumulative impact, informed by the EMRLCA and other studies. In addition, planning guidance for the siting and design of wind energy schemes should be produced at the county and/or district level where necessary, establishing the most appropriate sites for development and setting out the criteria against which new applications will be assessed.

AGRICULTURE AND LAND MANAGEMENT

Forces for Change

There is marked evidence of agricultural intensification and farm amalgamation, accompanied by a move towards arable production. This has resulted in the loss or damage of many typical landscape features, including traditional patterns of field boundaries and remnants of ridge and furrow, contributing to a more homogenous landscape. Soil erosion associated with the large and exposed open fields is an ongoing problem and may be exacerbated by further agricultural intensification and also the effects of climate change. The loss of pasture is particularly evident around settlements, where grazing animals and smaller field sizes contribute to the setting and structure of several villages.

There is also a proliferation of new large scale agricultural buildings, reflecting the loss of small holdings and the general increase in farm size. The popularity in bulb growing is also notable, with an increase in the number of poly-tunnels and glass houses. Such structures can reduce the sense of remoteness in rural areas and cause visual intrusion, enclosing previously open views.

Shaping the Future Landscape

The aim should be to protect existing rural landscape features, whilst encouraging positive management of those features lost or under threat. In particular the restoration of hedgerows should be given priority around urban areas, along with an increase in grassland and pasture, creating a stronger and more mixed pattern of land use, whilst helping to integrate new development into the landscape. This will also help to limit the occurrence and effects of soil erosion. However, care should be given not to disrupt the characteristic wide horizons and panoramas in more remote locations.

The aim should be to protect the distinctive open character of the landscape and consider the visual impact of any new structures. New, large scale agricultural buildings should be carefully sited, away from visually prominent locations and located amongst existing buildings where possible. The opportunity to conserve and upgrade existing barns and buildings should also be explored.

FORESTRY AND WOODLAND

Forces for Change

Woodland cover is generally sparse; however, there is evidence of more recent tree planting close to settlements or along field boundaries in an otherwise open agricultural landscape. Coniferous shelterbelts are particularly common around isolated farm buildings. While trees can be used to screen or soften views of buildings and create opportunities for recreation and nature conservation, new planting can introduce inappropriate and visually intrusive elements in this flat and open landscape.

Shaping the Future Landscape

The aim should be to protect the distinctive open character of the landscape by ensuring the type, scale and location of new woodland and tree planting is appropriate. Tree planting should generally be limited to roads margins or ditches where trees are already a local feature or in and around established settlements as part of mechanisms for visual containment of new built development. Instead priority should be given to managing more characteristic habitats and features, such as saltmarsh and drainage ditches as part of enhanced habitat reserves.

TOURISM AND LEISURE

Forces for Change

The continued popularity of coastal resorts has resulted in their expansion, with recent decades seeing the growth of large static caravan parks. This is particularly evident around towns such as Skegness and Mablethorpe. As with any new development on settlement margins this can be particularly damaging, causing visual intrusion, and resulting in the loss of surrounding landscape features and increasing the risk of coalescence. Static caravans tend to homogenise the landscape, creating a repetitive pattern of similar sized and shaped units.

Shaping the Future Landscape

The aim should be to protect the distinctive open character of the landscape and consider the visual impact of any new or extended caravan parks. Planning guidance for the siting and design of static caravan sites should be produced at the county and/or district level where necessary, establishing the most appropriate sites for development and ensuring strategic gaps between settlements are maintained. The management of native tree and hedgerow planting should also be encouraged, containing the edges of sprawling resorts.

ENVIRONMENTAL PROCESSES AND CLIMATE CHANGE

Forces for Change

Along the coast is a network of sea banks, protecting against tidal flooding and inundation. In an effort to combat the growing threat associated with sea level rise linked to the effects of climate change, new engineered flood defences are being created and parts of the existing sea bank are deliberately being breached. This process is resulting in a new line of defence and the loss of some productive agricultural land.

SECTION 4

Shaping the Future Landscape

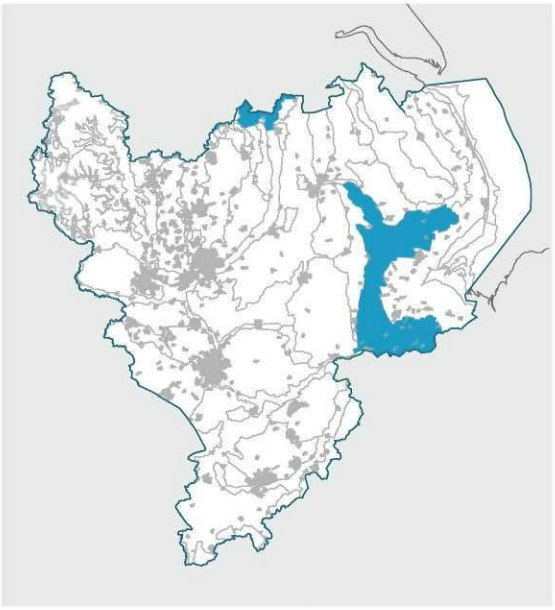
The aim should be a planned process for the future sustainable management of the coast, conserving areas further inland and creating new areas of saltmarsh along the coast. New or realigned flood defences should attempt to not compromise existing recreation, nature conservation or heritage features. The management of new and existing salt marshes should also be considered, including the re-introduction of grazing.

2B:

PLANNED AND DRAINED FENS AND CARRLANDS



Drainage channels divide the landscape (© J Watson)



KEY CHARACTERISTICS

- Consistently low lying terrain and simple palette of land uses and landscape features gives visual unity and strong sense of identity;
- Large scale open landscape of flat farmlands with extensive and uninterrupted vistas to distant horizons beneath vast skies;
- 18th and 19th century enclosure characterises historic landscape patterns underpinned by complex history of drainage and enclosure stretching as far back as the late Saxon period in some places;
- Significant areas at or below sea level, with modestly elevated areas acting as the focus of settlement;
- Hierarchy of canalised rivers, high level drains and ditches divide the landscape up into rigid geometric patterns, dictating the grain of the landscape and patterns of movement and settlement;
- Limited settlement pattern characterised by isolated farms and linear villages strung out along roads; majority of buildings in brick with tile roofs, further adding to uniform character of the landscape;
- Rich and varied arable land uses, root crops, bulbs, vegetables and horticultural glass houses give the landscape a highly productive character and seasonal variations in colour and texture; and
- Strong sense of remoteness in expansive and sparsely settled areas although periods of intense activity during harvest.

LANDSCAPE CHARACTER

The Planned and Drained Fens and Carrlands Landscape Character Type possesses a strong landscape character derived from a simple palette of landscape features. Low lying terrain, some of which lies below sea level, is the strongest unifying character, although the rigid geometry of field drainage ditches and roads, extensive arable farms and limited settlement all combine to add to the strong and instantly recognisable identity of the landscape.

The history of the various areas of fens and carrlands that combine to form this Regional Landscape Character Type is complex. Some areas were drained and settled relatively late, whereas others demonstrate ancient patterns of enclosure that stretch back as far as the late Saxon period. Despite this, the characteristic rigid geometry of parliamentary enclosures, roads and sparse settlement create visual unity in the landscape.

The land is highly productive and is particularly well suited to intensive modern arable agriculture. This has resulted in only very limited areas of biodiversity interest. Settlement is also thinly spread, maximising the area of agricultural land.

The landscape is one of vast skies, wide panoramas and distant horizons. Whilst periodically the landscape is busy with machines and gangs of agricultural labourers, it is typically quiet with a prevailing sense of remoteness and isolation.



Planned and drained Fens and Carrlands (© Carol Paterson, Natural England)

PHYSICAL INFLUENCES

The underlying geology is largely Quaternary deposits of clay and silt, which give rise to naturally wet, loamy or friable peaty soils. Landform is generally flat and low lying with significant areas lying at or below sea level.

A multitude of rivers and streams once meandered through the landscape, that from at least the Neolithic period deposited clays and silts washed down from neighbouring uplands to cloak the underlying geology and create a rich matrix of wetland environments. The influence of the sea is also important to note in areas fringing The Wash in Lincolnshire. Here, rising sea levels in the late Roman period around the outer, seaward fringes of the fens resulted in vast areas of marine silt being deposited, which in turn stemmed the flow of the rivers draining the neighbouring uplands, behind which freshwater peat fens developed.

With the flat landscape and no geological exposures, there is very limited potential for the application of practices for the care, maintenance and management of features of geodiversity interest and the promotion of their educational and interpretational interest. However, the former river channels beneath the fenland deposits, which often produce raised ground, and the river terraces associated with the rivers draining the landscape, form excellent geomorphological features worthy of preservation.

Centuries of water management have canalised the main rivers, straightened streams and created a gridded network of drainage channels, allowing widespread use of the productive soils for farming. Land cover is dominated by arable production, notably cereals, legumes and brassicas. Bulb and flower cultivation is also notable, with vast acres providing seasonal colour and visual interest.

Tree cover is sparse except for geometric shelter belts and plantations along field boundaries and close to farmsteads. Intensive and widespread land improvement has significantly reduced the coverage of semi natural habitat, which at one time would have been a combination of fenland, wet woodland, carr and standing open water, highly valued by local communities for fishing and wildfowling.

Despite widespread intensive agriculture, some linear stretches of reed bed and grassland are noted for their biodiversity value along several major drains and rivers, such as the River Glen south east of Bourne, and remnant semi natural habitats continue to thrive on the River Idle in Nottinghamshire. However, it should be noted that surviving semi natural habitat is highly fragmented, with sites located in extensive areas of intensively managed agricultural land.

CULTURAL INFLUENCES

Superficially, the fens and carrs appear to have been drained and settled in a relatively short space of time between the late 18th and early 19th centuries. However, there is significant time depth and complexity within the seemingly modern geometric landscape. Whilst there are remnants of ancient drove roads preserved in modern boundaries and routes and evidence of late Saxon and medieval strip enclosure on the Lincolnshire fens, the dominant pattern of medium to large rectilinear fields, defined by shallow wet field dykes, is generally associated with drainage from the 17th century onwards. This is overlain with the rigid and unrelenting geometry of the later parliamentary enclosures of the late 18th and early 19th centuries.

The General Drainage Act of the late 16th century opened the way for extensive reclamation of the Lincolnshire fens which was largely driven and funded by private and aristocratic investors, known as 'Adventurers'.

Reclamation of the fens continued throughout the centuries. However, as the peaty soils shrank and oxidised as they dried out, artificial methods of land drainage were needed, first in the form of windmills and steam pumps, and later by diesel and electric alternatives. Initially the reclaimed land was unenclosed common grazing. From the late 18th and 19th centuries, however, population growth and food shortages prompted the common grazing to be enclosed and turned over to arable crops which thrived on the rich peaty soils.

A similar pattern can be seen in the carrlands of north Nottinghamshire. Here successive drainage schemes saw land reclaimed from common grazing from the 17th century onwards, later to be overlain by a grid of regular geometric parliamentary enclosures and roads and the installation of pumps to drain the farmland into the River Idle.

Therefore, within a framework of centuries old enclosure, the geometric pattern of parliamentary fields was created across the landscape. The construction of road infrastructure and settlement of the reclaimed lands would also have mostly occurred at the time of the parliamentary enclosures, which further contributes to the current perception that the fenland and carrland areas we see today are the result of just two centuries of endeavour.

In recent times boundary loss has been a feature of the landscape, with the drive towards increased yields and development of ever larger machines promoting the creation of prairie fields in many areas. Other changes have arisen from the industrialised nature of modern farming practices with large buildings for the storage, processing and distribution of agricultural produce now a common feature.

The relatively late agrarian exploitation of these areas is evidenced in the low density of settlement and prevalence of isolated brick farmsteads of the 18th and 19th centuries. These isolated farmsteads are often the only built elements in wide areas of arable farmland and as such contribute to the perceived remoteness of some areas. In the absence of stone or wood, brick is the ubiquitous building material of the landscape and whilst there are various building styles and type of brick used, its widespread use adds to the visual unity of the landscape.

AESTHETIC AND PERCEPTUAL QUALITIES

The consistent relief of level landform and widespread arable land uses gives a high level of visual unity to the landscape, as well as contributing to a strong sense of place and local identity. This is further enhanced by the ubiquitous use of brick as the principal building material and 18th and 19th settlement patterns within a regular pattern of geometric parliamentary enclosures and roads networks.

The flat, featureless topography creates large scale and expansive views across wide areas. Combined with the relative absence of settlement and activity this gives the landscape a remote, tranquil character, although this is significantly reduced at times of the year when large gangs of seasonal labourers are employed to harvest vegetables.

The agricultural landscape is carefully controlled, with only very limited areas of semi natural habitat in evidence, giving the landscape a productive and utilitarian character. Where present, areas of scrub, semi natural woodland and reedbed gain added significance and provide a tantalising glimpse of the appearance of the landscape prior to drainage and enclosure.



Planned and Drained Fens and Marshes
(© Carol Paterson, Natural England)

LANDSCAPE CHANGE AND MANAGEMENT

BUILT DEVELOPMENT

Forces for Change

Whilst there is generally little settlement, piecemeal development along arterial roads is reducing the sense of remoteness and creating visual intrusion. Light industrial uses in particular, such as garages and workshops, interrupt the landscape. Where development is particularly concentrated, this can enclose views and dilute the landscape's typically strong identity.

Shaping the Future Landscape

The aim should be to protect the distinctive character of the landscape. New residential, commercial and industrial development should generally be encouraged within and around existing settlements, limiting widespread incremental development. Where isolated development is unavoidable, innovative best practice architectural ideas and planning solutions that minimise impact on the landscape should be encouraged.

ENERGY PROVISION

Forces for Change

Wind energy schemes are a common feature of this landscape due to the strength of prevailing winds off the North Sea. Given the Government's commitment to increasing energy from renewable sources, this trend looks set to continue with increasing pressure for wind energy schemes. New wind energy schemes will create visual landmarks in this predominantly flat landscape and reduce the sense of remoteness and isolation.

Shaping the Future Landscape

The aim should be to protect the open character of the surrounding landscape by siting wind energy schemes away from visually prominent or sensitive locations. The impact on long distance views from the coast and areas inland should also be considered. There is potential for strategic regional and sub regional level guidance on commercial wind energy schemes, including cumulative impact, informed by the EMRLCA and other studies. In addition, planning guidance for the siting and design of wind energy schemes should be produced at the county and/or district level where necessary, establishing the most appropriate sites for development and setting out the criteria against which new applications will be assessed.

AGRICULTURE AND LAND MANAGEMENT

Forces for Change

There is marked evidence of agricultural intensification and farm amalgamation, accompanied by a move towards arable production. Due to the flat, featureless topography of the area, specifically the lack of hedgerows, the implications of agricultural intensification is generally expressed in 'improvements' to dykes and embankments.

Indeed, ditches are a key feature of the landscape, draining the fens to create productive agricultural land. This process has implications for the shrinkage of peat soils and reducing water quality caused by soil erosion and nutrient leaching. Soil erosion associated with the large and exposed open fields may also be exacerbated by further agricultural intensification and the effects of climate change.

There is also a proliferation of new large scale agricultural buildings, reflecting the loss of smallholdings and the general increase in farm size. The impact of new structures is to reduce the sense of remoteness and create visual intrusions.

In addition to wind energy schemes, energy crops are being cultivated to meet renewable energy targets, including Miscanthus and Short Rotation Coppice (SRC). These fast growing and tall crops can radically change the appearance of the landscape. There is also a requirement for storage and processing facilities, which along with other types of agricultural buildings, can result in the loss of landscape features and increase visual intrusion.

Shaping the Future Landscape

The aim should be to protect the distinctive open character of the landscape and consider the visual impact of any new structures. New large scale agricultural buildings should be carefully sited, away from visually prominent locations and amongst existing buildings where possible. Specific design guidance for farmsteads may be appropriate, establishing the criteria for new development. Although the introduction of energy crops will be more difficult to manage, grant applications to Natural England or the Forestry Commission may require an assessment of landscape and visual impacts.

In response to agricultural intensification, natural vegetation should be managed along dykes, drainage ditches and field margins, creating visual and biodiversity interest. The aim should also be to manage water quality and levels of dykes and ditches. Management plans should be encouraged which seek to identify and remediate against the sources of pollution and soil erosion, and could also incorporate phased enhancements to ditches and dykes to enhance biodiversity. Such proposals may be supported by Environmental Stewardship grants.

FORESTRY AND WOODLAND

Forces for Change

Woodland cover is generally sparse; however, there is evidence of more recent tree planting close to settlements or around individual farm buildings. Fast growing coniferous trees, such as *Cupressocyparis leylandii*, are particularly common, used as a screen to development or to provide shelterbelts. Unless carefully sited, new planting can introduce inappropriate and visually intrusive elements in this flat and open landscape.

Shaping the Future Landscape

The aim should be to protect the distinctive open character of the landscape by ensuring the type and location of new woodland and tree planting is appropriate. Tree planting should generally be discouraged in remote areas. However, very limited native tree planting may be appropriate to soften the impact of agricultural or industrial buildings in the landscape. Instead, priority should be given to managing more characteristic habitats and features, such as dykes and drainage ditches.

TOURISM AND LEISURE

Forces for Change

Although the landscape is not currently a major tourist destination, there are an increasing number of visitor centres, picnic spots, caravan/camp sites and holiday cottages. As with any new development this can cause visual intrusion and result in the loss of landscape features. The effect is particularly evident in locations with little or no settlement.

Shaping the Future Landscape

The aim should be to protect the distinctive open character of the landscape and consider the visual impact of any new tourist facilities. Planning guidance for the design and siting of new tourist facilities should be produced at the county and/or district level where necessary, establishing the most appropriate sites for development whilst ensuring facilities respond to projected demand. In addition, the diversification of farms to provide attractions and accommodation should be carefully managed to ensure a balance is struck between maintaining rural character and supporting the rural economy.

