

CHAPTER 13: MISCELLANEOUS CONSIDERATIONS

INTRODUCTION

- 13.1 This chapter provides an assessment of the following issues and their potential for impact by the proposed development.
- Shadow Flicker
 - Public Safety
 - Air Quality
 - Communications
 - TV and Radio Reception
 - Agriculture and Land use
 - Tourism and Recreation
- 13.2 Baseline conditions have been established through consultation with relevant bodies, site visits and a detailed desk study taking account of consultee responses. Potential effects of the proposed development have been identified and assessed. If appropriate, suitable mitigation measures have been identified. Whilst these miscellaneous issues are considered relevant for inclusion within the Environmental Statement they either are not significant, or any mitigation which is required eliminates any potential effect. Therefore, these issues have been covered within this single chapter and no criteria have been developed to assess sensitivity or magnitude of change.

SHADOW FLICKER

Introduction

- 13.3 Shadow flicker is regular or semi-regular variation in light intensity caused when a light source is intermittently interrupted by an obstruction. Shadow flicker is defined in paragraph 73 of the Companion Guide PPS22: *Renewable Energy*.¹

“Under certain combinations of geographical position and time of day, the sun may pass behind the rotor of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as ‘shadow flicker’. It only occurs inside buildings where the flicker appears through a narrow window opening. The seasonal duration of this effect can be calculated from the geometry of the machine and the latitude of the potential site. For sites where existing or proposed developments may be subject to this problem, applicants for planning permission for wind turbine installations should provide calculations to quantify the effect.”

- 13.4 Operating wind turbines may cast long moving shadows where these are unobstructed on clear days and when the sun is low in the sky. These may fall on individuals or properties and cause a flickering effect with particular sun-turbine-window orientations. Effects may occur within rooms where moving shadows are cast directly over a window. If this occurs it is normally limited to dawn

or dusk times for properties with east or west facing windows and in close proximity to an operating turbine. Given these conditions, flicker will be more pronounced when a turbine faces squarely away from, or toward, a building, as this presents the widest shadow area. Properties directly north or south of turbines are less likely to be affected.

- 13.5 Potential flicker periods are therefore limited to particular hours of particular dates. Occurrence, time and duration of effects can be accurately predicted given turbine position, dimensions, yaw direction (where it faces) and orientation relative to the sun (determined by date, time of day and turbine latitude).
- 13.6 The effect of shadow flicker on receptors is limited to nuisance as modern turbines operate at a frequency outside the range where negative health effects may occur.^{2 3}

METHODOLOGY

Guidance

- 13.7 The Companion Guide to PPS22 includes a comprehensive discussion on the likelihood of occurrence of shadow flicker and the degree of impact. The Guide specifically states the parameters of the impacts of shadow flicker being limited to those receptors within **10 rotor diameters** of a turbine and within **130 degrees either side of north** to the turbines. At greater distances the shadow that is cast is too diffuse to have any impact and long shadows are not cast on their southern side. It states:

“Shadow flicker can be mitigated by siting wind turbines at sufficient distance from residences likely to be affected. Flicker effects have been proven to occur only within ten rotor diameters of a turbine. Therefore if the turbine has 80m diameter blades, the potential shadow flicker effect could be felt up to 800m from a turbine.”⁴

- 13.8 Although there is no guidance within the Scottish or English planning system on what criteria should be used to determine the significance of impact of shadow flicker, *Wind Energy Development Guidelines* published by the Ireland Department of the Environment, Heritage and Local Government (2006) states:

It is recommended that shadow flicker at neighbouring offices and dwellings within 500m should not exceed 30 hours per year or 30 minutes per day.⁵

² See Health and Safety Executive/Local Authority Enforcement Liaison Committee (HELA) circular, entitled 'Disco Lights and Flicker Sensitive Epilepsy' (available at http://www.hse.gov.uk/foi/internalops/fod/oc/200-299/225_5.pdf). It provides medical details on flicker frequencies likely to give rise to epileptic effects. It states: 'In 1971 the Greater London Council banned the use of flicker rates greater than 8 fps but to be effective the above figures show that any advice on restriction of flicker rate has to limit the frequency to below 5 fps.' The Dalby wind turbines have three blades and rotate within the ranges of 6 - 21.5 rpm (rotations per minute) with a resulting flicker frequency of 0.3 Hz – 1.07Hz (0.5 to 1.07 fps or flickers per second). This is below the concerning level of flicker.