ENVIRONMENTAL PROCESSES AND CLIMATE CHANGE

Forces for Change

The effects of rising sea level as a consequence of climate change has the potential to progressively affect the lower lying area and inundation of some areas may occur in the future. There is also the potential for the water table to rise in the river terrace deposits, resulting in waterlogged ground conditions and flooding.

Shaping the Future Landscape

The aim should be to adapt agricultural land management practices to accommodate the projected effects of sea level rise and inundation and flooding in the locations where this is anticipated, and in association with a planned process of future sustainable management options for the adjacent Settled Fens and Marshes.



Planned and Drained Fens (© Carol Paterson, Natural England)

Appendix 10.4 - Fenland LCAs

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	**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		

Landscape Character Areas - Outline Descriptions **APPENDIX 5**

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	**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		

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	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	

Landscape Character Areas - Outline Descriptions **APPENDIX 5**

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	**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		

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

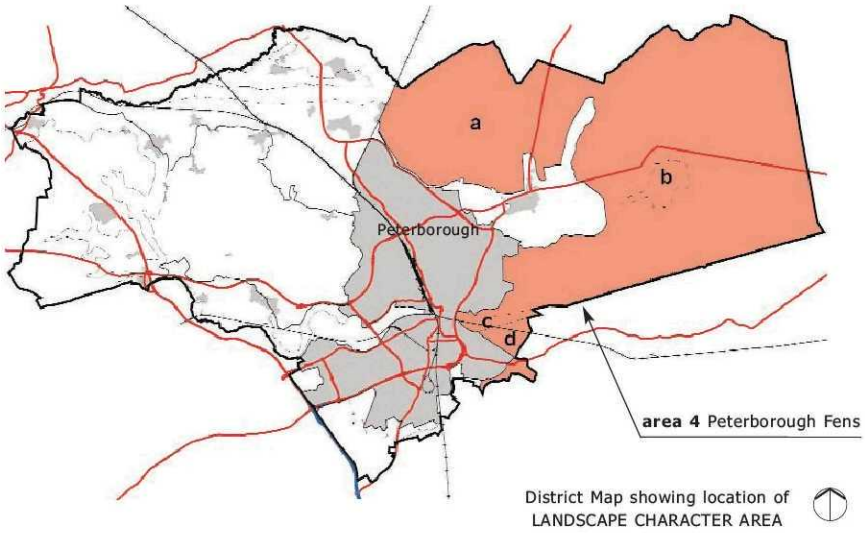
STRENGTH OF CHARACTER	WEAK	MODERATE	STRONG
S1 Impact of landform*	Insignificant	Apparent	Dominant/Prominent
S2 Impact of landcover*	Insignificant	Apparent	Dominant/Prominent
S3 Historic pattern*	Insignificant	Apparent	Dominant/Prominent
S4 Visibility from outside	Widely visible	Locally visible	Concealed
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 10.5 - Peterborough LCAs



LOCATION

This area covers much of the land to the east of the City of Peterborough, extending from the edge of Peterborough to the boundary of the authority. It is bisected by the A47.

CHARACTER SUMMARY

The fen landscape can be divided into four sub areas as follows:

a. Bedford North Level - an extensive area of low-lying reclaimed fen farmland dominated by a geometric pattern of arable fields

b. Thorney Island - an area of slightly elevated ground on clay soils with a intact pattern of hedges and organic fields

c. Nene Washes - an area of grassland which provides seasonal flood storage capacity

d. Horsey Toll - an area of slightly elevated landform to the south of the fens

KEY CHARACTERISTICS

- Flat extensive and open landscape with panoramic views and large skies
- Rectilinear field pattern reflecting the artificial drainage pattern
- Predominantly arable farmland
- Isolated farmsteads mainly of Victorian to modern origin
- Sparse tree cover generally limited to shelter belts/copses around farmsteads and avenues along drove roads
- Road pattern typically rectilinear and raised above the surrounding peat fen
- Scattered active and former mineral extraction sites
- Settlement on the drained fen mainly of recent origin
- Organic pattern of fields and stronger hedgerows around Thorney

DISTINCTIVE FEATURES

- Pill boxes and other WWII features
- Avenues of trees along roads
- Catswater Drain
- Embanked River Nene
- Duck Decoy
- Thorney Abbey and House
- Thorney water pumping station tower
- Duke of Bedford model village properties
- Abbey Fields parkland in Thorney
- Dog in a Doublet sluice

GEOLOGY AND SOILS

There is a surprising variety of soils on the level fens which reflects its complex history. To the north and south east there is a mix of deep humose soils, both calcareous and clayey in character (DownHolland 1 and Normoor Associations) which overly marine alluvium and fen peat laid down when the area was underwater as part of a more extensive Wash. The silty soils are often present as low ridges which relate to the extensive network of Roddons or old river systems that once drained parts of the area e.g. Borough Fen. The geology of the River Nene and Welland floodplain is formed on river alluvium with the overlying soils being stoneless clays and in places calcareous with seasonally high groundwater (Fladbury 1 Association). Smaller areas of glaciofluvial drift are overlaid by coarse loamy calcareous soils with some sand (Ireton Association), which is reflected in the presence of mineral extraction. Areas of river terrace drift with fine loamy soils (Waterstock Association) are found closer to the River Nene. In contrast to the majority of the area Thorney stands on an island of Jurassic and Cretaceous clay shale that is overlaid by slowly permeable clay soils with, localised waterlogging (Oxpasture Association).



• Soil profile in freshly cleared ditch (TLP)

TOPOGRAPHY

The expansive and level fens provide a dominant characteristic of the character area. Strong horizons provide the baseline for expansive and often dramatic skies.

DEGREE OF SLOPE

The fens are essentially flat. The only exceptions are at the margins of the 'islands'. Despite the lack of variation in height in absolute terms where a small change does appear this can be visually quite noticeable with sites e.g. 'Hill Farm' on the southern approach to Thorney and at Horsey Hill, the site of a civil war fort.

ALTITUDE RANGE

The altitude of the Peterborough Fens generally ranges between minus 1 and 3m AOD. The localised 'islands' or 'hills' which reach above the 5m contour and are also the site of historic settlements.

HYDROLOGY

This low-lying once forested land became increasingly inundated as sea levels rose and the drainage of seaward flowing rivers became impeded. In various episodes from the Mesolithic period to post-medieval times and at various places, brackish tidal creeks, meandering rivers, meres, lagoons, wet woodland, reed swamp, and raised bog, formed and then disappeared in accordance with changing environmental conditions and human intervention. This fenland landscape was not one uniform wetland, but a patchwork of localised wetland and dry land environments. The remains of prehistoric tidal creeks and rivers have been exposed by the wastage of covering deposits and now appear as complex patterns of raised silt ridges throughout the area.

The concerted efforts to drain the wetland fens originate in the medieval period. Morton's Leam, dug in the late 15th century, provided a direct navigation from Wisbech to Peterborough, and made a significant contribution to fenland drainage. The 17th century, however, saw the beginning of the large scale drainage works that eventually produced one of the most productive agricultural landscapes in Europe. The idea that the major fenland channels could have dual roles for navigation and drainage was extended to the excavation of the present Nene channel, which also created a 'wash' between the two rivers, to provide a flood safety valve for the drainage system.

The boundary of Area 4d is formed by the course of the Old Nene, an artificially enhanced and formerly navigable channel. In medieval and early post-medieval times it linked Peterborough to Whittlesey Mere, Ramsey, March, the central fens and ultimately the coast.
Artificial drainage of the low lying fens was initially provided by wind power but later changed to diesel engines. The system under the direction of the Internal Drainage Boards and Environment Agency is critical to maintaining the land in agricultural production.

LAND COVER AND LAND USE

The land cover pattern is dominated by agriculture including arable and root crops on the good quality rich fen soils with some localised irrigation. Fields are typically large with most field boundaries marked by drainage ditches. Tree cover is sparse and is generally only found in the form of shelter belts around isolated farmsteads, at settlement edges, or as avenues along some of the major drove roads e.g. Dairy Drove.

BIODIVERSITY

The Peterborough Fens Landscape Character Area is quite varied in terms of its wildlife and biodiversity value. Although arable farmland is the predominant ground cover, there are four main valuable habitat types within the Landscape Character Area, which include alluvial grassland & washland, ditches, pollarded willows and gravel workings/brick pits, all of which are, to some extent, manmade.
The Nene Washes, Area 4c, contain the main areas of alluvial grassland and washland within the character area, and are

also probably the most important biodiversity site. They are internationally important for breeding and wintering birds, and form part of the overall Nene corridor and its nationally important flyway for migratory birds which are designated as a SPA, RAMSAR site, SAC and SSSI. The grassland and ditches within the washes that is grazed by cattle when conditions allow, are also noted for their rich flora.

Species rich ditches are generally located towards the west of this LCA, and many are designated as County Wildlife Sites. These ditches tend to be located within areas of fen gravels and support a rich flora, as well as high populations of Water Voles. Many of the ditches, which are up to 300 years old, run for a considerable length and may be of national importance for species associated with ditches. The disused gravel workings in the character area often share similar aquatic plant species to the ditches, but are also designated as County Wildlife Sites for their populations of invertebrates.

Pollarded willows are located mainly along the lines of watercourses and drove roads, such as Willow Drove CWS. Pollarded willows are declining in number due to lack of management, and most are not replaced when they eventually die out.

Barn Owls and badgers are also known to be present within the Peterborough Fens. A programme to monitor Barn Owls on the Fens is currently underway.

HISTORICAL AND CULTURAL SIGNIFICANCE

Area 4 comprises part of the wider fenland landscape which on examination is one of the most diverse, distinctive and dynamic ancient landscapes in the country. The history of the fens and its people is a fascinating tale of man working with nature and then conquering it through the progressive drainage over the centuries. The onset of wetland conditions brought by rising sea levels buried vast prehistoric field systems, settlements, and burial mound cemeteries at the fen margins. Though increasingly exposed by the erosion of overlying peaty soils, the preservation of archaeological remains is often exceptional. The Bronze Age timber alignment and platform at Flag Fen is an internationally renowned archaeological site. It is the only place in the country where a substantial prehistoric timber structure can be viewed by the public in situ. There is a very well preserved Iron Age site north-east of Peakirk, which elsewhere in the country would be classified as a hill fort. Roman settlement occupied the fen margins, low islands, and the raised silt ridges of extinct prehistoric water courses but lacked the apparent wealth of the Nene and Welland valley villa sites. These Roman sites focused on livestock management and salt production.

The prevailing wetland character of the area into post-medieval times is reflected by the presence of an important duck decoy pond north-east of Newborough - the oldest continually operated decoy in the country and one of the most elaborate. From this time much of the undrained landscape provided rich hunting ground for wildfowl and eels, and a source of raw materials from reeds for roofing and willow for basket making.

FIELD PATTERN

The Earl of Bedford's Thorney estate provided the prototype for the reclamation of the whole of the fenland region of the east of England. It is exemplified in the ruthlessly tessellated rectangular ditched fields, and ruler-straight droves, roads and channels that characterise the broad sweep of the landscape fenland landscape.

Area 4b comprises the historic island of Thorney, the only place where parkland and ridge and furrow field systems could be established and these features remain highly distinctive in the local landscape. The remains of early reclamation and enclosure fields fan out from higher land into the surrounding fen margins.

TRANSPORT PATTERN

The historic Fen Causeway, an important Roman road that linked East Anglia to the Midlands, runs through Area 4, hopping across fen ground from Whittlesey Island to Peterborough. It is preserved as pronounced gravel and stone ridge at Flag Fen. Today the A47 and the A1703 are the main roads across the area. The road pattern is generally rectilinear following ditches and drains such as along the River Nene and the many minor roads that follow the drove roads e.g. English Drove and French Drove created during the draining of the fens to bring livestock to market. Most roads are now elevated above the surrounding arable landscape due to the erosion of the fen soils. The vertical alignment of the minor roads can vary due to varied settlement and the underlying pattern of harder silty soils which follow the line of ancient tidal watercourses.

The Nene was navigable at the time of the Vikings who sailed inland to sack the monastery at Peterborough. The Dog in a Doublet sluice marks the end of the current tidal stretch of the River Nene.

SETTLEMENT AND BUILT FORM

Thorney is the main historic settlement in the area. An important medieval abbey was established here following the colonisation of the island by a religious community in the Anglo-Saxon period. The present striking parish church incorporates the remains of the monastic church. Thorney was re-modelled by the Duke of Bedford and the architect Samuel Teulon during the 19th century. It retains the special character of an estate village, a very rare type of settlement in the fenland region and its margins. The Bedford family brought Huguenot settlers to Thorney, and also established farmsteads and cottages on the reclaimed fen.

The pattern of settlement on the fens today comprises isolated farmsteads typically located just a metre or two above the surrounding fields. These include a number of grand Victorian and Edwardian houses with mature shelter belts. Newborough built on reclaimed fen is one of the very few entirely 'modern' villages in the area, having been created in the 19th century. Its current mid to late 20th century character presents a rather harsh interface with the surrounding open landscape.

VISUAL AND SENSORY PERCEPTION

Due to the strong horizontal skyline and large skies the presence of built or natural features is significantly emphasised e.g. the avenues of trees which follow the drove roads create a marked silhouette highlighting form and species. However, the lack of major settlements and the dispersed nature of villages and farmsteads within the very open landscape create a feeling of isolation. The only major road through the area is the A47, which bisects it and creates localised disturbance to the landscape, particularly around the Thorney bypass. Other roads are more rural in character and have relatively little traffic on them, creating a quiet and peaceful landscape. The flat landform allows extensive views within and beyond the area meaning landmarks and visual detractors on the eastern edge of Peterborough and also outside the authority, such as the brick chimneys at Whittlesey and wind turbines to the east and north of the district are often visible from a great distance. To many the appreciation of the fens is an acquired taste yet it is a very distinctive landscape that can engender strongly contrasting responses.

RECREATIONAL OPPORTUNITIES

The fens have a very limited network of rights of way due to their relatively recent draining, with transport in the past often having been by boat. Some of the minor roads form part of the Green Wheel cycle network. There are a few tourist attractions within the area, including Thorney Abbey and Heritage Museum. The Nene Washes are also a popular location for bird watching.

Flag Fen Bronze Age Centre opened in 1987 after workers on nearby drainage ditch uncovered what turned out to be the Bronze Age timbers of a causeway between Peterborough and Whittlesey. The site now includes a museum, visitor centre, preservation hall containing in-situ timbers, an archaeology park and mere, and a Roman herb garden.

Lower Knarr Fen (TLP) •



4a BEDFORD NORTH LEVEL

Strength of Character = Strong

The flat, open nature of this landscape, with its rectilinear drainage pattern and relative lack of vegetation, create a very strong character. Although the area is exposed and, is widely visible from its surroundings, this does not weaken the character and may be considered to even strengthen it further. The sense of distance from major development generally leads to a tranquil character.

Condition = Moderate

The general lack of semi natural vegetation and the character of many of the drainage ditches means that the landscape generally has a relatively poor biodiversity value. Progressive drainage has gradually reduced the biodiversity value over the centuries although some man made features such as the Nene Washes has created valuable areas. The impact of built development on the landscape is mainly limited to isolated settlements and farmsteads or larger developments located beyond the area.

Landscape Strategy = Conserve and restore

The combination of strong character and moderate condition indicates the need to conserve the main characteristics of the landscape and then to restore the areas where the condition has deteriorated. This should involve ensuring that the open nature of the landscape is safeguarded from inappropriate elements and development. The harsh edges of some of the fen villages should be softened with appropriate planting, in keeping with other planting belts around Fen settlements. The planting along Thorney bypass should be monitored and adjusted to ensure that it is in keeping with the Fen landscape.

Sensitivity

The ecological sensitivity of the Fens is relatively low overall. The flat topography means that this area has moderate visual sensitivity, however due to the open character the impact of any built development would be significant not only within the area but also as seen from the more sensitive Thorney Island (Area 4d). Cultural sensitivity is moderate within this area.

• Reclaimed Fenland East of Thorney (B. Robinson)



STRENGTH OF CHARACTER

Impact of landform:	**dominant**
Impact of land cover:	**dominant**
Impact of historic pattern:	**prominent**
Visibility from outside:	**widely visible**
Sense of enclosure:	**exposed**
Tranquillity:	**tranquil**
Distinctiveness/rarity:	**unusual**

CONDITION

Land cover change:	**localised**
Age structure of tree cover:	**mature**
Extent of semi-natural habitat survival:	**scattered**
Management of semi-natural habitat:	**poor**
Survival of cultural pattern:	**intact**
Impact of built development:	**moderate**
Visual unity:	**coherent**

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

4b THORNEY ISLAND

Strength of Character = Moderate
The impact of landcover within Thorney Island is strong, with its more intimate mix of pasture and arable fields. The area is partially enclosed, allowing localised views into the island area. The presence of the A47 locally interrupts the tranquillity that can be experienced elsewhere on the Fens. The elevated situation and clay soils has determined a landscape pattern which contrasts with the surrounding fen. On balance the strength of character is considered to be moderate.

Condition = Moderate
This is a mature landscape with a coherent visual unity. However, the vegetation on Thorney Island is generally mature, and approaching over maturity in some locations, with semi-mature habitats becoming scattered. The cultural pattern has also been interrupted by modern agricultural practices and the expansion of the built up area of Thorney.

Landscape Strategy = Improve and conserve
The island nature of this landscape should be conserved and its historic structure and field patterns should be reinforced and improved wherever possible. Interpretation of the historic features of the sub area should be provided and built development should be closely restricted.

Sensitivity
The overall ecological sensitivity of the island is considered to be very low due to its isolation. Its cultural sensitivity is considered to be moderate, whilst the slight elevation of the island above the surrounding flat landscape means that the visual sensitivity of this area is high. Any development on the island will be prominent not only within the rest of the island but from the surrounding Fen landscape.

• Duke of Bedford Cottages, Thorney (TLP)



STRENGTH OF CHARACTER

Impact of landform:	**apparent**
Impact of land cover:	**prominent**
Impact of historic pattern:	**apparent**
Visibility from outside:	**locally visible**
Sense of enclosure:	**partial**
Tranquillity:	**moderate**
Distinctiveness/rarity:	**unusual**

CONDITION

Land cover change:	**localised**
Age structure of tree cover:	**mature**
Extent of semi-natural habitat survival:	**linked**
Management of semi-natural habitat:	**not obvious**
Survival of cultural pattern:	**intact**
Impact of built development:	**moderate**
Visual unity:	**coherent**

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

4c NENE WASHES

Strength of Character = Strong

Although the Nene Washes are very exposed, which could potentially weaken their character they have a very prominent flat landform and distinctive washland grazing meadows. The Washes represent an artificial but historic feature of the River Nene and have fulfilled a flood prevention role for a long period of time. Compared to the surrounding Fen landscape a number of valuable habitats are present meaning this is a rare sub area with a strong character.

Condition = Good

The management of the widespread semi-natural habitats within this sub area is good mainly as a result of its flood storage function. Much of the woody vegetation within the sub area is over mature, however this does not weaken the overall condition of the landscape as it is predominantly meadowland. The cultural pattern of the Washes is largely intact, although built development on the edges of Peterborough and Whittlesey has a high visual impact. Overall the condition of the Washes is considered to be good.

Landscape Strategy = Safeguard and manage

The strong character and good condition of the Nene Washes means that they need to be safeguarded and managed. The functional requirement to provide a flood storage should ensure the continued management of the area for biodiversity.

Sensitivity

Despite the designations within this sub area, the lack of variety of habitat types means that the ecological sensitivity is considered to be moderate. Cultural sensitivity is also moderate, but visual sensitivity is considered to be low as the flat valley landscape is surrounded by land that is marginally higher than it.

• Nene Washes (TLP)



STRENGTH OF CHARACTER

Impact of landform:	**prominent**
Impact of land cover:	**prominent**
Impact of historic pattern:	**prominent**
Visibility from outside:	**locally visible**
Sense of enclosure:	**exposed**
Tranquillity:	**moderate**
Distinctiveness/rarity:	**rare**

CONDITION

Land cover change:	**insignificant**
Age structure of tree cover:	**over mature**
Extent of semi-natural habitat survival:	**widespread**
Management of semi-natural habitat:	**good**
Survival of cultural pattern:	**intact**
Impact of built development:	**high**
Visual unity:	**coherent**

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

4d HORSEY TOLL

Strength of Character = Moderate
This is a predominantly arable sub area, however, it does not have a distinct character of its own. Its slight elevation above the surrounding area, and the civil war fort on Horsey Hill, now marked by mature trees, combine to create an unusual landscape when compared to the rest of the Fens. Overall, however, the character of Horsey Toll is considered to be of moderate strength.

Condition = Moderate
Although landcover change within this sub area has been insignificant, semi-natural habitats are scattered with limited biodiversity value, and their management is not obvious. The expansion of housing at Stanground has a marked visual influence on the area and this will continue with additional planned development including the bypass. The vegetation pattern is generally in decline apart from the vegetation around the site of the fort.

Landscape Strategy = Improve and conserve
The historic features of this sub area need to be conserved, but the character of Horsey Toll needs to be improved in order to ensure a more attractive and robust edge to the expanding City of Peterborough. Drainage ditches within the area should be managed more sympathetically for wildlife in order to provide better habitat linkages, with new hedgerows and field margins introduced.

Sensitivity
The overall ecological sensitivity of this sub area is low and the cultural sensitivity is moderate. The very slightly undulating, but still low-lying landform, means is moderately visually sensitive. The openness of the area would mean that new development would be visually significant not only within the area but also from the adjacent Nene Washes and the Fens.

• Horsey Hill Civil War Fort (TLP)



STRENGTH OF CHARACTER

Impact of landform:	**apparent**
Impact of land cover:	**prominent**
Impact of historic pattern:	**apparent**
Visibility from outside:	**locally visable**
Sense of enclosure:	**open**
Tranquillity:	**moderate**
Distinctiveness/rarity:	**unusual**

CONDITION

Land cover change:	**insignificant**
Age structure of tree cover:	**mature**
Extent of semi-natural habitat survival:	**scattered**
Management of semi-natural habitat:	**not obvious**
Survival of cultural pattern:	**declining/relic**
Impact of built development:	**high**
Visual unity:	**coherent**

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

COUNTRYSIDE MANAGEMENT

Generally

- Promote plant species in accordance with the Cambridgeshire Landscape Guidelines and use of local provenance wherever possible
- Restore and maintain pollarding cycles to traditionally pollarded willows, which are an important habitat for tree sparrows
- Encourage the planting of new willows for pollarding along key routes and waterways
- Encourage management and replacement regime for existing tree avenues along with single species. Promote new avenues in selected areas linking with 'quiet lanes'
- Promote rationalising planting to Thorney Bypass to create a single species avenue
- Review suitable locations for controlled flooding of areas in addition to the Nene Washes to counter the implications of climate change
- Ensure right of way signage is clear but appropriate to the location using local materials where possible
- Encourage appropriate management of all drainage ditches to improve wildlife value, by improving water quality and establishing grass headlands
- Encourage increased public access to the Fens, particularly through the designation of 'quiet lanes' and extension on the Green Wheel network
- Preserve and interpret pill boxes and other features along the 'GHQ line'
- Discourage the planting of inappropriate woodland blocks throughout the Fens
- Retain the rectilinear field pattern that characterises the Fens
- Encourage the restoration of mineral extraction sites to traditional Fen and wetland habitats including wet woodland
- Promote a strategy to minimise peat shrinkage and loss from agricultural fields

4a Bedford North Level

- Encourage planting along the Catswater Drain corridor to improve its biodiversity value and distinctiveness
- Encourage diversification of farming techniques and crops, encouraging organic farming and reducing the use of fertilizer
- Consider use of Peterborough Farms estate for trialling new biodiversity and cropping techniques
- Discourage development that could alter the water table of the Fens, particularly around the sensitive Flag Fen area
- Restrict tall buildings and structures that will visually impact over a large area where not suitably mitigated

4b Thorney Island

- Target hedgerow planting in the 'Island' landscape - using former fields boundaries as guidance for appropriate locations
- Encourage restoration of Abbey Fields parkland, including replacement/ restoration of parkland trees
- Encouraged the retention of pasture through out the island
- Develop interpretation of history of Thorney and its role in the drainage of the surrounding Fens

4c Nene Washes

- Encourage seasonal grazing on the Washes
- Improve public access where not adversely affecting the ecology of the area
- Protect from development that would alter its visual or environmental character
- Improve links out into the area from Peterborough City centre

4d Horsey Toll

- Preserve and interpret historic civil war hill fort
- Target hedgerow planting on elevated sections using former fields boundaries as guidance for locations

Guidelines in relation to development

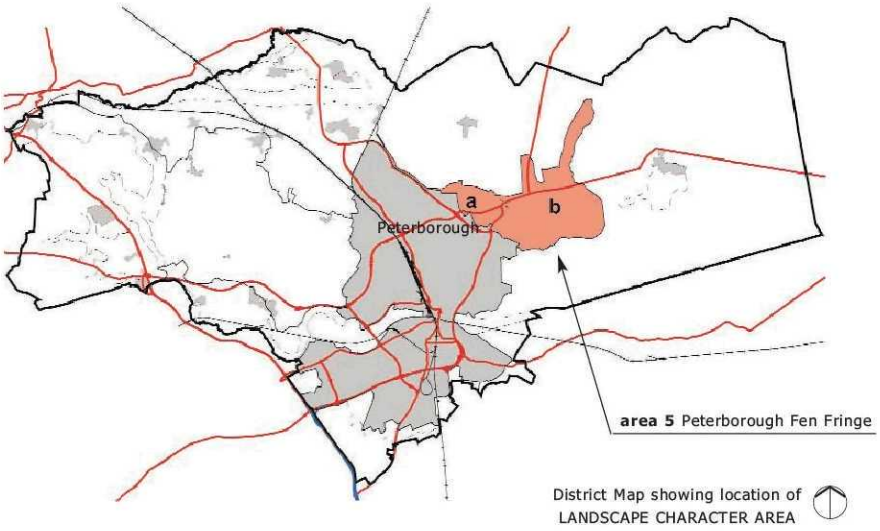
- Ensure careful consideration is given to development on the fringes of settlements to minimise visual intrusion
- Ensure built development is generally enclosed by existing and/or strengthened vegetation
- Where development is otherwise considered acceptable ensure that the forms and materials create elegant structures within the open landscape
- Encourage the improvement of village and farmstead edges through the use of appropriate shelter belt planting
- Limit expansion of Thorney to retain the remaining organic hedged landscape and parkland areas
- The use of traditional building materials should be encouraged, particularly around Thorney
- Prevent development that could detract from local landmarks such as Thorney Abbey

- River Nene, Flag Fen and Stanground (B. Robinson)



PETERBOROUGH FEN FRINGE

5 area



LOCATION

The area lies between the built edge of Peterborough as marked by the A15 Paston Parkway to the west and the fens to the east.

CHARACTER SUMMARY

This is a transitional area between urban Peterborough and the Fens and includes the last largely undeveloped areas of slightly elevated landscape set on underlying clay soils to the east of Peterborough. The character area can be divided into two sub-areas as follows:

a. Norwood Fen Fringe - an area with a mix of land uses including arable farmland and disturbed landforms following the extraction of clay from the area, over many years, for the brick industry

b. Eye Fen Fringe - an area centred on an historic village location

KEY CHARACTERISTICS

- Gently undulating landform slightly higher than adjacent fen
- Evidence of former clay extraction, with clay pits now both nature reserves and a landfill site
- Isolated farmsteads and residential properties
- Large commercial buildings associated with the site of former brickworks
- Some medium sized hedgerows containing a variety of species
- Promontory of open historically cultivated land extending to the east up to the line of the Catswater Drain

DISTINCTIVE FEATURES

- Car Dyke Roman canal
- Household waste/landfill site
- Dogsthorpe Star Pit SSSI/LNR
- Former BOCM Paul building
- Eye village core
- Permanent travellers site

- Car Dyke. (TLP)



GEOLOGY AND SOILS
The extent of the fen fringe at Eye is determined by the underlying river terrace drift geology. The soils are deep loams over lying sandy soils with local groundwater and areas of seasonal waterlogged loams over clay (Shabbington Association), which explains the previous extraction of clay for the Dogsthorpe Star brickworks.

TOPOGRAPHY
The landform comprises a subtle elevated area set above the adjacent low lying fens. The man made features in the landscape provide more dramatic contrasts in landform. These include the former brick pits which are well below sea level and the domed land fill site to the south of the A47 which is slowly creating a new hill in the landscape. The embanked Car Dyke provides a strong linear feature to the northern boundary of the area.

DEGREE OF SLOPE
Natural slopes are typically very gentle and less than 1 in 100 while much steeper slopes are associated with the man made features.

ALTITUDE RANGE
To the west around Norwood the land rises up to 13m AOD while to the east the settlements of Eye and Eye Green are located on a minor ridge above the 5m contour. A narrow finger of land to the north east which has been cultivated and part of the parish since medieval times follows the Reaches towards Powder Blue Farm at 4m AOD.

HYDROLOGY
The area is drained by a series of ditches and dykes that flow onto the fens or into artificial channels. The northern boundary follows the embanked Car Dyke that runs from Cambridge to Lincoln and was one of the greatest engineering feats carried out by Roman Empire in Britain. It is thought that the waterway was built to carry food and supplies from East Anglia to the north, with cargoes of corn, wool for uniforms, leather for tents and shields, and salted meat. Although the Dyke does not seem to have been used for transport subsequently it is a substantial water-filled ditch with associated earth banks, which effectively marks the historic fen edge.

The Catswater Drain formed the old county boundary between Northamptonshire and Cambridgeshire and marks the eastern boundary of the character area. Its north-south course defined the fen edge in medieval times and the east side of the narrow peninsular that juts out into the fen towards Lincolnshire. Despite its apparent natural meandering form the Catswater Drain is likely to have been excavated in the Late Saxon period or medieval period. The counter drain just north of Oxney House defines a narrow valley that flows into a small land-locked fen embayment south of Eye.
Following the extraction of clay there are a number of artificial lakes at the bottom of the former brick clay pits. Two of these at Eye Green and Dogsthorpe Star Pit are important wildlife habitats.

Car Dyke. (B. Robinson) •



LAND COVER AND LAND USE
The land cover of this area is very varied. There are areas of arable farmland around the edges of Eye and Peterborough, growing a mix of linseed, oil seed rape, wheat and sugarbeet. Field boundaries include a mixture of hedgerows and drainage ditches, with hedgerows still containing elm in places. Former brick pits now function contrastingly as a landfill site and nature reserves. Woodland can be found around the edges of the nature reserves at Dogsthorpe Star Pit and Eye Green. Car Dyke forms a distinct linear water feature along the edge of the area, with grassy banks and tall vegetation along most of its length. Other isolated areas of grassland can be found to the south of Eye, particularly around Eyebury Farm.

BIODIVERSITY
The main habitats within the Eye Fen Fringe occur in locations that have either been heavily influenced or created by human activity. The main areas of wildlife interest are concentrated at the locations of former brick pits. Dogsthorpe Star Pit is a former brick pit and is designated as a SSSI and LNR for a number of reasons. It has rich and varied mosaic of habitats, with its plant life including orchids and a range of aquatic or semi-aquatic plants. It also hosts a large number of rare and scarce invertebrates, including a range of different water beetles and some species that are usually only found in costal areas, which suggests saline conditions underlying the pit. There are also a wide variety of birds that visit the site, both aquatic/wading species, including rare migrants such as the green winged teal.
Eye Green LNR is also a former brick pit, and supports a range of birds, invertebrates, insects and grassland wildflowers. There are also County Wildlife Sites within the character area that have been designated for their woodland habitat e.g. Little Wood CWS, or for their value as species rich ditches e.g. Cat's Water Drain.

HISTORICAL AND CULTURAL SIGNIFICANCE

Large scale archaeological excavations in advance of sand and gravel extraction have demonstrated that an extensive network of fields and droves was created on the fen margins during the Bronze Age. Their primary purpose seems to have been livestock management. Hitherto they were thought to be Roman since enclosure on this vast scale was considered to be beyond the region's prehistoric people.

There are many Roman farmsteads in the area. They tend to be situated on the fen edge to make use of seasonal grazing land. During the medieval period several monastic farms (granges) were established in this area by Peterborough abbey. Northolm, Tanholt, Eyebury, Singlesole, and Oxney are mentioned in medieval documents. All these sites are still occupied by substantial farm houses and yards. Oxney, though originating as a cattle farm, became a significant moated residence that was used as a retreat by monks and by retiring abbots. It was endowed with a chapel and a fair. The present imposing Oxney House, largely re-built in the 19th century and now undergoing redevelopment, retains medieval vaulted rooms.

FIELD PATTERN

A large part the whole of the area was already enclosed prior to the parliamentary enclosure act for Eye in 1820. The more organic pattern of fields and drains and presence of hedgerows and hedgerow trees reflect this ancient enclosure in contrast to the neighbouring fens. However there are no substantial areas of ridge and furrow surviving in the old open field areas. A park was created around Eyebury, south of Eye, in 1299. There is a large earth bank at the south edge of Eye which formed the north boundary of the park, and probably housed its rabbit warren.

TRANSPORT PATTERN

Car Dyke runs along the eastern boundary of Area 5a and considerable lengths of the monument survive as substantial earthworks and a water-filled ditch. The present A47 (T) retains the feel of the historic causeway that ran between the fen edge at Eye and the island of Thorney. The former railway, still marked by an embankment and a few buildings, runs on a parallel course to the north of the A47. The A1073 runs northwards from Eye to Crowland.

SETTLEMENT AND BUILT FORM

The village of Eye owes its name to the Old English phrase meaning 'island in the marsh' and was surrounded to the north, east and south. The main settlement is medieval or earlier in origin and has a linear main street and backstreet plan on a ridge of high ground overlooking fen ground. St Mathews church built in 1846 from limestone is a replacement for the medieval church which occupied the same site. Eye is separated from its sister village of Eye Green by the A47. Eye became one of the brickmaking villages of the Peterborough area, along with Fletton, Yaxley and Stanground. The village of Eye has a number of buildings built in local yellow brick.

• Dogsthorpe Star Pit (TLP)



VISUAL AND SENSORY PERCEPTION

The landfill site, the A15 Paston Parkway and the A47 trunk road provide visual and audible disturbance even to the adjacent nature reserves. Within much of Area 5b away from these intrusive features, the landscape is open and exposed with little vegetation and in many ways similar to the adjacent fen. In Area 5a there is a locally more intimate character with some tall hedgerows creating a stronger sense of enclosure on the eastern side of the city. From most parts of this area, however, the urban edge of Peterborough intrudes into views. In many locations this intrusion is minimised by the screening provided by shelterbelts along the edges of the parkway system, but in other locations, particularly to the south of Eye, this intrusion is much more noticeable where large industrial units are prominent. The southern residential edge of Eye is also harsh and intrudes on views to the south of the area.

RECREATIONAL OPPORTUNITIES

Dogsthorpe Star Pit and Eye Green nature reserves are both publicly accessible and promoted as visitor attractions. They have informal footpaths around them and interpretation boards are also provided at both sites. The Green Wheel cycle network has routes running through the northern part of this area and along the northern edge of Dogsthorpe Star Pit. Rights of Way through the area are very limited, although there are a number of permissive routes.

• Land at Norwood Farm (TLP)



5a NORWOOD FEN FRINGE

Strength of Character = Moderate

Despite the discordant nature of this sub area, it is unusual for this side of the city, with a wide variety of landuses occurring in a relatively small area. Most of the features of the area combine to create a moderate strength of character, with its slightly elevated clay based landform being apparent in contrast to the surrounding Fens. Its recent history is apparent in the legacy of pits from the extraction of clay, while its more ancient history can also be identified through interpretation of features such as Car Dyke. The level of enclosure is variable through the sub area, with mature hedgerows creating an intimate scale of landscape in certain locations but areas such as the landfill being much more exposed.