³ Planning for Renewable Energy A Companion Guide to PPS22 (2004), Chapter 8: Wind, Para 77 'Around 0.5 % of the population is epileptic and of these around 5 % are photo-sensitive. Of photo-sensitive epileptics less than 5 % are sensitive to lowest frequencies of 2.5-3 Hz, the remainder are sensitive only to higher frequencies. The flicker caused by wind turbines is equal to the blade passing frequency. A fast-moving three-bladed machine will give rise to the highest levels of flicker frequency. These levels are well below 2 Hz. The new generation of wind turbines is known to operate at levels below 1 Hz.'

⁴ Planning for Renewable Energy A Companion Guide to PPS22 (2004)

⁵ The shadow flicker recommendations are based on research by Predac, a European Union sponsored organisation promoting best practice in energy use and supply which draws on experience from Belgium, Denmark, France, the Netherlands and Germany.

¹ Planning for Renewable Energy A Companion Guide to PPS22 (2004).

Assessment methodology

- 13.9 The assessment of shadow flicker has been conducted using *WindFarm* Version 4.1.2.3. This accurately predicts where shadows might be cast by the proposed turbines over the course of a year and calculates maximum possible durations of occurrence.
- 13.10 The shadow flicker assessment has assumed the following scenario:
- Windows always directly face the turbines having dimensions 1m x 1m with 2m above ground level and a depth of 0.1m.
 - Wind direction is always parallel to the turbine-sun-receptor alignment. In short, this means that a turbine will always face the receptor and therefore cast the widest shadow.
 - There is no screening of light or shadow from clouds, hedges, trees, houses and other visual obstacles that in actuality may intervene between sensitive receptors and proposed turbine positions.
 - Minimum sun height 2 degrees.
 - Calculations from height above ground level of viewer 1.7m.
- 13.11 The assessment has assumed a worst case scenario in which the maximum theoretical shadow flicker may occur and is therefore an over estimation in probability of effects. It should also be noted that for effects to occur in rooms within which shadows are cast need to be occupied, with blinds or curtains open and views to the wind turbine unobstructed.
- 13.12 It is considered that residential properties are of *high sensitivity* to potential shadow flicker effects.

BASELINE

- 13.13 No residential receptors were identified as having the potential to be affected by shadow flicker. (see **Figure 13.1**). That is, no residential properties were within 10 rotor diameters of a turbine (a candidate V90 turbine with a rotor diameter of 90m was used for the assessment).

Planning Policy

- 13.14 There is no local or regional policy which relates specifically to shadow flicker however **Policy C5** of the North Kesteven Local Plan does look to protect the amenities of other land users.

ASSESSMENT OF EFFECTS

- 13.15 There are no residential properties within the area that could potentially be affected by shadow flicker, which is shown graphically in **Figure 13.1**. The only buildings within the area are in agricultural use.
- 13.16 Therefore there the magnitude of impact is **no change** and thus **not significant**.

MITIGATION

- 13.17 Mitigation measures can be implemented to ameliorate the effects of shadow flicker on individual residential properties. The Department for Business, Enterprise and Regulatory Reform (BERR) describes the implementation of a mitigation scheme if deemed appropriate.⁶

'Where it has been predicted that shadow flicker effects may occur in theory, a local planning authority may consider it appropriate to impose a planning condition to provide that wind turbines should operate in accordance with a shadow flicker mitigation scheme which shall be submitted to and approved by the Local Planning Authority...' (3.11)

Proposed Mitigation Scheme

- 13.18 Whilst this assessment has shown that there will be no instances of shadow flicker at any residential properties, Ecotricity is happy to propose the following procedure should the Local Planning Authority feel it necessary to follow the precautionary principle.
- 13.19 The following procedures can be used to mitigate against any potential nuisance caused by shadow flicker once a complaint has been received, either by the Local Planning Authority (LPA) or by Ecotricity (using a contact telephone number held at the Wind Park or lodged with the LPA).
- 13.20 Ecotricity will ask the complainant to keep a log of dates and times when shadow flicker is occurring for a period of two weeks, and then submit it to Ecotricity. The turbine manufacturers are able to produce for an individual property, a twelve month shadow flicker calendar detailing when shadow flicker may potentially occur on a minute by minute basis. The information from the complainants log will be cross checked with the theoretical dates/times of shadow flicker and an engineer will be sent by Ecotricity to the affected property(s), to verify that shadow flicker effects are indeed occurring. Ecotricity will advise the LPA of the date and time of the engineers visit, should a Council officer wish to attend. The arrangements for the engineers visit will depend on the availability of the occupier and the appropriate weather conditions being in place.
- 13.21 Once shadow flicker effects have been established as occurring, the turbines can then be automatically shut down when shadow flicker is affecting the individual property. This is achieved by:
- A photocell which monitors the intensity of sunlight is fitted as standard to the turbine tower.
 - Based upon the known trajectory of the sun and rotation of the earth, specialist industry standard software WindPRO is used to calculate the number of times of the year where shadow flicker will occur; assuming that: there is sufficient intensity of sunlight to cause a shadow from each of the turbines, windows of affected properties face the turbine and there are no significant obstructions between the house and the turbine. The software differentiates between each turbine, enabling only the turbine(s) which are causing the shadow flicker effects to be shutdown.
 - The Software within the Supervisory Control System of each individual turbine is programmed with the times each day shadow flicker may in theory occur. During this period the turbine(s) will automatically shut down if there is sufficient light intensity, as measured by the photocell, to create a shadow flicker effect.