Condition = Poor

A number of elements of the sub area indicate that its condition could improve. These include the varying ages of vegetation e.g. young planting around the landfill site to mature woodland blocks and hedgerows in the area to the north of Dogsthorpe Star Pit. The semi-natural habitats within the sub area, although scattered, are also well managed, with Dogsthorpe Star Pit SSSI undergoing regular management to its valuable habitats. On the whole, however, the condition of the sub area is considered to be poor. Widespread changes have occurred within the area and much of its cultural pattern has been destroyed, leaving an incoherent and jumbled landscape.

Landscape Strategy = Improve and Restore

This sub area has undergone much change and has been left disjointed and in need of improvement. There are a number of important features within the area, such as Dogsthorpe Star Pit, Eye Green nature reserve and Car Dyke, but these need to be better integrated with their surroundings. Hedgerows are becoming over mature and in need of regeneration and better links to nearby woodland blocks. The roads that pass through the area could also be better accommodated to reduce visual and audible intrusion. The landfill site will need to be carefully incorporated back into the landscape when it comes to the end of its workable life.

Sensitivity

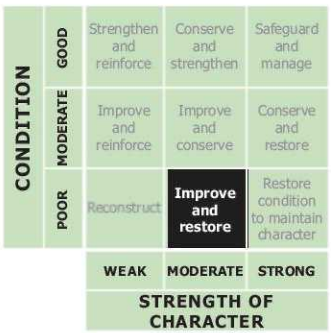
Ecological sensitivity in this sub area is either low or very low. The area disturbed by clay extraction is particularly highlighted as being of very low sensitivity, although Dogsthorpe Star Pit is a designated nature reserve. Cultural sensitivity is considered to be moderate overall but Car Dyke is an important local feature. Visual sensitivity is also considered to be moderate for this sub area. However, any development should take account of the views into the area from the adjacent Fens.

STRENGTH OF CHARACTER

Impact of landform:	**apparent**
Impact of land cover:	**apparent**
Impact of historic pattern:	**apparent**
Visibility from outside:	**locally visible**
Sense of enclosure:	**partial**
Tranquillity:	**discordant**
Distinctiveness/rarity:	**unusual**

CONDITION

Land cover change:	**widespread**
Age structure of tree cover:	**mixed**
Extent of semi-natural habitat survival:	**scattered**
Management of semi-natural habitat:	**good**
Survival of cultural pattern:	**declining**
Impact of built development:	**high**
Visual unity:	**incoherent**



5b EYE FEN FRINGE

Strength of Character = Moderate

On the whole, this sub area is considered to have a moderate strength of character. It has strong features, such as its predominately arable landcover, but it also has a number of weak characteristics. These include its openness and visibility from the edge of Peterborough, Eye and the wider Fen landscape. These factors, combined with its arable landuse, make it a frequent landscape type in this part of the country. Given its location, however, it is a moderately tranquil sub area away from the main roads. In terms of landform there are some noticeable undulations, particularly as it rises up to the more historic settlement of Eye on the line of the A47.

Condition = Moderate

The condition of this sub area is considered to be moderate, despite having a number of weak elements to it. Its cultural pattern is declining as a result of the expansion of Eye and Peterborough, and their influence on the surrounding land. This has resulted in an incoherency throughout this sub area with fragmentation of landscape units and harsh edges to development. Semi-natural habitats have become scattered, and with the exception of Eye Green LNR there is no obvious management, other than regular dredging of drainage ditches to maintain their drainage function.

Landscape Strategy = Improve and Conserve

The moderate strength of character and condition of this sub area indicate that there is room for improvement such as the scope to improve the harsh urban edges of Eye and parts of Peterborough through careful tree belt planting in character with the surrounding Fen landscape and the heavily vegetated boundaries to Peterborough in other parts of the city. The corridor of the A47 could also be targeted for selective enhancements to integrate it further into the sub area. Improvements to the landscape structure including some hedgerow planting need to ensure that the sub area becomes more cohesive and reads more as a Fen island.

Sensitivity

Ecological sensitivity in this sub area is considered to be either low or very low. The areas adjacent to Eye have very low sensitivity, which may be a result of the expansion of Eye and its influence on the land beyond its boundaries. Cultural and visual sensitivity are both considered to be moderate, however, any development should take account of the views into the area from the adjacent Fens and the edges of Peterborough.

• The Southern edge of Eye (TLP)



STRENGTH OF CHARACTER

Impact of landform:	**apparent**
Impact of land cover:	**prominent**
Impact of historic pattern:	**apparent**
Visibility from outside:	**widely visible**
Sense of enclosure:	**open**
Tranquillity:	**moderate**
Distinctiveness/rarity:	**frequent**

CONDITION

Land cover change:	**localised**
Age structure of tree cover:	**mature**
Extent of semi-natural habitat survival:	**scattered**
Management of semi-natural habitat:	**not obvious**
Survival of cultural pattern:	**declining**
Impact of built development:	**high**
Visual unity:	**incoherent**

CONDITION	STRENGTH OF CHARACTER: 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

COUNTRYSIDE MANAGEMENT

Generally

- Promote plant species in accordance with the Cambridgeshire Landscape Guidelines and use of local provenance wherever possible
- Identify and encourage the provision of additional rights of way and extensions to the Green Wheel network to give improved quality of access in the area
- Ensure right of way signage is clear but appropriate to the location using local materials where possible
- Introduce a programme of sympathetic improvements along the A47 to improve its integration within the landscape and tie together the separate sub areas
- Provide enhanced connectivity of habitats
- Promote the extended use of the area for informal recreation

5a Norwood Fen Fringe

- Promote the restoration of the landfill site for public access and recreation
- Protect Car Dyke from potentially damaging development, provide interpretation and promote its use for informal recreation
- Ensure that Dogsthorpe Star Pit and Eye Green nature reserves are protected from potentially damaging development whilst improving public access
- Target hedgerow planting and restoration in the northern part of the sub area to retain its enclosure and more intimate scale
- Ensure appropriate management of woodland blocks with thinning and replanting as necessary

5b Eye Fen Fringe

- Target hedgerow planting to the south of Eye -to help define the boundaries of the area with the fens
- Encourage appropriate management of all drainage ditches to improve wildlife value, by improving water quality and establishing grass 'verges' and headlands
- Introduce screening to the southern edge of Eye to soften the currently visible harsh boundaries
- Target opportunities for enhanced interpretation of the historic landscape

Guidelines in relation to development

- Discourage development on flatter land beyond the edge of the raised island of Eye
- Ensure careful consideration is given to the siting of appropriate development on the fringes of settlements to minimise visual intrusion
- Ensure new development is enclosed by existing and/or strengthened vegetation to minimise visual intrusion on the surrounding landscape
- The use of traditional building materials should be encouraged, particularly in development around Eye
- Encourage the improvement of village and farmstead edges through the use of appropriate shelter belt planting
- Ensure new roads are carefully integrated into the landscape with appropriate planting along them

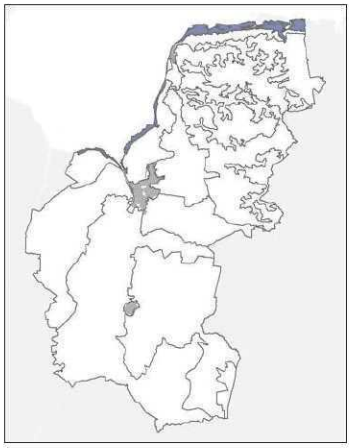
- Fields north of Dogsthorpe Star Pit (TLP)



Appendix 10.6 - Kings Lynn LCTs

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A: OPEN COASTAL MARSHES







Location and Boundaries

There are two separate locations of this Landscape Character Type within the Borough. The first is located to the north of the Borough, its northern boundary being entirely defined by intertidal mudflats that extend out to the open waters of The North Sea (referred to here as the North Sea marshes). Its southern boundary is bordered by Coastal Slopes (Landscape Character Type C) that forms a subtle ascending backdrop. The second location forms the most seaward point of the arc of land to the north and north west of King's Lynn – its northern edge abutting the open waters of The Wash and the southern boundary being entirely defined by the sea defence bank that separates it from Drained Coastal Marshes Landscape Character Type (referred to here as The Wash marshes).

Key Characteristics

- A medium scale landscape defined by extensive areas of salt marsh, shingle banks, sand dunes, brackish lagoons and reed beds marking the transition between land and sea. Although expansive and open, small details such as the winding creeks and small fishing boats reduce the sense of scale overall.
- Low lying with elevation predominantly ranging between 0 and 5m AOD.
- A flat landform providing distant and open views across the marsh towards both the sea and inland.
- The saltmarshes are interspersed by tidal creeks and inlets that have a natural, organic form making for an irregular land cover pattern.
- Settlement is notably absent although views can be gained of the villages aligning the A149 in the adjacent Coastal Slopes landscape type.
- The coastal skyline is largely uninterrupted and smooth – giving way to wide open skies. The skyline inland from the North Sea marshes is greatly influenced by built form and the presence of woodland on the adjacent Coastal Slopes. The skyline inland from The Wash marshes is defined by the strong line of the sea defence bank.
- Visible built structures are limited – only evident at Brancaster Beach where there are a number of public facilities including Brancaster Golf clubhouse and toilets.

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B: DRAINED COASTAL MARSHES





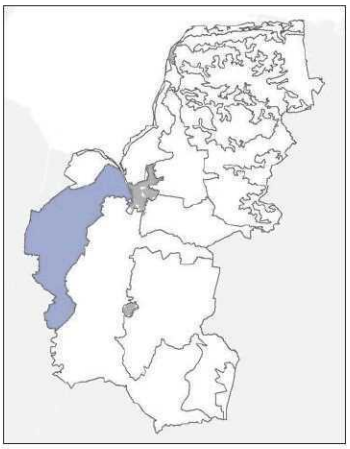


This Landscape Character Type occurs within the north west of the Study Area. The entire northern and western edge is defined by a series of sea wall defences separating this landscape from the adjacent Open Coastal Marshes (Type A). To the south, the drained marshes are bound by The Fens – Settled Inland Marshes Landscape Character Type. The Wooded Slopes with Estate land and the Coastal Slopes (Type C) define the boundary to the east.

Key Characteristics

- A large scale landscape with an overwhelming sense of openness and exposure due to the simplicity of the land cover and landform.
- This area was reclaimed from the waters of The Wash and is delineated on its seaward extent by extensive sea defence walls.
- The land use is simple and repetitive dominated by large, geometric arable fields that are intensively farmed and bordered by drainage ditches and dykes.
- Towards the east, the landscape appears less intensively farmed and there is an increase in tree cover, low, gappy hedges are a feature.
- The landform is uncomplicated and flat with an elevation range between –2m AOD and 5m AOD.
- The River Great Ouse and the Babingley River cut through the landscape with significant sections canalised and embanked. A number of smaller, minor watercourses also meander through the marshes before entering The Wash.
- Views are both distant and panoramic, defined by wide open skies and a simple uninterrupted horizon often defined by the sea wall.
- There is a notable absence of vertical elements across most of the area and there are no obvious landmarks or points of focus aside from the strong visual line of the sea walls and embanked rivers.
- Settlement and built structures are largely absent aside from the occasional isolated farmstead and the stationary caravans (and associated facilities) at Shepherd's Port and west of Heacham.
- Although greatly influenced by humans, the majority of the landscape feels both physically and perceptually remote.
- There are some localised pockets of human activity (such as at the caravan sites) but for the most part the landscape is remote, peaceful and still.

D: THE FENS – SETTLED INLAND MARSHES







Location and Boundaries

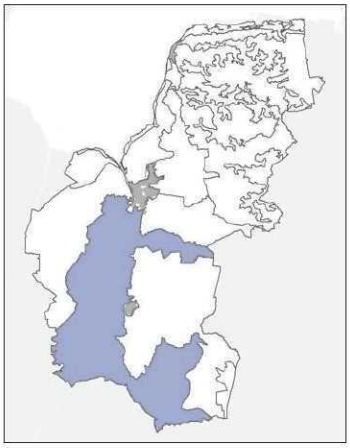
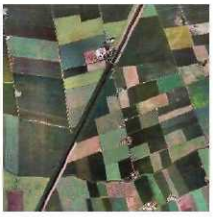
This Landscape Character Type is located to the west of the Study Area. The northern boundary is defined by the Drained Coastal Marshes Landscape Character Type, whilst The Fens – Open Inland Marshes define the eastern and southern edge. The western boundary of the landscape is demarcated by the administrative Borough boundary.

Key Characteristics

- A large scale, low lying landscape offering distant, panoramic views that evoke a sense of openness. This open character is less evident where settlements, shelterbelts and orchards occur.
- Simplistic terrain characterised by a distinctly flat landform providing wide horizons. Earthworks in the form of rivers and creek embankments bring topographic change and strong, straight lines of contrast.
- An intensively farmed arable landscape comprising predominantly geometric fields divided by straight drainage channels and dykes and underlain predominantly by silts. Field size is variable in places with small units defining settlement edges.
- Fruit orchards are a relatively common (yet declining) feature with rectangular plots ordered into rows. These rows often channel views and where orchards occur alongside roads, views across the landscape are more restricted. Conifer planting is also a relatively common feature.
- Buildings and storage associated with horticulture and food production industries, as well as power stations, pumping stations and sluices, provide visible human built elements.
- Well served by a network of rural roads that follow an irregular path.
- The landscape appears well settled – with villages, town edges, large houses, individual farms and properties generally in view. Settlement is predominantly found aligning secondary roads and has a linear arrangement with villages often merging through ribbon development.
- The skyline appears cluttered in places due to the varied heights, forms and textures of vertical elements including trees, pylons and buildings.
- Lines of pylons are dominant features slicing diagonally across the field system. The pylons and posts carrying overhead wires are frequently in view.
- Views can be gained to the edge of King's Lynn and Wisbech.

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E: THE FENS – OPEN INLAND MARSHES




Location and Boundaries

This Landscape Character Type covers a large area within the southwest of the Study Area. To the north the landscape is bordered by The Fens – Settled Inland Marshes and the settlement of King's Lynn. Two distinct landscape types adjoin the eastern boundary: Farmland with Woodland and Wetland and Settled Farmland with Plantations.

Key Characteristics

- A large scale landscape with extensive vistas and wide open skies evoking a strong sense of openness, exposure and isolation.
- The elevation of the landscape ranges between 1m AOD to -2m AOD resulting in a strikingly flat, low lying terrain.
- Strong geometric and linear landscape patterning defined by large scale intensive arable farming with extensive field units divided by a regular network of drainage ditches and dykes, long straight roads, large straight rivers and cut off channels.
- A largely unsettled landscape with villages and dispersed farmsteads with adjoining outbuildings.
- Isolated farmsteads are often surrounded by wind break trees that provide points of focus in a landscape largely devoid of landmarks or strong focal points.
- A simple but strong skyline – uninterrupted and smooth with expansive horizons giving way to huge skies.
- Posts carrying overhead wires are frequently in view.
- Pylons cross the landscape. These are conspicuous due to the lack of other vertical elements (other than large sheds) and form a strong contrast with the flat open horizontal plane.
- Drainage channels and dykes flanked with golden rushes and bright green grass banks draw the eye and contrast with the dark predominantly peaty soils.
- Views into the adjoining Fens landscape – Settled Inland Marshes – are clear however the distinction between the landscape types is not obvious – appearing as one continuous landscape type where settlements are not in view.

Appendix 10.7 - South Kesteven LCTs

THE FENS CHARACTER AREA 4



4.155 **Key Characteristics**

- Low flat terrain, level horizons and large skies.
- Large-scale open rectangular fields, divided by drainage ditches and embanked rivers.
- Sparse trees and woodland cover.
- Little settlement apart from individual farmsteads, often with large-scale agricultural buildings.

4.156 **Location and boundaries**



4.157 Within South Kesteven, the Fens extend east from the Car Dyke to the South Forty Foot Drain. The Fens continue to the east beyond the district boundary. To the west of the Car Dyke lies a transitional area to the Kesteven Uplands, described as the 'Fen Margin'.

Physical Influences

4.158 The Fens are a complex landscape formed by the draining of land over the last 2000 years, but with most land drained during the last 150 years. Within South Kesteven the Fens comprise peat, overlying Oxford Clay. The land only exists because of man's intervention, and continued management, to prevent inundation. Within this area the land lies below 5m AOD, typically at 2-3m above sea level. The land is drained by a series of east/west drainage ditches, such as Haconby Lode and Rippingale Running Dike, which are pumped into the South Forty Foot Drain, which lies to the east and forms the District Boundary.

Human Influences

4.159 The whole landscape of the Fen is directly attributable to human influences, as discussed in the previous section. The landscape exists because of the draining of the land from the fen, turning bog, woodland and rough ground to create productive agricultural land. The drainage of the land resulted in the shrinking of the peat fen, further reducing the levels of the land and increasing the need for drainage. Historically this required windmills to lift water from the low lying drains into the more major drains and rivers. Today electric pumps continue this work, as the peat continues to shrink and be eroded by the wind.

4.160 The Lincolnshire Fens were some of the last to be drained, and the Fens within South Kesteven contain few older buildings, and no villages. The Fens are accessed by a series of lanes or 'Droves', which extend east from the B1177 and the B1394. These lanes serve individual

THE FENS CHARACTER AREA 4

farmsteads. Most lanes are dead ends, limited by the South Forty Foot Drain. The Fens within South Kesteven contain no significant woodlands, historic parks or houses, ecological conservation areas or nationally designated areas of wildlife value. They are a working landscape based on intensive agricultural production.

Landscape Character

4.161 The character of the Fens is determined by the level low lying terrain. The man-made rectangular fields are large in scale divided by drainage ditches, with virtually no trees or woodland. This results in an open landscape of huge scale, with enormous skies which have a significant influence on the character of the landscape. The open fields are punctuated only by the groups of individual farm buildings spread along the Droves. Most of these include large-scale agricultural buildings with some scattered trees amid the farms themselves. The rising land to the west of the Kesteven Uplands provides enclosure and visual diversity in this direction. The Fens continue to the north, east and south of the District boundary, adding to the large-scale open character of the landscape. Distant vertical interest in the landscape is provided by wind turbines beyond the District boundary.

4.162 The distinctive landscape of the fens draws a varied human response. Some find the openness uplifting and dramatic, while others find the landscape oppressive and intimidating. Whatever response, the landscape remains distinctive and a contrast to much of the rest of the District.

4.163 The western edge of the character area is more influenced by settlements such as near Tallington. Here the character merges with the Kesteven Uplands to the west.

4.164 The lack of communities or settlements provides a character that is remote and isolated, though punctuated by intensive activity depending on the season and agricultural activity.


Baston


Market Deeping


Market Deeping

Settlement

4.165 Settlement within the Fens is generally sparse and restricted to isolated farms and houses. The farms


Fen Farm, Aslackanby


Deeping St James


Deeping St James


Deeping St James

often contain some large-scale metal-clad agricultural buildings.

4.166 The main settlement is located on the edge of the Fen at Market Deeping and Deeping St James. These settlements merge with each other. Vernacular buildings in the village centres are mostly constructed of limestone, often with collyweston slate roofs.

4.167 Many properties appear Georgian in age, with some older smaller buildings. Building characteristics are similar to the southern part of the Kesteven Uplands to the west, from where the building materials would originate.The settlement centres are typically linear, with more extensive areas of modern development beyond. These are typically brick- built, of varying age and style.

4.168 With few notable landscape features in the surrounding fen landscape, there is little to dictate the form of the settlement. The towns appear to have expanded along the roads and where space was available. The towns do not, therefore, have a distinctive form. Some settlement edges within the wider fen are quite abrupt, perhaps marked by a boundary hedgerow. Any new development around the settlement should carefully consider the settlement edge. In some places it may be appropriate to have properties looking out over the countryside and in other areas to have areas of planting. Back fences backing onto open countryside would not be appropriate

Landscape Sensitivity

4.169 The large-scale of the fen landscape, and the lack of trees and woodlands, creates a very distinctive landscape. The features of value in this landscape include the ditches and watercourses and the wide open views. There is little settlement and few well used roads and lanes.

4.170 Landscape sensitivity to new employment or residential provisions would be **low** to **medium** and at the edge of the existing settlements. Large-scale development would not, however, be appropriate in the more remote parts of The Fens. Any major proposals within this remote and open landscape would be highly visible and would interrupt the openness of the landscape. Agricultural buildings at existing farmsteads could, however, be assimilated, building on the existing landscape pattern.

4.171 Landscape sensitivity to wind energy proposals would be **low** to **medium**. The scale of the landscape, and the relative lack of features of intrinsic landscape value, would mean that some wind turbines may be accommodated.

4.172 Wind turbines are relatively visually permeable, and a limited development would allow the overall character of the landscape to be maintained. Acceptability in the landscape would, however, depend on the detailed siting and design, and overall cumulative impact with any other proposals within the district or surrounding areas. Locations close to existing large-scale human influences such as electricity lines, are likely to be most appropriate. Locations near to larger settlements are not likely to be appropriate.

4.173 **The landscape management objectives for The Fens include;**

- Maintenance of field boundaries, including ditches and dykes.
- Phased management of the ditches and dykes to minimise wildlife disturbance.
- Protection of historic and archaeological sites.
- Conservation and management of grazing marsh.
- Protection of water quality.
- Consider the scale and design of new farm buildings.
- Concentrate new planting around farms and large-scale farm buildings.

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LVA Vp No	Viewpoint location	NGR	NGR	Distance (km)	Bearing	Visual receptor	LPA	Landscape designation	Comments
A	Junction of Broad Drove West & Elloe Bank	5E+05	3E+05	0.35	N	Motorists and bridleway users	Fenland	None	Vp 1 in ES was considered a more suitable viewpoint in proximity to the site, being representative of residential views and a busier local road.
B	Broad Drove West	5E+05	3E+05	0.9	N	Motorists	Fenland	None	Again, Vp 1 in ES was considered more suitable.
C	Cross Road, Sutton St Edmund	5E+05	3E+05	0.9	W	Motorists and a few nearby residents	South Holland	None	Represents mainly side on views from nearby properties towards the proposed turbines. Vp 2 in ES was considered to illustrate views from more central parts of the settlement.
D	Play area, Sutton St Edmund	5E+05	3E+05	0.9	W	Recreational users	South Holland	None	Representative of views from very eastern outskirts of settlement, as mainly recreational views. Vp 2 in ES was considered to illustrate views of residential receptors in settlement.
E	Gote Lane, Gorefield	5E+05	3E+05	2.5	SE	Motorists and a few nearby residents	Fenland	None	Not representative of views from the settlement in general due to orientation of much of settlement. This is an unusually open view towards the turbines from the outskirts of the settlement. Vp 5 in ES is considered to show a similar orientation of view to that which would be available from this location.
F	Bridleway nr Newton	5E+05	3E+05	2.6	E	Bridleway users	Fenland	None	Similar orientation of view towards turbines as from Vp 5 in ES. This view would show stacking effect of pylon line to site, emphasising nearby vertical forms and Vp 5 does not.
G	B1165, Newton	5E+05	3E+05	3	E	Residents, motorists	Fenland	None	View represents a few properties on west edge of Newton but stacking effect of pylons would emphasise nearby vertical forms.
H	Footpath off High Broadgate, Tydd St Giles	5E+05	3E+05	3.8	NE	Walkers	Fenland	None	Walker must walk a certain distance down this footpath outside of the settlement in order to gain a clear view of the turbines. Not representative of views from settlement itself and partially screened by intervening built form and vegetation.
I	Newton, B1165 Rectory Lane	5E+05	3E+05	4.4	E	Motorists, a few residents	Fenland	None	Mainly representative of B road users and not necessarily of residents. Similar view to that from Vp 5 in ES.
J	B1165, Sutton St James	5E+05	3E+05	5	N	Residents, motorists	South Holland	None	Partial view towards turbines from between residential properties. Vp 7 in ES represents a similar view.
K	Leedsgate Bridge	5E+05	3E+05	4.5	NNW	Motorists, bridleway users	South Holland	None	Proposed turbines would only be visible from one side of the road due to intervening vegetation, therefore, not a particularly open view. VP 7 in ES was considered to provide a better view of the turbines from a similar orientation.
L	B1165 Drawdyke	5E+05	3E+05	4.9	N	Motorists, a few residents	South Holland	None	Fairly open view to the south but Vp 7 was considered to illustrate a greater number of sensitive receptors.
M	B1168 Holbeach Drove	5E+05	3E+05	5.2	W	Residents, motorists	South Holland	None	Located at a similar distance and orientation as Vp 6 in the ES. Vp 6 illustrates a greater range of cumulative issues.
N	Wisbech St Mary	5E+05	3E+05	5.3	S	Motorists, a few residents	Fenland	None	Not representative of the village as a whole. Similar orientation etc to Vp 4 in ES.
O	Tydd St Mary	5E+05	3E+05	5.7	NE	Residents, motorists	South Holland	None	Situated very close to two pylon lines and not representative of views from the main settlement (no clear views were found to be available from main settlement).

LVA Vp No	Viewpoint location	NGR	NGR	Distance (km)	Bearing	Visual receptor	LPA	Landscape designation	Comments
P	A1101 Wisbech	5E+05	3E+05	5.7	E	Motorists, a few residents	Fenland	None	Only view found to be available from public areas in Wisbech. Turbines would be partially visible above nearby built form of Leverington. Similar orientation and distance to Vp 5 from ES.
Q	A1101 Four Gotes	5E+05	3E+05	6	NE	Motorists, a few residents	Fenland	None	Located in close proximity to pylon lines and not representative of many sensitive receptors.
R	Walpole Marsh	5E+05	3E+05	9.3	NE	Residents, motorists	Kings Lynn & West Norfolk	None	Located in close proximity to numerous pylon lines.
S	Mill Bank, Holbeach Fen	5E+05	3E+05	9.3	N	Motorists	South Holland	None	Not representative of a wide range of receptors. Vp 12 in ES considered to represent a greater number of sensitive receptors from a similar orientation.
T	A47 Thorney Toll	5E+05	3E+05	9.4	SW	Residents, motorists	Fenland	None	Viewpoint 13 in ES was considered to represent a greater range of receptors whilst illustrating a similar view.
U	A17 near Long Sutton	5E+05	3E+05	9.6	N	Motorists	South Holland	None	Illustrates a view from the main road used by many road users but at this distance the view from this road is very intermittent and dependant on intervening features. Vp 12 in ES was considered to represent a similar view but from a more sensitive receptor group.
V	Moulton Chapel	5E+05	3E+05	9.6	NW	Residents, motorists	South Holland	None	View from very edge of settlement, not representative of views of most residents.
W	Local road Waldersey	5E+05	3E+05	9.8	S	Motorists, cyclists	Fenland	None	Not a well used local road and view represents few receptor types.
X	Local road nr Holbeach	5E+05	3E+05	10.8	N	Motorists, cyclists	South Holland	None	Not a well used local road and view represents few receptor types.
Y	Mill Road over A47	6E+05	3E+05	11.7	E	Motorists	Kings Lynn & West Norfolk	None	Elevated, short lived view from a local road, not representative of views from A47 or nearby residential areas.
Z	A1073, Cowbit	5E+05	3E+05	12.2	WNW	Residents, motorists	South Holland	None	Similar in distance and orientation to Vp 11 in ES.
AA	B1357, Moulton	5E+05	3E+05	12.5	NW	Residents, motorists	South Holland	None	View from very southern edge of settlement, not representative of main parts of settlement. Similar in distance and orientation to Vp 12 in ES.
BB	A1073, Crowland	5E+05	3E+05	13.3	W	Motorists	South Holland	None	Partial and distant view, not representative of settlement area. Viewpoint 11 in ES located nearby.
CC	Footpath by River Welland nr Spalding	5E+05	3E+05	15.4	NW	Walkers	South Holland	None	Viewpoint located on elevated bank by watercourse. Not representative of residential views within settlement or views from nearby roads.
DD	Holbeach St Marks	5E+05	3E+05	18	N	Residents, motorists	South Holland	None	Very distant view where proposed turbines would be seen as tips only above intervening vegetation and built form in context of nearby pylons.

Appendix 10.9 - Cumulative Review

Cumulative Appraisal

Introduction

1. This appendix presents the results of a cumulative appraisal that has examined a further two "Development Scenarios". These Development Scenarios examine the potential cumulative effects of Treading Wind Farm in combination with a number of other permitted (but not yet built) and proposed wind farms within the 20km radius study area. These are described as Development Scenarios Two and Three and are set out in more detail below.

2. Development Scenario One assesses the potential effects of Treading Wind Farm on a baseline containing ten existing wind energy developments. **Chapter 10, Volume 2** of the ES contains the findings of this assessment.

3. Development Scenario Two considers the permitted Foundry Way turbine, Coldham Wind Farm extension, Nutsgrove, Wryde Croft, French Farm and The Grange Wind Farms. Given that these turbines are permitted, it is expected that they would be built before the Treading turbines (should they be permitted). Therefore, within this Development Scenario, these permitted turbines are included within the baseline (along with all existing operational turbines) and an assessment is made on the additional cumulative effects of the proposed Treading Wind Farm. This is described as Development Scenario Two.

4. Development Scenario Three considers the five proposed schemes within the study area; Boardinghouse, Burnt House Farm, Floods Ferry, Holbeach Marsh and Hundred Road Wind Farms. It is our understanding that Boardinghouse, Burnt House Farm and Floods Ferry Wind Farms are all within the appeal process, and Holbeach Marsh and Hundred Road Wind Farms are both local planning applications. Should these wind farms be permitted before determination of the Treading Wind Farm application, it is reasonable to expect that they would be constructed prior to the Treading turbines (should these also be permitted). Therefore, these proposed turbines, along with the permitted turbines are included within the baseline (along with all existing operational turbines) and an assessment is made on the additional cumulative effects of the proposed Treading Wind Farm. This is described as Development Scenario Three.

5. The appraisal has been based on fieldwork observations, and computer-generated cumulative wireframes from six viewpoint locations (Viewpoints 6, 9, 10, 11, 13, & 16 from the main LVIA viewpoints), showing the different Development Scenarios. These figures are all provided within **Volume 4** of the ES (**Figures 10.8 (a - e) & 10.9 (a - e)**). No cumulative ZTVs have been produced for this assessment as Figure 10.6, the Treading ZTV illustrates that the topography of the study area is so flat that a ZTV will only suggest potential visibility of wind turbines across the entire study area. Therefore, fieldwork and wireframes have been used as the main assessment tools for this cumulative review.

Description of developments

6. The Treading Wind Farm site is located approximately 6km northeast of Wisbech and just over 1km east of Sutton St Edmund. The proposal includes six turbines 126m to tip and an 80m high anemometer mast, all located on flat farmland.

7. The permitted Wryde Croft Wind Farm consists of six 100m to tip wind turbines which would be situated approximately 4.6km northeast of Thorney and would be located approximately 6.9km southwest of the nearest proposed Treading turbine.

8. The permitted Nutsgrove Wind Farm consists of seven 102m to tip wind turbines located immediately south of the permitted Wryde Croft turbines. The Nutsgrove turbines would be approximately 4.3km northeast of Thorney and would be located approximately 7.6km southwest of the nearest proposed Treading turbine.

9. The recently permitted Grange Wind Farm consists of seven 125m to tip wind turbines situated close to the River Nene and approximately 1.5km south of Sutton Bridge. The Grange turbines would be approximately 8.3km northeast of the nearest proposed Treading turbine.

10. The recently permitted French Farm Wind Farm consists of two 100m to tip wind turbines situated approximately 3.5km north of Thorney and approximately 10.3km southwest of the nearest proposed Treading turbine.

11. The permitted Coldham Wind Farm extension consists of seven 100m to tip wind turbines located immediately northwest of the main Coldham and Stags Holt Wind Farms. The Coldham extension turbines would be approximately 6km south of Wisbech and approximately 12.4km southeast of the nearest proposed Treading turbine.

12. The permitted Foundry Way turbine is a single 111m to tip turbine located close to the existing Longhill Road single turbine. The Foundry Way turbine would be approximately 0.9km north of the northern outskirts of March and 13.7km south of the nearest proposed Treading turbine.

13. Boardinghouse Wind Farm is a proposed wind farm currently in the appeal process. It comprises five 110m to tip turbines, located immediately north of the existing Ranson Moor turbines and approximately 2.7km southwest of March. The closest Boardinghouse turbine would be approximately 18.7km from the nearest Treading turbine.

14. Burnt House Farm Wind Farm is a proposed wind farm currently in the appeal process, comprising three turbines, each 100m to tip, located 5.7km southeast of Whittlesey and approximately 17.4km south of the nearest proposed Treading turbine.

15. Floods Ferry Wind Farm is a proposed wind farm currently in the appeal process, comprising nine turbines, each 110m to tip, located 7.3km east of Whittlesey and approximately 17.1km south of the nearest proposed Treading turbine.

16. Holbeach Marsh Wind Farm is a proposed wind farm currently in the local planning process, comprising eight turbines, each 110m to tip, located 5km

northeast of Holbeach and approximately 14.8km north of the nearest proposed Treading turbine.

17. Hundred Road Wind Farm is a proposed wind farm currently in the local planning process, comprising two turbines, each 125m to tip, located approximately 0.5km north of the northern outskirts of March and approximately 15.4km south of the nearest proposed Treading turbine.

18. There are ten existing operational wind farms and wind turbines within or just beyond the 20km radius study area, all of which are located over 13km or more from the nearest proposed Treading turbine. These wind farms are:

19. Coldham Wind Farm (eight turbines – 13.2km southeast of the nearest Treading turbine (100m to tip));

20. Stags Holt Wind Farm (nine turbines – 14km southeast of the nearest Treading turbine (100m to tip));

21. Stags Holt Extension (one turbine – 14.4km southeast of the nearest Treading turbine (100m to tip));

22. Longhill Road turbine (one turbine – 13.3km south of the nearest Treading turbine (100m to tip));

23. Ranson Moor Wind Farm (five turbines – 19.2km south of the nearest Treading turbine (107m to tip));

24. Glassmoor Wind Farm (eight turbines – 23km southwest of the nearest Treading turbine (100m to tip));

25. McCain turbines (three turbines – 21.5km southwest of the nearest Treading turbine (125m to tip));

26. Abbey Produce turbine (one turbine – 21.5km southwest of the nearest Treading turbine (125m to tip));

27. Deeping Wind Farm (eight turbines – 17.9km west-northwest of the nearest Treading turbine (100m to tip)); and

28. Red House Wind Farm (six turbines – 14.6km north of the nearest Treading turbine (100m to tip)).

29. The locations of the existing, permitted and proposed wind farms and turbines are shown on **Figure 10.2**, in relation to the Treading Wind Farm 20km radius study area.