⁶ Department for Business, Enterprise and Regulatory Reform (October 2007). Onshore Wind Energy Planning Conditions Guidance Note. A report for the Renewables Advisory Board and BERR.

- If there is insufficient light to cause shadow flicker the turbine will continue to operate during periods where shadow flicker is theoretically possible.

13.22 This shadow flicker mitigation is currently implemented at turbines operated by Ecotricity, including the Ecotech Turbine in Norfolk.

RESIDUAL SIGNIFICANCE

13.23 The effects of shadow flicker can be fully mitigated. The resulting impact will be **not significant**.

PROPOSED MONITORING

13.24 The results of the Shadow Flicker Assessment show that no residential receptors have the potential to be affected from the proposed development. If incidences of shadow flicker occur, the above mitigation scheme will be implemented.

STATEMENT OF SIGNIFICANCE

13.25 This assessment has identified and assessed that no receptors have the potential to be affected by shadow flicker due to the turbines operating.

13.26 Mitigation schemes that have been used and have proved successful in other locations in the UK where shadow flicker has arisen, including those operated by Ecotricity, have been discussed. With the implementation of the proposed mitigation scheme any potential shadow flicker effects will be **not significant**.

PUBLIC SAFETY

13.27 The relevant guidance in the documents listed below has been used to assess the impact of the proposed development.

- Office of the Deputy Prime Minister: PPS22 Planning and Renewable Energy (2004)
- Office of the Deputy Prime Minister: Planning for Renewable Energy A Companion Guide to PPS22
- BWEA: Guidelines for Health and Safety in the Wind Energy Industry (2005)
- Relevant British Standards: BS EN 50308:2004 Wind turbines - Protective measures - Requirements for design, operation and maintenance BS EN 61400-1:2004 Wind turbine generator systems -- Part 1: Safety requirements BS 8004:1986 Code of practice for foundations BS 7121-2:2003 Code of practice for safe use of cranes. Inspection, testing and examination.

13.28 Public rights of way within the vicinity of the proposed development site include:

- The closest adopted public highway is the A17 road which is 1,100 metres south of the nearest wind turbine;
- The closest footpath or other PROW to the site is 275 metres north of the nearest turbine;

- The closest railway is 2.2km from the nearest turbine; and,
- There are no residential properties within the 'developable area of this project as defined in **Chapter 3: Site Selection and Design**.

Assessment of effects

Construction and Decommissioning

13.29 Turbine construction is undertaken according to relevant British Standards and BWEA guidance relating to the design and construction of foundations and the use of cranes.

13.30 During construction, the development could potentially affect people in the following ways:

A17 Road users

13.31 The potential for road users on the A17 to be distracted by the wind turbines is dealt with specifically within **Chapter 5: Landscape and Visual**. **Figure 5.13** demonstrates at which points along the A17, the wind turbines will be visible. Due to the intermittent views of the wind turbines on both the eastbound and westbound approaches it is anticipated that the proposed development will have minimal impact on the potential for distraction of drivers using the A17.

Footpaths and Bridleways

13.32 No footpaths or bridleways pass through the development area. The nearest Public footpath allows for the recommended separation distance from the closest wind turbine. The impact is therefore not significant.

Operation

13.33 Wind turbine technology is well proven with many years of experience in Europe and throughout the world. The companion guide to PPS22 states that:

'properly designed and maintained wind turbines are a safe technology' (Para. 49)

13.34 All Enercon turbines include an integral lightening conductor and are designed and manufactured in accordance with British and European Standards (listed below), and the relevant certification documentation can be provided on request.