Windfarm	No. of turbines	Tip height	Proximity (approx)	Status
Coldham	8	100m	13.2km southeast	Operational
Stag's Holt	9	100m	14km southeast	Operational
Longhill Road	1	100m	13.3km south	Operational
Stags Holt extension	1	100m	14.4km southeast	Operational
Ranson Moor	5	107m	19.2km south	Operational
McCain	3	125m	21.5km southwest	Operational
Glassmoor	8	100m	23km southwest	Operational

Abbey Produce	1	125m	21.5km southwest	Operational
Deeping	8	100m	17.9km west-northwest	Operational
Red House	6	100m	14.6km north	Operational
Coldham Extension	7	100m	12.4km south-southeast	Permitted
The Grange	7	125m	8.3km northeast	Permitted
Foundry Way	1	111m	13.7km south	Permitted
French Farm	2	100m	10.3km southwest	Permitted
Nutsgrove	7	102m	7.6km southwest	Permitted
Wryde Croft	6	100m	6.9km southwest	Permitted
Boarding House	5	110m	18.7km south	Appeal
Burnt House Farm	3	100m	17.4km south	Appeal
Floods Ferry	9	110m	17.1km south-southwest	Appeal
Holbeach Marsh	8	110m	14.8km north-northeast	Proposed
Hundred Road	2	125m	15.4km south	Proposed

Table 10.9/1 – Cumulative Wind Farms

Visibility Analysis

30. Normally for a cumulative review a series of cumulative ZTVs would be produced to predict the parts of the study area where the proposed Treading turbines would be visible in combination and separate to the existing, permitted and other proposed wind farms and turbines. However, as **Figure 10.6** in the main ES illustrates, as ZTVs rely only on topographical information to produce the zones of potential visibility, given the extremely flat nature of the landform within the Fens, any ZTV suggests that the turbines would be visible from all parts of the study area. This would also be the case for cumulative ZTVs, which would suggest that all the wind turbines would be visible from all parts of the study area. Fieldwork has shown that this would not be the case, due to the recurrent screening effects of built form and vegetation, especially over distances. Therefore, for this assessment, fieldwork observations and a viewpoint analysis have been utilised.

Viewpoint Analysis

31. In addition to the introduction of wind turbines into views where wind turbines are not already visible, significant effects on landscape and visual amenity can arise as a result of an increase in the number and proximity of wind turbines visible from any one location. Therefore, a viewpoint analysis has been undertaken that considers a selection of the viewpoints assessed in **Chapter 10, Volume 2** and concentrates on those where a number of the proposed and permitted wind farms would be visible in conjunction with the Treading turbines, as these are the locations where there is the potential for significant additional effects to arise as a result of Treading turbines, in the context of these permitted and proposed turbines.

32. As a result of this process, six of the sixteen viewpoints have been re-analysed. These are listed in **Table 10.9/2** below. **Those wind farms shown in brackets are potentially visible, but are screened from view at the viewpoint by vegetation.**

Table 10.9/2 Viewpoints

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
6	B1167, French Drove by New South Eau	533220 308925	2	6.0	SW/NE	Peterborough	Peterboro-ugh Fens	None	Road users	Coldham (14.6km) Stags Holt (14.8km) Longhill Road (12.6km) Stags Holt extension (15.4km) Ranson Moor (16.6km) McCain (14.8km) Abbey Produce (15.0km) (Glassmoor (17.1km)) Deeping (14.9km) (Red House (21.1km)) Coldham extension (13.8km) Foundry Way (12.7km) (The Grange (16.3km)) French Farm (4.6km) Nutsgrove (2.5km) Wryde Croft (0.9km) Boardinghouse (16.0km) (Burnt House Farm (13.9km)) Floods Ferry (12.8km) (Holbeach Marsh (21.0km)) Hundred Road (12.5km).

Treading Wind Farm

APPENDIX 10.9

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
9	Nene Way, Tydd St Mary's Marsh	547150 318905	1	9.2	NE/SW	South Holland	Settled Fens and Marshes	Long distance footpath	Walkers, road users	(Coldham (17.7km)) (Stags Holt (18.7km)) (Longhill Road (20.3km)) (Stags Holt extension (19.0km)) (Ranson Moor (27.3km)) (McCain (31.6km)) (Abbey Produce (31.8km)) (Glassmoor (32.3km)) (Deeping (27.0km)) Red House (11.0km) (Coldham extension (17.2km)) (Foundry Way (20.5km)) The Grange (0.5km) (French Farm (21.0km)) (Nutsgrove (18.5km)) (Wryde Croft (18.0km)) (Boardinghouse (26.6km)) (Burnt House Farm (27.1km)) (Floods Ferry (25.4km)) Holbeach Marsh (11.2km) (Hundred Road (20.9km)).

APPENDIX 10.9

Treading Wind Farm

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
10	Nene Way near Guyhirn Corner	538460 302080	3	10.4	S/N	Fenland	The Fens	Long distance footpath	Walkers.	Coldham (7.0km) Stags Holt (7.0km) Longhill Road (4.0km) Stags Holt extension (7.6km) Ranson Moor (9.1km) McCain (15.4km) Abbey Produce (15.3km) (Glassmoor (13.7km)) (Deeping (23.0km)) (Red House (26.4km)) Coldham extension (6.4km) Foundry Way (4.2km) (The Grange (18.5km)) French Farm (11.9km) Nufsgrove (5.9km) Wryde Croft (7.0km) Boardinghouse (8.5km) Burnt House Farm (8.2km) Floods Ferry (6.5km) (Holbeach Marsh (26.4km)) Hundred Road (3.8km).

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
11	B1166, Hull's Drove, Great Postland	527525 311715	2	10.5	W/E	South Holland	Planned and drained Fens and Carrlands	None	Road users.	Coldham (20.9km) Stags Holt (21.1km) (Longhill Road (18.6km)) Stags Holt extension (21.7km) (Ranson Moor (21.4km)) McCain (15.1km) Abbey Produce (14.6km) (Glassmoor (19.4km)) Deeping (8.6km) (Red House (21.7km)) Coldham extension (20.1km) (Foundry Way (18.7km)) (The Grange (19.9km)) French Farm (2.8km) Nufsgrove (7.8km) Wryde Croft (6.2km) (Boardinghouse (21.0km)) Burnt House Farm (17.9km) Floods Ferry (17.3km) (Holbeach Marsh (21.5km)) (Hundred Road (18.3km)).

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
13	B1167, Wisbech Road, Thorney	529355 304155	2	12.0	SW/NE	Peterborough	Peterboro-ugh Fens	None	Road users and a few residents	(Coldham (16.4km)) (Stags Holt (16.3km)) (Longhill Road (13.0km)) (Stags Holt extension (16.9km)) Ranson Moor (14.0km) McCain (8.6km) Abbey Produce (8.9km) Glassmoor (11.8km) (Deeping (14.9km)) (Red House (27.0km)) (Coldham extension (15.7km)) (Foundry Way (13.1km)) The Grange (22.3km) French Farm (4.7km) Nutsgrove (4.3km) Wryde Croft (4.6km) Boardinghouse (13.7km) Burnt House Farm (10.3km) Floods Ferry (9.9km) (Holbeach Marsh (26.9km)) (Hundred Road (12.4km)).

Treading Wind Farm APPENDIX 10.9

Vpt no:	Viewpoint	NGR	Approx elevation (mAOD)	Nearest Treading turbine (km)	Direction of viewpoint from/ to site	Local Authority	Landscape Character	Landscape designations and recreational routes	Receptors	Other wind farms potentially visible from viewpoint (approx distance and direction to nearest wind turbine)
16	Whittlesey Road across West Fen	536005 296975	1	15.7	S/N	Fenland	The Fens	SUSTRANs cycle route	Road users and cyclists	Coldham (10.0km) Stags Holt (9.3km) Longhill Road (6.0km) Stags Holt extension (10.2km) Ranson Moor (4.4km) (McCain (12.3km)) (Abbey Produce (11.9km)) Glassmoor (8.5km) (Deeping (24.7km)) (Red House (31.8km)) Coldham extension (9.9km) Foundry Way (5.9km) The Grange (24.1km) French Farm (13.9km) Nufsgrove (8.8km) Wryde Croft (10.1km) Boardinghouse (4.0km) Burnt House Farm (2.6km) Floods Ferry (0.9km) (Holbeach Marsh (31.8km)) Hundred Road (5.0km).

33. The viewpoint numbers are consistent with the numbers used in **Chapter 10**, **Volume 2** and the locations of these viewpoints are shown on **Figure 10.2**.

34. These viewpoints have been re-analysed following the methodology described in **Appendix 10.1, Volume 2** in the context of two different Development Scenarios; that is, for Development Scenario Two the analysis has assumed that all the permitted wind farms and wind turbines are built and operational, and examined whether the addition of the proposed Treading turbines would result in a significant additional change in the views from these locations (Viewpoints 6, 10, 11, 13 & 16).

35. The viewpoints have then been re-analysed again in the context of Development Scenario Three; that is, the analysis has assumed that the permitted and proposed wind farms and wind turbines are built and operational, and examined whether the addition of the proposed Treading turbines would result in a significant additional change in the views from these locations (Viewpoints 6, 9, 10, 11 & 16).

36. The computer-generated wireframe views used in this re-analysis and presented in **Volume 4** of the ES concentrate on the sector(s) of the view in which the permitted and proposed wind turbines would be located. The wind turbines from each wind farm are clearly marked on each wireframe. (**Figures 10.8 (a-e) and 10.9 (a-e)**).

37. The results of the re-analysis of Development Scenario Two are presented below in **Table 10.9/3**. The fieldwork observations and assessment findings suggest that, with the permitted/consented turbines as part of the baseline, the magnitude of change arising from the addition of the Treading turbines to these views will predominantly be lower than when introducing the Treading turbines into a landscape where very few turbines currently exist in the locality (as set out in Development Scenario 1 in **Chapter 10**, **Volume 2**). Overall, the main wind turbines that affect this change at the viewpoints are the Wryde Croft, Nutsgrove and French Farm turbines as they are the closest permitted turbines to the Treading site. Generally, those permitted turbines located beyond approximately 8km from the Treading turbines would have no effect in cumulative terms.

38. Therefore, with the Wryde Croft, Nutsgrove and French Farm turbines within the baseline, the pattern of significant effects on views would be more confined than is predicted to arise as a result of the addition of only the Treading turbines to the current baseline (as predicted in **Chapter 10**, **Volume 2**). This is because the main change to views of a local landscape will occur with the introduction of the first wind turbines. Beyond this, the introduction of further turbines will create a change in views across the landscape, but generally not such a large change as the introduction of these first turbines. In this case, the introduction of the Wryde Croft, Nutsgrove and French Farm turbines would result in wind turbines generally being recurrently visible within and around the landscape in the locality of the Treading site, something that currently doesn't really occur as all existing built turbines are located at distances of over 13km from the Treading site. This is reflected in the main LVA viewpoints (Figures 10.7i-xvii) where those viewpoints close to the Treading site generally do not include visibility of existing wind turbines, and if they do, these existing turbines are distant and partial. Given the limited size of the Treading site, the introduction of these six proposed turbines to a landscape where wind turbines will be a recurrently visible feature (once the permitted turbines are built) would result

in only limited significant effects on views. This is reflected by the magnitude of change in **Table 10.9/3**.

39. **Table 10.9/3** shows no significant effects from any of the five viewpoints re-assessed. As **Table 10.4** in **Chapter 10**, **Volume 2** illustrates, Development Scenario One would also not result in any significant effects from any of these viewpoints. This is largely because these viewpoints are all located at distances of over 6km from the nearest proposed Treading turbine and so are at a sufficient distance so as to not result in significant effects on receptors. Having said that, as has been noted above, no clear and open views of other wind farms (existing or permitted) were available from the viewpoints closer to the Treading site (Viewpoints 1-5), which is why they were not used as part of this assessment.

40. Nevertheless, what can be ascertained from this is that the magnitude of change and resulting significance of effects from Vps 1 to 5 would remain consistent regardless of whether the baseline contains the permitted turbines, these effects are as a result of the proposed Treading turbines and cannot be considered cumulative effects. Therefore, the initial indication is that the separation between the Nutsgrove, Wryde Croft and French Farm turbines from the Treading turbines would be sufficient to not result in significant cumulative effects. However, this will be discussed in more detail later in this review, mainly in relation to the settlements of Whaplode Drove, Holbeach Drove and Gedney Hill.

41. The results of the re-analysis of Development Scenario Three are presented in **Table 10.9/4**. Fieldwork and assessment findings suggest that, with the permitted/consented and proposed wind farms as part of the baseline, the magnitude of change arising from the addition of the Treading turbines to these views would predominantly be lower than when introducing the Treading turbines into a landscape where few turbines currently exist in the locality (as set out in Development Scenario 1 in **Chapter 10**, **Volume 2**). All of the proposed (and appealed) turbines are located at distances of over 13km from the Treading turbines and so their visibility in conjunction with the Treading turbines is extremely limited, partial and distant, as illustrated by the viewpoints. Therefore, with these other proposed turbines already as part of the baseline along with numerous other existing and permitted turbines, to introduce the limited number of Treading turbines would result in very limited changes to views. As with Scenario Two, no clear and open views of other wind farms (existing, permitted or proposed) were available from the viewpoints closer to the Treading site (Viewpoints 1-5), which is why they were not used as part of this assessment. And similarly, the effects resulting at Viewpoints 1-5 as illustrated in **Chapter 10, Table 10.4** are as a result of the proposed Treading turbines alone and cannot be considered cumulative effects.

Table 10.9/3 Summary of Viewpoint Analysis - Development Scenario Two (all permitted wind farms and wind turbines within baseline, with Treading as additional)

Viewpoint location			Proposed Treading wind turbines				Viewpoint Analysis - Additional effects of Treading wind turbines			
Vpt No	**Location**	**NGR**	**Distance to nearest/ furthest visible turbines**	**Number + extent of turbines visible**	**Field of view occupied by turbine array**	**Background**	**Receptors**	**Sensitivity of location**	**Magnitude of change**	**Overall impact and significance**
6	B1167, French Drove by New South Eau	533220 308925	6.0km/ 7.9km	6 hubs and upper blades	6°	Sky	Motorists	Medium	Slight/ negligible	Minor+
10	Nene Way near Guyhirn Corner	538460 302080	10.4km/ 11.5km	6 rotor sweeps	9°	Sky	Walkers	High	Slight	Moderate
11	B1166, Hull's Drove, Great Postland	527525 311715	10.5km/ 12.3km	6 hubs and upper blades	5°	Sky	Motorists	Medium/ low	Negligible	Minor/ negligible+
13	B1167, Wisbech	529355 304155	12.0km/ 13.9km	4 almost complete,	4°	Sky	Motorists	Medium	Negligible	Minor

Viewpoint location			Proposed Treading wind turbines				Viewpoint Analysis - Additional effects of Treading wind turbines			
Vpt No	**Location**	**NGR**	**Distance to nearest/ furthest visible turbines**	**Number + extent of turbines visible**	**Field of view occupied by turbine array**	**Background**	**Receptors**	**Sensitivity of location**	**Magnitude of change**	**Overall impact and significance**
13	Road, Thorney	529355 304155	12.0km/ 13.9km	2 rotor sweeps	4°	Sky	Motorists	Medium	Negligible	Minor
							Residents	High		Moderate/ minor
16	Whittlesey Road across West Fen	536005 296975	15.7km/ 16.9km	3 rotor sweeps, 3 upper blades	5°	Sky	Motorists	Medium/ low	Negligible	Minor/ negligible+
							Cyclists	High		Minor

Table 10.9/4 Summary of Viewpoint Analysis - Development Scenario Three (all permitted and proposed wind farms and wind turbines within baseline, with Treading as additional)

Viewpoint location			Proposed Treading wind turbines				Viewpoint Analysis - Additional effects of Treading wind turbines			
Vpt No	Location	NGR	Distance to nearest/ furthest visible turbines	Number + extent of turbines visible	Field of view occupied by turbine array	Background	Receptors	Sensitivity of location	Magnitude of change	Overall impact and significance
6	B1167, French Drove by New South Eau	533220 308925	6.0km/ 7.9km	6 hubs and upper blades	6°	Sky	Motorists	Medium	Slight/ negligible	Minor+
9	Nene Way, Tydd St Mary's Marsh	547150 318905	9.2km/ 11.1km	6 upper blades	4°	Sky	Walkers	High	Negligible	Moderate/ minor
							Motorists	Medium/ low		Minor/ negligible+
10	Nene Way near Guyhirn Corner	538460 302080	10.4km/ 11.5km	6 rotor sweeps	9°	Sky	Walkers	High	Slight	Moderate

Viewpoint location			Proposed Treading wind turbines				Viewpoint Analysis - Additional effects of Treading wind turbines			
Vpt No	**Location**	**NGR**	**Distance to nearest/ furthest visible turbines**	**Number + extent of turbines visible**	**Field of view occupied by turbine array**	**Background**	**Receptors**	**Sensitivity of location**	**Magnitude of change**	**Overall impact and significance**
11	B1166, Hull's Drove, Great Postland	527525 311715	10.5km/ 12.3km	6 hubs and upper blades	5°	Sky	Motorists	Medium/ low	Negligible	Minor/ negligible+
16	Whittlesey Road across West Fen	536005 296975	15.7km/ 16.9km	3 rotor sweeps, 3 upper blades	5°	Sky	Cyclists	High	Negligible	Moderate/ minor
							Motorists	Medium/low		Minor/ negligible+

Visual Appraisal

42. ZTVs have not been used in this review due to the very flat nature of the local topography. Therefore, fieldwork and a Viewpoint Analysis have been used as the main tools to assess the cumulative issues resulting from the introduction of the Treading turbines to this study area.

43. Currently, the central portion of the study area is devoid of wind turbines, with the majority of existing turbines located on the southern side of the study area, south of Wisbech. However, this situation will now change with the relatively recent permission of several wind farms within the central section of the study area at Grange, French Farm, Wyrde Croft and Nutsgrove, as well as the extension of the Coldham site and the permission of the Foundry Way turbine. As a result, once these thirty wind turbines are built, turbines will also become recurrently and proximately visible within the centre of the study area between Crowland and Wisbech. It is considered that the potential introduction of a further six turbines into this section of the study area at Treading would increase the recurrence of turbine visibility, but within an area which will already be characterised by turbine visibility. All of the other proposed turbines are located at sufficient distances on the edge of the study area so as to not add further to this wind farm landscape within the central section of the study area.

44. However, the Viewpoint Analysis suggests that the distance between the Treading turbines and the permitted turbines is generally sufficient to result in a separation of significant effects and so extremely limited significant cumulative effects. Fieldwork has found that the key area where significant cumulative effects may arise is in the settlements of Gedney Hill and Holbeach Drove. The location of these settlements between the Treading and permitted turbines would result in potential significant cumulative effects on the visual amenity of residents who could clearly see both the permitted (Wryde Croft or Nutsgrove or French Farm turbines) and the Treading turbines from their residences. However, in reality, it is expected that the number of residents able to do so would be extremely limited given the separation and orientation of properties in relation to these wind farms, and the screening effects of nearby built form and vegetation. Treading would be located to the east, with Nutsgrove and Wryde Croft located to the south. Therefore, it is likely that most residents would see wind turbines in one direction, but not the other. Fieldwork found that the orientation of other settlements in the landscape between Treading and the permitted turbines (such as Parson Drove, Murrow and Newton) would result in more pronounced screening effects from adjacent built form and vegetation so that significant cumulative effects are not expected to arise.

45. The recurrent visibility of turbines from roads, footpaths etc can also cause significant cumulative effects on visual amenity to arise. Fieldwork found that recurrent visibility of existing turbines within the south of the study area currently gives rise to some significant cumulative effects, especially along main roads such as the A47, the rail line between March and Whittlesey and parts of the Nene Way between Guyhirn and Whittlesey. Fieldwork also found that the introduction of the permitted turbines into the central portion of the study area would generally result in some significant cumulative effects, such as along the B roads, some local roads, bridleways and footpaths in the area, which the introduction of the Treading turbines would only add to modestly.

46. Overall, the Viewpoint Analysis for Scenarios Two and Three illustrate that the distances between the existing, permitted, proposed and Treading schemes is sufficient to result in extremely limited significant cumulative changes in views from single locations. Therefore, if the consented/permitted and proposed turbines were to be built, the pattern and intensity of potential significant effects on views and visual amenity as a result of the Treading turbines would be similar to those predicted in **Chapter 10, Volume 2** (Development Scenario One). The main way in which significant cumulative effects arise within this study area is as a result of recurrent turbine visibility, which is already a facet of the study area due to the existing turbines, and will be extended into the centre of the study area as a result of the permitted turbines.

Landscape Appraisal

Cumulative effects on Landscape Character

47. The proposed Treading Wind Farm is located within The Fens/Peterborough Fens/Planned and Drained Fens and Carrlands LCA/LCT, see **Figure 10.5**. This conjoined LCA/LCT occupies a large extent of land within the central section of the study area and is described as a large scale, low lying landscape with a simple palette of land uses and extensive views. The Treading turbines would not be the first wind turbines within this LCA/LCT, as the Coldham, Stags Holt, Longhill Road, Ranson Moor, Glassmoor and Deeping turbines are already built within this LCA/LCT and the Foundry Way, Nutsgrove, Wryde Croft and French Farm turbines have been permitted within the LCA/LCT. These operational and permitted turbines are and would be (in the case of the permitted schemes) openly visible from parts of this LCA/LCT, already altering the character of some parts of the LCA/LCT. The introduction of the permitted turbines would extend into the centre of study area the 'wind farm landscape' that this recurrent visibility creates in the south of the study area and the introduction of the Treading turbines would reinforce this effect slightly further.

48. As discussed in paragraph 10.233 of **Chapter 10**, **Volume 2**, the Wind Turbine Development in Fenland Report produced for Fenland District Council (LP, 2008) illustrated in Figure 14A that when taking all the main landscape and visual constraints within the District into account, the proposed site offered one of only three locations within the District capable of accommodating a wind energy development. The report also states that the site has a high landscape capacity to accommodate a small (up to 6 turbines) or small/medium (6 to 11 turbines) sized wind turbine development, or a high/medium capacity to accommodate a medium sized development (12-16 turbines).

Conclusions

49. The addition of all of the permitted and other proposed turbines to the baseline would essentially result in some changes to landscape character and visual amenity such that overall the additional effects of introducing the six proposed Treading turbines would be less than that predicted in **Chapter 10**, **Volume 2** for Development Scenario One and there would be a slight reduction in the extent of significant additional effects as a result of Treading Wind Farm where all these permitted and other proposed schemes already exist.

50. A number of the existing and permitted wind farms within the study area are located within the Fens/Peterborough Fens/Planned and Drained Fens and Carrlands LCA/LCT, suggesting that the character of this landscape is suitable to accommodate wind energy development. Indeed, as the Wind Turbine Development in Fenland report concludes, the landscape of the site has a high landscape capacity to accommodate a small (up to 6 turbines) wind energy development.

51. The findings of the Cumulative Appraisal suggest that given the limited size of this development and the careful siting within a suitable landscape type, the introduction of this wind farm would be acceptable in landscape and visual amenity terms within the context of existing and permitted wind energy developments.

Appendix 10.10 - Shadow Flicker Assessment Data

25/ 1	537350	312589	42	0.55	0.43	18.2
25/ 2	537350	312589	42	0.55	0.43	18.2
26/ 1	537355	312614	42	0.55	0.43	18.2
26/ 2	537355	312614	42	0.55	0.44	18.3
27/ 1	537357	312665	42	0.55	0.43	17.9
27/ 2	537357	312665	42	0.55	0.43	17.9
28/ 1	537363	312745	43	0.54	0.41	17.6
28/ 2	537363	312745	42	0.54	0.42	17.7
29/ 1	537448	312857	48	0.57	0.45	21.5
29/ 2	537448	312857	49	0.57	0.44	21.7
29/ 3	537448	312857	0	0.00	0.00	0.0
29/ 4	537448	312857	0	0.00	0.00	0.0
29/ 5	537448	312857	48	0.56	0.45	21.4
29/ 6	537448	312857	50	0.56	0.43	21.6
31/ 1	537439	313523	0	0.00	0.00	0.0
31/ 2	537439	313523	0	0.00	0.00	0.0
31/ 3	537439	313523	0	0.00	0.00	0.0
31/ 4	537439	313523	0	0.00	0.00	0.0
32/ 1	537444	313575	0	0.00	0.00	0.0
32/ 2	537444	313575	0	0.00	0.00	0.0
Total,mean,max of events			238	0.57	0.41	462.8
Total,mean,max per day			238	0.91	0.54	129.0

Turbine	Easting	Northing
3	538635	312707

House/ Window	Easting	Northing	Days per year	Max hours per event	Mean hours per event	Total event hours
1/ 1	538626	313484	0	0.00	0.00	0.0
1/ 2	538626	313484	0	0.00	0.00	0.0
1/ 3	538626	313484	0	0.00	0.00	0.0
1/ 4	538626	313484	0	0.00	0.00	0.0
2/ 1	538746	313481	0	0.00	0.00	0.0
2/ 2	538746	313481	0	0.00	0.00	0.0
2/ 3	538746	313481	0	0.00	0.00	0.0
2/ 4	538746	313481	0	0.00	0.00	0.0
3/ 1	539075	313943	0	0.00	0.00	0.0
3/ 2	539075	313943	0	0.00	0.00	0.0
3/ 3	539075	313943	0	0.00	0.00	0.0
3/ 4	539075	313943	0	0.00	0.00	0.0
4/ 1	539114	313984	0	0.00	0.00	0.0
4/ 2	539114	313984	0	0.00	0.00	0.0
4/ 3	539114	313984	0	0.00	0.00	0.0
4/ 4	539114	313984	0	0.00	0.00	0.0
5/ 1	539183	314059	0	0.00	0.00	0.0
5/ 2	539183	314059	0	0.00	0.00	0.0
5/ 3	539183	314059	0	0.00	0.00	0.0
5/ 4	539183	314059	0	0.00	0.00	0.0
6/ 1	539272	314079	0	0.00	0.00	0.0
6/ 2	539272	314079	0	0.00	0.00	0.0
6/ 3	539272	314079	0	0.00	0.00	0.0
6/ 4	539272	314079	0	0.00	0.00	0.0
10/ 1	539984	314185	0	0.00	0.00	0.0
10/ 2	539984	314185	0	0.00	0.00	0.0
10/ 3	539984	314185	0	0.00	0.00	0.0
10/ 4	539984	314185	0	0.00	0.00	0.0
11/ 1	540103	314149	0	0.00	0.00	0.0
11/ 2	540103	314149	0	0.00	0.00	0.0
12/ 1	540159	314061	0	0.00	0.00	0.0
12/ 2	540159	314061	0	0.00	0.00	0.0
12/ 3	540159	314061	0	0.00	0.00	0.0
12/ 4	540159	314061	0	0.00	0.00	0.0
13/ 1	540393	313715	0	0.00	0.00	0.0
13/ 2	540393	313715	0	0.00	0.00	0.0
14/ 1	540491	313608	0	0.00	0.00	0.0
14/ 2	540491	313608	0	0.00	0.00	0.0
14/ 3	540491	313608	0	0.00	0.00	0.0
14/ 4	540491	313608	0	0.00	0.00	0.0
16/ 1	540313	313051	0	0.00	0.00	0.0
16/ 2	540313	313051	0	0.00	0.00	0.0
16/ 3	540313	313051	0	0.00	0.00	0.0
16/ 4	540313	313051	0	0.00	0.00	0.0
20/ 1	538668	311778	0	0.00	0.00	0.0
20/ 2	538668	311778	0	0.00	0.00	0.0
21/ 1	538147	311857	0	0.00	0.00	0.0
21/ 2	538147	311857	0	0.00	0.00	0.0
22/ 1	537397	312047	0	0.00	0.00	0.0
22/ 2	537397	312047	0	0.00	0.00	0.0
22/ 3	537397	312047	0	0.00	0.00	0.0

22/ 4	537397	312047	0	0.00	0.00	0.0
23/ 1	537317	312223	0	0.00	0.00	0.0
23/ 2	537317	312223	0	0.00	0.00	0.0
23/ 3	537317	312223	0	0.00	0.00	0.0
23/ 4	537317	312223	0	0.00	0.00	0.0
24/ 1	537322	312295	0	0.00	0.00	0.0
24/ 2	537322	312295	0	0.00	0.00	0.0
24/ 3	537322	312295	0	0.00	0.00	0.0
24/ 4	537322	312295	0	0.00	0.00	0.0
25/ 1	537350	312589	0	0.00	0.00	0.0
25/ 2	537350	312589	0	0.00	0.00	0.0
26/ 1	537355	312614	0	0.00	0.00	0.0
26/ 2	537355	312614	0	0.00	0.00	0.0
27/ 1	537357	312665	0	0.00	0.00	0.0
27/ 2	537357	312665	0	0.00	0.00	0.0
28/ 1	537363	312745	0	0.00	0.00	0.0
28/ 2	537363	312745	0	0.00	0.00	0.0
29/ 1	537448	312857	0	0.00	0.00	0.0
29/ 2	537448	312857	0	0.00	0.00	0.0
29/ 3	537448	312857	0	0.00	0.00	0.0
29/ 4	537448	312857	0	0.00	0.00	0.0
29/ 5	537448	312857	0	0.00	0.00	0.0
29/ 6	537448	312857	0	0.00	0.00	0.0
31/ 1	537439	313523	0	0.00	0.00	0.0
31/ 2	537439	313523	0	0.00	0.00	0.0
31/ 3	537439	313523	0	0.00	0.00	0.0
31/ 4	537439	313523	0	0.00	0.00	0.0
32/ 1	537444	313575	0	0.00	0.00	0.0
32/ 2	537444	313575	0	0.00	0.00	0.0
Total,mean,max of events			0	0.00	0.00	0.0
Total,mean,max per day			0	0.00	0.00	0.0

Turbine	Easting	Northing
4	539005	312869

House/ Window	Easting	Northing	Days per year	Max hours per event	Mean hours per event	Total event hours
1/ 1	538626	313484	51	0.50	0.41	21.0
1/ 2	538626	313484	50	0.49	0.40	20.1
1/ 3	538626	313484	0	0.00	0.00	0.0
1/ 4	538626	313484	0	0.00	0.00	0.0
2/ 1	538746	313481	24	0.31	0.25	6.1
2/ 2	538746	313481	20	0.27	0.22	4.4
2/ 3	538746	313481	24	0.32	0.26	6.2
2/ 4	538746	313481	22	0.27	0.21	4.7
3/ 1	539075	313943	0	0.00	0.00	0.0
3/ 2	539075	313943	0	0.00	0.00	0.0
3/ 3	539075	313943	0	0.00	0.00	0.0
3/ 4	539075	313943	0	0.00	0.00	0.0
4/ 1	539114	313984	0	0.00	0.00	0.0
4/ 2	539114	313984	0	0.00	0.00	0.0
4/ 3	539114	313984	0	0.00	0.00	0.0
4/ 4	539114	313984	0	0.00	0.00	0.0
5/ 1	539183	314059	0	0.00	0.00	0.0
5/ 2	539183	314059	0	0.00	0.00	0.0
5/ 3	539183	314059	0	0.00	0.00	0.0
5/ 4	539183	314059	0	0.00	0.00	0.0
6/ 1	539272	314079	0	0.00	0.00	0.0
6/ 2	539272	314079	0	0.00	0.00	0.0
6/ 3	539272	314079	0	0.00	0.00	0.0
6/ 4	539272	314079	0	0.00	0.00	0.0
10/ 1	539984	314185	0	0.00	0.00	0.0
10/ 2	539984	314185	0	0.00	0.00	0.0
10/ 3	539984	314185	0	0.00	0.00	0.0
10/ 4	539984	314185	0	0.00	0.00	0.0
11/ 1	540103	314149	0	0.00	0.00	0.0
11/ 2	540103	314149	0	0.00	0.00	0.0
12/ 1	540159	314061	0	0.00	0.00	0.0
12/ 2	540159	314061	0	0.00	0.00	0.0
12/ 3	540159	314061	0	0.00	0.00	0.0
12/ 4	540159	314061	0	0.00	0.00	0.0
13/ 1	540393	313715	0	0.00	0.00	0.0
13/ 2	540393	313715	0	0.00	0.00	0.0
14/ 1	540491	313608	0	0.00	0.00	0.0
14/ 2	540491	313608	0	0.00	0.00	0.0
14/ 3	540491	313608	0	0.00	0.00	0.0
14/ 4	540491	313608	0	0.00	0.00	0.0
16/ 1	540313	313051	0	0.00	0.00	0.0
16/ 2	540313	313051	0	0.00	0.00	0.0

16/	3	540313	313051	0	0.00	0.00	0.0
16/	4	540313	313051	0	0.00	0.00	0.0
20/	1	538668	311778	0	0.00	0.00	0.0
20/	2	538668	311778	0	0.00	0.00	0.0
21/	1	538147	311857	0	0.00	0.00	0.0
21/	2	538147	311857	0	0.00	0.00	0.0
22/	1	537397	312047	0	0.00	0.00	0.0
22/	2	537397	312047	0	0.00	0.00	0.0
22/	3	537397	312047	0	0.00	0.00	0.0
22/	4	537397	312047	0	0.00	0.00	0.0
23/	1	537317	312223	0	0.00	0.00	0.0
23/	2	537317	312223	0	0.00	0.00	0.0
23/	3	537317	312223	0	0.00	0.00	0.0
23/	4	537317	312223	0	0.00	0.00	0.0
24/	1	537322	312295	0	0.00	0.00	0.0
24/	2	537322	312295	0	0.00	0.00	0.0
24/	3	537322	312295	0	0.00	0.00	0.0
24/	4	537322	312295	0	0.00	0.00	0.0
25/	1	537350	312589	0	0.00	0.00	0.0
25/	2	537350	312589	0	0.00	0.00	0.0
26/	1	537355	312614	0	0.00	0.00	0.0
26/	2	537355	312614	0	0.00	0.00	0.0
27/	1	537357	312665	0	0.00	0.00	0.0
27/	2	537357	312665	0	0.00	0.00	0.0
28/	1	537363	312745	0	0.00	0.00	0.0
28/	2	537363	312745	0	0.00	0.00	0.0
29/	1	537448	312857	0	0.00	0.00	0.0
29/	2	537448	312857	0	0.00	0.00	0.0
29/	3	537448	312857	0	0.00	0.00	0.0
29/	4	537448	312857	0	0.00	0.00	0.0
29/	5	537448	312857	0	0.00	0.00	0.0
29/	6	537448	312857	0	0.00	0.00	0.0
31/	1	537439	313523	0	0.00	0.00	0.0
31/	2	537439	313523	0	0.00	0.00	0.0
31/	3	537439	313523	0	0.00	0.00	0.0
31/	4	537439	313523	0	0.00	0.00	0.0
32/	1	537444	313575	0	0.00	0.00	0.0
32/	2	537444	313575	0	0.00	0.00	0.0
Total,mean,max of events				51	0.50	0.33	62.4
Total,mean,max per day				51	0.79	0.54	27.3