- BS EN 50308:2004 Wind turbines - Protective measures - Requirements for design, operation and maintenance
- BS EN 61400-1:2004 Wind turbine generator systems -- Part 1: Safety requirements

13.35 The site selection process (**Chapter 3: Site Selection and Design**) has ensured that all of the *turbines* would be located at least fall over distance from public highways, with the closest turbine being approximately 1.1km from the A17.

13.36 In accordance with guidance set out in the Companion Guide to PPS22 (page 171), none of the turbines will be within blade tip fall over distance +10%, i.e. 132m for the proposed turbines, to any occupied buildings, roads, railways, or power lines.

- 13.37 There is a single 11kV overhead line 20m from turbine 1. Discussions have been conducted with E.On Central Networks and agreement has been received on burying this 11kV line to accord with a 132m separation distance from the remaining overhead line.

Mitigation

- 13.38 It has been agreed with E.On central networks to bury the overhead 11kV line so as to accord with the 132m recommended separation distance to electric pylons.
- 13.39 Effective, routine bi-annual maintenance by qualified technical staff will be undertaken to ensure the optimum performance of the turbines with a minimum risk. The turbines include a remote monitoring system in order for the turbines to be permanently monitored from the applicant's offices.

Statement of Residual Significance

- 13.40 All effects identified regarding public safety are considered to be **insignificant**.

AIR QUALITY

Methodology and Baseline Conditions

- 13.41 The relevant guidance in the documents listed below has been used to assess the impact of the proposed development.
- Defra 2006 Air Quality Strategy Review for England, Scotland, Wales and Northern Ireland
 - Local Air Quality Management Areas (www.airquality.co.uk)
- 13.42 A large and long term effect (positive or negative) on air quality of the district would be considered as significant. This assessment can then be extended to assess the long term impact on a regional or global scale.
- 13.43 There are no Air Quality Management Areas (AQMA) affecting the proposed site, and none within Lincolnshire as a whole.
- 13.44 The surrounding area of the proposed development is dominated by arable and livestock farmland with small areas of deciduous and coniferous woodland, although punctuated by the adjacent A17. As the site is used for agricultural production, the occurrence of dust emissions associated with agricultural practices is part of the baseline conditions of the site and area. However, the land on site is used primarily as arable land and will have higher dust emissions than land used for farming livestock. The neighboring A-roads directly to the south and to the west of the site will also mean the area will be affected by road traffic emissions of airborne pollutants.

Assessment of Effects

- 13.45 Earth moving activities during the construction and decommissioning processes may generate air-borne particulate material, particularly during hot and dry weather. The relative distance to residential properties and the short period over which this would occur would, however, limit the air quality impact.

- 13.46 As discussed in **Chapter 1**, the proposed wind turbines are expected to produce approximately 131.12 GWh per annum, and thereby prevent the emission of an estimated 56,382 tonnes of CO₂ each year⁷ as well as emissions of NO_x and SO₂. This would directly contribute to regional and national targets for improvements in air quality and for reduction in greenhouse gas emissions.

- 13.47 It will also prevent the release of particulate matter (which can cause breathing difficulties, asthma and lung cancer), as well as preventing thermal pollution and the production of significant amounts of ash and slag.

- 13.48 There would be no change in air quality during maintenance of the turbines.

Mitigation

- 13.49 Mitigation to reduce the potential impact of dust emissions to residential properties in the vicinity of the development includes the avoidance of works or damping down of operational areas during times of high wind and will be undertaken in order to minimise the transportation of dust particles.
- 13.50 A full Construction Method Statement detailing how air quality will be dealt with during the construction phase will be presented to the Local Council prior to any construction taking place on the site.

Statement of Residual Significance

- 13.51 The proposed development would contribute to improvements in air quality by replacing energy generation from fossil fuel sources. Whilst there is the potential for some adverse impact during the construction, this would be mitigated by construction practices and as such any effects will be **insignificant**.

COMMUNICATIONS

Baseline Conditions

- 13.52 The relevant guidance in the documents listed below has been used to assess the impact of the proposed development.
- Bacon D.F. 2002 Fixed-link wind-turbine exclusion zone method – A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance, available from <http://www.ofcom.org.uk/radiocomms/ift/licensing/classes/fixed/Windfarms/>
- 13.53 A significant effect would be classified as a direct negative impact upon an existing fixed link within the area due to the turbines operation. For a significant impact to occur the fixed link would no longer be able to operate due to the presence of the wind turbines.
- 13.54 Consultation with Ofcom (see **Appendix 2.1**) identified that there is ten fixed links operating in the vicinity of the site. These links belongs to BT, MLL Telecomm and Fixed Link Unit and in a consultation responses, presented in **Appendix 2.1**, all three companies concluded that there

⁷ This figure is derived using a carbon dioxide offset ratio of 430g carbon dioxide per kWh of wind generation. It should be noted that future changes in the power generating mix and fuel costs in the UK over the life of the wind park means this figure may change over time.

would be no impact from the proposed development on their operating or planned communications network.

- 13.55 A range of organizations have also been consulted during the preparation of this chapter including; Anglian Water, Arqiva, Cable and Wireless, Joint Radio Company (JRC), National Grid Wireless, Orange, Three, T-Mobile and the BBC. A summary of consultation responses is shown in **Appendix 2.1**.

Assessment of Effects

- 13.56 Wind turbines have the potential to disrupt microwave telecommunication links, as the rotating blades may interfere with a signal if within a direct line between the transmitter and receiver of the link. As a precaution, the fixed link operator will safeguard a buffer area, generally in the region of 100m either side of the line of sight of a microwave link, in order to ensure that the fixed link is not compromised by the development.
- 13.57 After consultation with the necessary communication link operators the links have been plotted and buffered to a necessary distance to ensure no impact is made given the respective link frequencies.
- 13.58 A single link path was identified by JRC which crosses the developable area east to west. This link path is operated and used by E.ON Central Networks. Given the location, direction and nature of the link path the recommended separation distance was not available. Further discussions were had with JRC and completion of a detailed link assessment was completed see **Appendix 13.1**.

Mitigation

- 13.59 Mitigation following the recommendations of the JRC detailed co-ordination report will be completed which will include for scanning of the affected link path at Holme Farm PMR from the alternative base station at Londonthorpe.
- 13.60 All other links have been buffered to the appropriate distance and turbines have not been located in these buffered areas.

Statement of Residual Significance

- 13.61 There will be no effect on any telecommunications links subject to redirecting the single affected link path as agreed with JRC. The effect is therefore deemed to be **insignificant**.

TV AND RADIO RECEPTION

Methodology and Baseline Conditions

- 13.62 The relevant guidance in the documents listed below has been used to assess the impact of the proposed development.
- BBC/ Ofcom fact sheet – The Impact of Large Buildings and Structures (including Wind Farms) on Terrestrial Television Reception⁸.

⁸ BBC and Ofcom (2006). *The Impact of Large Buildings and Structures (including Wind Farms) on Terrestrial Television Reception*.

- 13.63 Significance will be determined if the presence of the wind turbines would permanently effect the long term quality of the reception of television and radio links to residents within the vicinity of the proposed development.
- 13.64 The terrestrial TV and Radio transmitter that transmit signals that may be received in the locality of the proposed development, is Belmont and Waltham.

Assessment of Effects

- 13.65 In respect of domestic television reception, the presence of wind turbines may reflect signals, causing a double reception, where two signals are received on the screen, one as a “shadow” of the other (as Enercon turbines are direct drive machines, the slow rotational speed of the blades means that there is less likelihood of interference with TV signals than from traditional gearbox driven turbines, which have a higher rotational blade speed). These effects are difficult to predict prior to the operation of turbines, and are only likely to occur where the proposed wind park is between residential properties and the transmitter.
- 13.66 The Belmont and Waltham transmitters will be switched over to digital in two stages in August 2011. As highlighted in the guidance this significantly reduces the overall risk of TV interference.
- 13.67 The BBC guidance notes suggest that any group of wind turbines are placed at least 500m away from the viewer in order to reduce the likelihood and severity of any interference. All the turbines within this development are placed at least 500m from any third party residential properties.

Mitigation

- 13.68 Ecotricity's contact number will be held at the wind park, a contact number will be lodged with the council to enable members of the public in the area to contact Ecotricity in the event of a reduction in quality of TV reception. The telephone number is; 08000 326 100.
- 13.69 If there is a detrimental loss or alteration in TV reception signals, which occurs as a direct result of the operation of the approved wind turbines, Ecotricity (Next Generation Ltd) will investigate the interference and rectify in the following sequential manner:
- Within three weeks from the date of a complaint being received by Ecotricity an independent licensed TV engineer will attend the complainant(s) property(s) and investigate the reason for inference.
 - Within two weeks of visiting the complainant(s) property the engineer will confirm whether or not the interference is caused by the operation of the wind turbines. If the engineer advises that the impairment of television reception is directly attributable to the wind farm, then reasonable endeavors will be used by Ecotricity to remedy the impairment of television reception. Such measures could include: re-aligning the aerial to another nearby transmitter; installing a TV signal booster box, installing a digital set-top box or in extreme circumstances installing satellite television.
 - If Ecotricity are unable to remedy the impairment for reasons relating to the non co-operation on the part of the user or any other member of the public or due to circumstances beyond their control, Ecotricity will inform the Council in writing and will have no liability to remedy the impairment.
 - If the engineer advises that either there is no impairment of television reception or that the impairment of television reception is not directly attributable to the operation of the wind