Turbine	Easting	Northing
5	539428	313191

House/ Window		Easting	Northing	Days per year	Max hours per event	Mean hours per event	Total event hours
1/	1	538626	313484	35	0.45	0.36	12.7
1/	2	538626	313484	36	0.45	0.35	12.7
1/	3	538626	313484	0	0.00	0.00	0.0
1/	4	538626	313484	0	0.00	0.00	0.0
2/	1	538746	313481	41	0.52	0.41	16.7
2/	2	538746	313481	42	0.52	0.40	16.8
2/	3	538746	313481	0	0.00	0.00	0.0
2/	4	538746	313481	0	0.00	0.00	0.0
3/	1	539075	313943	0	0.00	0.00	0.0
3/	2	539075	313943	0	0.00	0.00	0.0
3/	3	539075	313943	0	0.00	0.00	0.0
3/	4	539075	313943	0	0.00	0.00	0.0
4/	1	539114	313984	0	0.00	0.00	0.0
4/	2	539114	313984	0	0.00	0.00	0.0
4/	3	539114	313984	0	0.00	0.00	0.0
4/	4	539114	313984	0	0.00	0.00	0.0
5/	1	539183	314059	0	0.00	0.00	0.0
5/	2	539183	314059	0	0.00	0.00	0.0
5/	3	539183	314059	0	0.00	0.00	0.0
5/	4	539183	314059	0	0.00	0.00	0.0
6/	1	539272	314079	0	0.00	0.00	0.0
6/	2	539272	314079	0	0.00	0.00	0.0
6/	3	539272	314079	0	0.00	0.00	0.0
6/	4	539272	314079	0	0.00	0.00	0.0
10/	1	539984	314185	0	0.00	0.00	0.0
10/	2	539984	314185	0	0.00	0.00	0.0
10/	3	539984	314185	0	0.00	0.00	0.0
10/	4	539984	314185	0	0.00	0.00	0.0
11/	1	540103	314149	0	0.00	0.00	0.0
11/	2	540103	314149	0	0.00	0.00	0.0
12/	1	540159	314061	0	0.00	0.00	0.0
12/	2	540159	314061	0	0.00	0.00	0.0
12/	3	540159	314061	0	0.00	0.00	0.0
12/	4	540159	314061	0	0.00	0.00	0.0
13/	1	540393	313715	0	0.00	0.00	0.0
13/	2	540393	313715	0	0.00	0.00	0.0
14/	1	540491	313608	0	0.00	0.00	0.0
14/	2	540491	313608	0	0.00	0.00	0.0
14/	3	540491	313608	0	0.00	0.00	0.0
14/	4	540491	313608	0	0.00	0.00	0.0
16/	1	540313	313051	36	0.43	0.34	12.3
16/	2	540313	313051	36	0.43	0.34	12.1
16/	3	540313	313051	36	0.43	0.34	12.3
16/	4	540313	313051	36	0.43	0.34	12.2
20/	1	538668	311778	0	0.00	0.00	0.0
20/	2	538668	311778	0	0.00	0.00	0.0
21/	1	538147	311857	0	0.00	0.00	0.0
21/	2	538147	311857	0	0.00	0.00	0.0
22/	1	537397	312047	0	0.00	0.00	0.0
22/	2	537397	312047	0	0.00	0.00	0.0
22/	3	537397	312047	0	0.00	0.00	0.0
22/	4	537397	312047	0	0.00	0.00	0.0
23/	1	537317	312223	0	0.00	0.00	0.0
23/	2	537317	312223	0	0.00	0.00	0.0
23/	3	537317	312223	0	0.00	0.00	0.0
23/	4	537317	312223	0	0.00	0.00	0.0
24/	1	537322	312295	0	0.00	0.00	0.0
24/	2	537322	312295	0	0.00	0.00	0.0
24/	3	537322	312295	0	0.00	0.00	0.0
24/	4	537322	312295	0	0.00	0.00	0.0
25/	1	537350	312589	0	0.00	0.00	0.0
25/	2	537350	312589	0	0.00	0.00	0.0
26/	1	537355	312614	0	0.00	0.00	0.0
26/	2	537355	312614	0	0.00	0.00	0.0
27/	1	537357	312665	0	0.00	0.00	0.0
27/	2	537357	312665	0	0.00	0.00	0.0
28/	1	537363	312745	0	0.00	0.00	0.0
28/	2	537363	312745	0	0.00	0.00	0.0
29/	1	537448	312857	0	0.00	0.00	0.0
29/	2	537448	312857	0	0.00	0.00	0.0
29/	3	537448	312857	0	0.00	0.00	0.0
29/	4	537448	312857	0	0.00	0.00	0.0
29/	5	537448	312857	0	0.00	0.00	0.0
29/	6	537448	312857	0	0.00	0.00	0.0
31/	1	537439	313523	0	0.00	0.00	0.0
31/	2	537439	313523	0	0.00	0.00	0.0
31/	3	537439	313523	0	0.00	0.00	0.0
31/	4	537439	313523	0	0.00	0.00	0.0
32/	1	537444	313575	0	0.00	0.00	0.0
32/	2	537444	313575	0	0.00	0.00	0.0
Total,mean,max of events				82	0.52	0.36	107.7
Total,mean,max per day				82	0.68	0.43	35.6

Turbine	Easting	Northing
6	539673	313504

House/ Window		Easting	Northing	Days per year	Max hours per event	Mean hours per event	Total event hours
1/	1	538626	313484	0	0.00	0.00	0.0
1/	2	538626	313484	0	0.00	0.00	0.0
1/	3	538626	313484	0	0.00	0.00	0.0
1/	4	538626	313484	0	0.00	0.00	0.0
2/	1	538746	313481	0	0.00	0.00	0.0
2/	2	538746	313481	0	0.00	0.00	0.0
2/	3	538746	313481	0	0.00	0.00	0.0
2/	4	538746	313481	0	0.00	0.00	0.0
3/	1	539075	313943	50	0.53	0.42	21.0
3/	2	539075	313943	51	0.53	0.41	21.2
3/	3	539075	313943	0	0.00	0.00	0.0
3/	4	539075	313943	0	0.00	0.00	0.0
4/	1	539114	313984	60	0.54	0.41	24.7
4/	2	539114	313984	59	0.54	0.42	24.9
4/	3	539114	313984	0	0.00	0.00	0.0
4/	4	539114	313984	0	0.00	0.00	0.0
5/	1	539183	314059	82	0.55	0.43	35.3
5/	2	539183	314059	80	0.54	0.44	35.1
5/	3	539183	314059	0	0.00	0.00	0.0
5/	4	539183	314059	0	0.00	0.00	0.0
6/	1	539272	314079	65	0.53	0.47	30.3
6/	2	539272	314079	64	0.52	0.46	29.5
6/	3	539272	314079	65	0.53	0.46	30.2
6/	4	539272	314079	64	0.52	0.46	29.4

10/ 1	539894	314185	0	0.00	0.00	0.0	
10/ 2	539894	314185	0	0.00	0.00	0.0	
10/ 3	539894	314185	0	0.00	0.00	0.0	
10/ 4	539894	314185	0	0.00	0.00	0.0	
11/ 1	540108	314149	44	0.47	0.38	16.9	
11/ 2	540108	314149	43	0.46	0.37	15.8	
12/ 1	540159	314661	75	0.53	0.45	33.8	
12/ 2	540159	314661	74	0.53	0.45	33.3	
12/ 3	540159	314661	75	0.53	0.45	33.5	
12/ 4	540159	314661	74	0.53	0.45	33.1	
13/ 1	540393	313715	39	0.51	0.40	15.7	
13/ 2	540393	313715	40	0.51	0.40	15.8	
14/ 1	540491	313088	36	0.46	0.36	12.9	
14/ 2	540491	313088	36	0.46	0.36	12.9	
14/ 3	540491	313088	36	0.46	0.36	12.9	
14/ 4	540491	313088	36	0.46	0.36	12.9	
15/ 1	540313	313061	52	0.49	0.41	21.3	
15/ 2	540313	313061	53	0.50	0.41	22.2	
15/ 3	540313	313061	55	0.50	0.41	21.4	
16/ 4	540313	313061	54	0.50	0.41	22.4	
20/ 1	538668	311778	0	0.00	0.00	0.0	
20/ 2	538668	311778	0	0.00	0.00	0.0	
21/ 1	538147	311857	0	0.00	0.00	0.0	
21/ 2	538147	311857	0	0.00	0.00	0.0	
22/ 1	537397	312047	0	0.00	0.00	0.0	
22/ 2	537397	312047	0	0.00	0.00	0.0	
22/ 3	537397	312047	0	0.00	0.00	0.0	
22/ 4	537397	312047	0	0.00	0.00	0.0	
23/ 1	537317	312223	0	0.00	0.00	0.0	
23/ 2	537317	312223	0	0.00	0.00	0.0	
23/ 3	537317	312223	0	0.00	0.00	0.0	
23/ 4	537317	312223	0	0.00	0.00	0.0	
24/ 1	537322	312295	0	0.00	0.00	0.0	
24/ 2	537322	312295	0	0.00	0.00	0.0	
24/ 3	537322	312295	0	0.00	0.00	0.0	
24/ 4	537322	312295	0	0.00	0.00	0.0	
25/ 1	537330	312589	0	0.00	0.00	0.0	
25/ 2	537330	312589	0	0.00	0.00	0.0	
26/ 1	537335	312814	0	0.00	0.00	0.0	
26/ 2	537335	312814	0	0.00	0.00	0.0	
27/ 1	537357	312665	0	0.00	0.00	0.0	
27/ 2	537357	312665	0	0.00	0.00	0.0	
28/ 1	537383	312745	0	0.00	0.00	0.0	
28/ 2	537383	312745	0	0.00	0.00	0.0	
29/ 1	537448	312857	0	0.00	0.00	0.0	
29/ 2	537448	312857	0	0.00	0.00	0.0	
29/ 3	537448	312857	0	0.00	0.00	0.0	
29/ 4	537448	312857	0	0.00	0.00	0.0	
29/ 5	537448	312857	0	0.00	0.00	0.0	
29/ 6	537448	312857	0	0.00	0.00	0.0	
31/ 1	537439	313523	0	0.00	0.00	0.0	
31/ 2	537439	313523	0	0.00	0.00	0.0	
31/ 3	537439	313523	0	0.00	0.00	0.0	
31/ 4	537439	313523	0	0.00	0.00	0.0	
32/ 1	537444	313575	0	0.00	0.00	0.0	
32/ 2	537444	313575	0	0.00	0.00	0.0	
Total_aeom_max of events					232	0.55	0.42	618.4
Total_aeom_max per day					232	1.83	0.87	207.3

APPENDIX 11. CULTURAL HERITAGE

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Appendix 11.1 - Scoping Correspondence

Appendix 11.1

Historic Environment; Scoping Correspondence.

Date Consulted	Consultee	Contact	Date Comments Received	Comments	Response
2009	Fenland District Council	Rebecca Hunt	Collated by Engena Jan2010 and passed to AE	The physical impact of the proposal and effect on the setting of any sites of significant archaeological or historical importance should be assessed Account should be taken in the ES of any designation areas with in the site or proximity to. The potential impact of the wind energy project on the designated areas and the significance of this impact should be assessed	Impacts directly and on the setting of both designated and un-designated sites of historic and archaeological significance considered in the EIA.
2009	South Holland District Council	Liz Mayle Conservation Officer	Collated by Engena Jan2010 and passed to AE	I recall there is a requirement for such documents to consider the impact upon the setting of listed buildings. This will need to be added/considered properly. Guanock House and Yarwood Hall come to mind as nearest, but should also check for SAMs , and also take landmarks some distance away into consideration (Sutton St. Edmund)	Impacts on setting of listed buildings including Guanock House and Yarwood Hall assessed in the EIA.

Date Consulted	Consultee	Contact	Date Comments Received	Comments	Response
2009	English Heritage (East Midlands Office)	Glynn Coppack	Collated by Engena Jan2010 and passed to AE	In general terms, English Heritage advises that a number of considerations will need to be taken into account when proposals of this nature are being assessed This includes consideration of the impact of ancillary infrastructure. such as tracks and grid connections, as well as the turbines themselves: • The potential impact upon the landscape. especially if a site falls within an area of historic landscape: • Direct impacts on historic/archaeological fabric (buildings. sites or areas). whether statutorily protected or not. All grades of listed buildings should be identified: • Other impacts. particularly the setting of listed buildings. scheduled monuments, registered parks and gardens. conservation areas etc. including long views and any specific designed views and vistas within historic designed landscapes In some cases. intervisibility between historic sites may be a significant issue: • The potential for buried archaeology: • Effects on landscape amenity from public and private land: • Cumulative impacts The ZTV of the proposed development should initially be based on topographical data before the impact of existing trees and buildings etc on lines of sight is assessed. Finally. the effects of proposed mitigation measures on the ZTV should be demonstrated. We also recommend that photomontages are produced for key viewpoints. English Heritage would wish to be consulted about possible viewpoints where significant historic assets are affected. From a brief review of our own records. it is apparent that Scheduled Ancient Monuments: Boundary Cross, Old Fen Dyke NM 22685, Medieval Boundary Earthworks at Queens Bank, NM 20817, Settlement in Moulton West Fen NM L1223. Settlement West of Cates Cove Corner NM L1223, White Cross 80 M North of Poultry Farm NM 22713, Boundary Cross, Manor Hill Corner NM 22683, Fleet Settlement Site Near Lambert Drain NM L/285 and Romano-British Settlement South of Shell Bridge NM LI 168. Listed Buildings: Church of Holy Trinity, Gedney Hill grade II* LBS 198005 and Tower to Church of St James, Sutton St James grade II* LBS 197940 are key visual receptors in this area and any impact upon them would need to be considered in depth. The two turbines that fall within Fenland District Council should be referred to our East of England Regional Office at 24 Brooklands Avenue, Cambridge, CB2 8BU for comments on the affects on Heritage assets in their area The County Historic Environment Record holds information on undesignated archaeology and should also be consulted	All identified concerns taken on board and considered in EIA process. EH East of England Office consulted as were county Historic Environment records.
2009	Cambridgeshire CC Archaeology		Collated by Engena Jan2010 and passed to AE	No reply to original consultation issued by Wind Prospect	Detailed consultation entered into during 2010 by AE resulting in an agreed scheme of evaluation excavation and scoping method.

Date Consulted	Consultee	Contact	Date Comments Received	Comments	Response
2009	Lincolnshire CC Archaeology		Collated by Engena Jan2010 and passed to AE	No reply to original consultation issued by Wind Prospect	Detailed consultation entered into during 2010 by AE resulting in an agreed scheme of evaluation excavation and scoping method.
April 2010	National Monuments Record	Angharad Wicks	April 2010	Search Request made with NMR for designated and non-designated archaeological, historic building, events and register(s) data	Data received and entered into project GIS
April 2010	Cambridgeshire CC HER	Sally Phillips	May 2010	Search request made for all data within defined study area.	Data received and entered into project GIS
April 2010	Lincolnshire CC HER	Mark Bennet	April 2010	Search request made for all data within defined study area.	Data received and entered into project GIS
29/6/2010	Cambridgeshire CC HER	Daniel McConnell	29/6/2010	Ongoing correspondence identifying need for pre-application evaluation excavation. Approval of WSI for evaluation works on 3/9/2010	Oxford Archaeology East appointed to undertake agreed WSI evaluation 8/9/2010
29/6/2010	Lincolnshire CC HER	Louise Jennings	13/8/2010		
4/10/2010	South Holland District Council	Tracey Meachen	21/10/2010	Short reply received offering thanks for scoping document and concluding '*I cannot see anything that would concern the council at this stage*'. Numbers and location of conservation areas within 10km of the site confirmed and that there are no new conservation area designations in process.	Assessment methodology progressed, identified conservation areas assessed.
4/10/2010	Fenland District Council	Martyn Kendall	5/10/2010	Receipt of scoping document acknowledged. No further response received.	
4/10/2010	English Heritage (East Midlands Office)	Glynn Coppack	No comments received	Glynn Coppack had left EH since first consultation in 2009. No further response received from EH East Midlands Office.	Original comments from Glynn Coppack in 2009 acted upon.

Date Consulted	Consultee	Contact	Date Comments Received	Comments	Response
4/10/2010 (resent 19/11/2010)	English Heritage (East of England Office)	Jade Spencer	12/12/2010	Advice letter sent with generic advice to take into account EH guidance note '*Wind Energy and the Historic Environment'*, and; • The potential impact upon the landscape, especially if a site falls within an area of historic landscape; • Direct impacts on historic/archaeological fabric (buildings, sites or areas), whether statutorily protected or not. All grades of listed buildings should be identified; • Other impacts, particularly the *setting* of listed buildings, scheduled monuments, registered parks and gardens, conservation areas etc, including long views; • The potential for buried archaeology; • Effects on landscape amenity from public and private land; • Cumulative impacts The use of wirefarmes, montages and assessments of sound and light were advocated on public amenity. Given the proposed height of the turbines EH advocate considering the the impact on the setting of all historic assets within 5km of the site. Depending on topography, there may be a need to assess the impact on all grade I and II* listed buildings and registered parks and gardens up to 10km of the site.	EH guidance note already used in assessment. Wireframes, montages and studies on sound and light are all part of the EIA. All designated assets considered to 5 km, but non designated only to 2 km. Maximum area of study taken out to 15km.

Date Consulted	Consultee	Contact	Date Comments Received	Comments	Response
				Following buildings specifically identified for assessment; Bell Tower, south east of Church of St Giles, Tydd St Giles (Grade I). Park House, Leverington, Church of St Giles, Tydd St Giles, Church of St John the Baptist, Parson Drove (Grade II*) Consultation with county HERs and EH East Midlands Office advocated	All identified buildings assessed in the EIA process. Consultation entered into with all bodies identified.

Appendix 11.2 - Archaeological Evaluation Report

Appendix 11.2

Historic Environment; Archaeological Evaluation Report.

Archaeological Evaluation Report

Archaeological Evaluation and Palaeoenvironmental Assessment: Treading Wind farm Site Sutton St Edmund Lincolnshire



Archaeological Evaluation Report

oxfordarchaeology
eastwestcast

Novemeber 2010

Client: Archaeo-Environment on behalf of Wind Ventures

OA East Report No: 1210

OASIS No: oxfordar3-83186

NGR: TF 389 130

Archaeological Evaluation and Palaeoenvironmental Assessment:

Treading Windfarm Site, Sutton St Edmund, Lincolnshire

By Taleyna Fletcher BA AifA and Dr Chris Carey

With contributions by Rachel Fosberry HNC, AIfA

Editor: Rachel Clarke BA AIfA

Illustrator: Séverine Bézie BA MA

Report Date: Novemeber 2010

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Site Name:	Archaeological Evaluation and Palaeoenvironmental Assessment: Treading Windfarm Site, Sutton St Edmund, Lincolnshire
HER Event No:	n/a
Date of Works:	September 2010
Client Name:	Archaeo-Environment on behalf of Wind Ventures
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Receiving Body:	CCC Stores (TBC)
Accession No:	n/a
Prepared by:	Taleyna Fletcher
Position:	Project Officer
Date:	November 2010
Checked by:	James Drummond-Murray
Position:	Project Manager
Date:	November 2010
Signed:	.....

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