turbines then the complainant should refer the matter to a television engineer to be agreed between the local authority and Ecotricity. If there is no agreement, the President of the Institute of Electrical Engineers should nominate an engineer who shall carry out an assessment. Ecotricity will not be liable for carrying out mitigation works pending the determination of an engineer.

- Any dispute or difference arising between Ecotricity and the local authority with regard to any matter in relation to the mitigation measures should be referred to the decision of a Television Engineer.
- All costs in respect of restoring TV transmission will be paid for by Ecotricity, where the degradation in reception/picture quality has been found by the engineer to be occurring as a result of the operation of the turbine. Where satellite TV is installed Ecotricity will pay the one off installation costs.

13.70 The Government has set out policy for television services to go completely to digital. The Belmont and Waltham transmitters are due for digital switchover in August 2011. Any deterioration in television would therefore be restored resulting in negligible residual effect. (It should be noted that digital TV reception are usually much more resistant to the effects of reflection⁹).

Statement of Residual Significance

13.71 The implementation of recent digital transmissions to the area will significantly reduce potential TV interference. Should interference arise then it is expected to only include for the area west of the site where there are very few dwellings all of which are more than 500m from the turbines. With the implementation of the mitigation methods described, any effect will be **insignificant**.

AGRICULTURE

Methodology and Baseline Conditions

13.72 This section assesses the implications for agriculture in the Lincolnshire Region and the development area resulting from the construction, operation and eventual decommissioning of the proposed wind turbines.

13.73 The proposed development site is part of a farm totaling 604 hectares, virtually all comprising of arable crops and some limited grazing.

13.74 The site is shown as Grade 1 and 2 agricultural land. Grade 1 and 2 land is considered prime agricultural land and is categorised in the Agricultural Land Classification system as:

Grade 1 - excellent quality agricultural land

13.75 Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

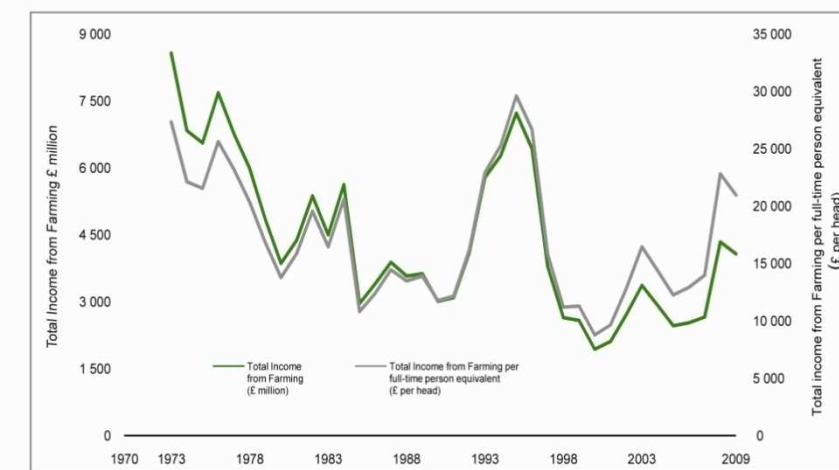
Grade 2 - very good quality agricultural land

13.76 Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

13.77 The East Midlands region has approximately 391,000 hectares of land classified as grassland and rough grazing (2008 figures), 786,000 hectares of land for crops and bare fallow (2008), 80,000 hectares of woodland (1998 figures), 89,000 hectares for set aside and other agricultural uses (2007 figures) and 101,000 hectares of urban and suburban land (2001 figures).¹⁰

13.78 Defra reported in 2009¹¹, that total income from farming in the United Kingdom is estimated to have fallen by 6.2 per cent in real terms. This is 44 per cent below the high point in 1995. The dramatic rise in farming's profitability in the early nineties followed the decline in the euro/sterling exchange rate after the United Kingdom left the Exchange Rate Mechanism. The equally rapid reverse in the second half of the decade was caused by increases in the exchange rate, lower world commodity prices and the impact of BSE.

Figure 13.1: Long term trends in farming income in real terms at 2008 prices.



13.79 In order to support their income from farming, farmers and landowners are increasingly turning to alternative sources of income such as wind energy development. The NFU in its 2009 briefing paper states¹²:

'With 75 per cent of UK land area in the agricultural sector, the NFU believes that its members are well-placed to capture renewable natural energy flows, while maintaining our traditional role in food production as well as the delivery of other environmental and

⁹ Ofcom, (2009) Tall structures and their impact on broadcast and other wireless services. Section 3.3.
http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/fixed/Windfarms/tall_structures/tall_structures.pdf

¹⁰ East Midlands Regional Sustainable Development Indicators Factsheet,
http://www.defra.gov.uk/sustainable/government/progress/regional/documents/east_midlands_factsheet.pdf

¹¹ DEFRA (2009) Agriculture in the United Kingdom,
<http://www.defra.gov.uk/evidence/statistics/foodfarm/general/auk/latest/documents/AUK-2009.pdf>

¹² NFU (2009), Briefing, Wind Power in Agriculture – small medium and Large Scale.
http://www.nfuonline.com/Our-work/Environment/Renewable-energy/Windpower_briefing2/

land management services. It is the NFU's aspiration that every farmer and grower should have the opportunity to become a net exporter of low-carbon energy.'

Assessment of effects

- 13.80 Given the short time period and the temporary nature of the construction period, the effects of the developments construction on agriculture have been assessed as minimal.
- 13.81 Describe minimal land take and impact on agricultural land. Example below from Dalby.
- 13.82 During construction the wind park will occupy 9.98 hectares of land for access tracks, construction compound, crane pads and the turbine foundations. After the construction phase of approximately 52 weeks this will reduce further as the turbine foundations can return back to agricultural use. It is estimated that the agricultural land lost during the operational phase will be 9.62ha.
- 13.83 The loss of 9.62 hectares of ALC Grade 1 & 2 land represents a very small proportion of the total agricultural land in the region, and only a 1.6% loss on the landholdings itself. It is therefore clear that there is only a minimal magnitude of change with regard to the amount of agricultural land taken out of production. Given that the development is within an area of ALC Grade 1 & 2 agricultural land, it is considered that the supply of agricultural land has high sensitivity. However In addition, the loss of agricultural land need not be a permanent change in land use, given that the turbines will be decommissioned and the land returned to agricultural use. It should also be stressed that whilst operational the land will still be used for agricultural purposes.
- 13.84 In the face of declining subsidies to farmers, agricultural diversification is key in order to ensure that farming continues to contribute to the economy of the North Kesteven District. The development represents a viable alternative land use, providing a 'crop' of wind turbines, which will help to sustain the economic viability of the farm, thereby safeguarding the productivity of the farm. As farming can be dependent upon successful diversification, farms can be seen to be highly sensitive to such alternative land uses as proposed. In economic terms a development of 22 wind turbines on land totaling 9.62 hectares is assessed as representing a low magnitude of change, as a result of the turbine developer leasing the land from the farmer and the subsequent income received.
- 13.85 Although taking up a small area of agricultural land, the development is not expected to have any significant negative effect on agricultural production as the land surrounding turbines can still be used for crop production. The development will allow diversification of income and therefore provide benefits to the agricultural economy. The overall impact on agriculture is therefore deemed to be moderate.

Mitigation

- 13.86 The site design process set out in **Chapter 3: Site Selection and Design** of this Environmental Statement has minimised the amount of agricultural land taken out of production. Where possible existing access tracks have been utilised.

Significance

- 13.87 The loss of a small area of ALC Grade 1 & 2 agricultural farm spread across several fields is **not significant**.

TOURISM

Methodology

- 13.88 This section assesses the implications for tourism in North Kesteven and the developmental area resulting from the construction, operation and eventual decommissioning of the proposed wind turbines.
- 13.89 The latest report into tourism 'The Economic Impacts of Wind Farms on Scottish Tourism 2008'¹³, suggests that for 97 percent of visitors "wind farms would have no impact on their decision to visit Scotland again." The study also claims 68 percent of tourists were positive about the statement "a well suited wind farm does not ruin the landscape," with a further 12 percent neutral.

Baseline and Assessment of Effects

- 13.90 Tourism pays an important role in the economic wellbeing of the North Kesteven District through investment, the creation of jobs for local residents and support of local services. The District receives 2 million visitors annually, and spending is around £81 million spread throughout the local economy and supporting directly and indirectly 1,500 jobs¹⁴.
- 13.91 Lincolnshire, including the Fens, has a long tradition of 'windfarming'. The man-made fenland owes its existence in part to wind technology which provided essential power for drainage, amongst other things. A good number of these mills are still extant and few still operational, including Maud Foster Mill, Heckington Mill and Sibsey Trader Windmill which are all open to the public. Heckington Mill is the closest at just over 5km.
- 13.92 There are two golf courses within the vicinity of the site South Kyme Golf Course which is located 4km to the both west and Boston West Golf Club which is located over 5k to the east. Both benefit from generous planting however still would have visibility of the wind park. Bearing in mind the separation distances, the man-made landscape context, expansive nature of the fenland and the nature of the activity it is considered that the wind park would results in only a negligible impact on these two facilities in relation to tourism.
- 13.93 Princess Royal Sports Arena is located approximately 5km away from the site. It is considered that this facility would primarily be used by local residents and would not be a tourist feature. With this in mind and the primarily indoor nature of this facility it is considered the impact would be insignificant.
- 13.94 The Battle of Britain Memorial Flight Visitor Centre is located immediately to the north of RAF Coningsby surrounded by large scale buildings and landscape associated with the airbase. There are long range views towards the application site from the approaches to the visitors centre which are partially interrupted by vegetation and buildings. The impact is considered to be low as a consequence of separation distance and the built-up, dynamic context of the airbase surroundings.
- 13.95 Tattershall Castle is situated at the south western edge of Tattershall settlement. It is open to the public from spring to autumn and there are elevated, 360 degree panoramic views from the top of the keep including towards the application site. There is no / negligible visibility towards the site from the base of the castle or the grounds. It is considered that the impact upon tourism for this site would be minor due to the large scale, expansive character of the Fens, combined with the

¹³ <http://www.scotland.gov.uk/Publications/2008/03/07113554/0>

¹⁴ <http://www.n-kesteven.gov.uk/section.asp?docId=375>

separation distance and the man-made recreational landscape and airfield in the foreground from an EIA point of view.

- 13.96 Boston Stump is the tower of St Botolph's Church which is located in the centre Boston. There are no views towards the application site from the bottom of the church, but the tower is open to the public year round and there are elevated, 360 degree panoramic views from the viewing gallery including towards the site. Due to the urban context in the foreground combined with intervening distance it is considered that the impact upon the Church tower as a tourist destination is likely to be minor.
- 13.97 The Lincolnshire Wolds AONB is an extensive area of relatively open, rolling chalk upland, situated over 20km to the north east of the application site
- 13.98 There are five Historic Parks and Gardens located within 20km from the application site, however none of these are open to the public.
- 13.99 There are two Country Parks located approximately 10km away from the proposed site, Witham Way and Tattershall Lakes. Witham Way Country Park would have visibility of the wind park however taking account of the separation distance of around 10km, the urban fringe context and the expansive fenland context the predicted visual change at this general location would be very low magnitude which, resulting in a minor and not significant effect on this resource as a tourist destination.
- 13.100 Tattershall Lakes is located approximately is generally enclosed by tree planting / woodland, hedges and residential buildings. Where uninterrupted views towards the application site are available, between gaps in vegetation and built form, the predicted visual change would be low at most with a minor impact.
- 13.101 There are no public footpaths or bridleways that cross the site. The closest footpath or other PROW to the site is 275 metres north of the nearest turbine. It is likely that this footpath is used primarily by local residents and is not tourist attraction in its own right. As such it is considered that the impact would be minor.
- 13.102 National Cycle Route 1 is the main route open through Lincolnshire which goes through Boston, Lincoln and Market Rasen. It is known as the Hull to Fakenham cycle route. At it closest the route is approximately 4km from the site to the north east. Running parallel to this at approximately 5km at its closest is the Water Rail way and the River Watham which is a navigable waterway. The zone of theoretical visibility (see **Figure 5.9b**) shows that there will be visibility from these recreation routes across relatively unrestricted fenland albeit at right angles. The River Witham however is enclosed by raised banks / dykes for much of its course. It is considered that the impact upon these recreational routes in terms of tourism are minor.
- 13.103 It is not considered likely that the wind park itself will become a tourist destination resulting in significant numbers of visitors, which might affect local villages and highways.

Mitigation

- 13.104 No mitigation measures are proposed.

Statement of Residual Significance

- 13.105 The significance for those tourist and recreational receptors close to the site is considered negligible. The effect on the region's two identified tourist attractions is considered as not significant. The overall significance is therefore considered as **negligible**.