



Holbeach Marsh Wind Farm

Non Technical Summary

December 2009



**SCOTTISHPOWER
RENEWABLES**

Preface

This document comprises the Non-Technical Summary of the Environmental Statement, which has been prepared in support of an application for consent for the Holbeach Marsh Wind Farm, hereafter known as the Development, located near the settlement of Holbeach, north east of Spalding and north west of Kings' Lynn, Lincolnshire, at National Grid Reference TF 411 289.

The Environmental Statement comprises the following documents:

- Non-Technical Summary;
- Environmental Statement Volume 1: Main Report (including Figures); and
- Environmental Statement Volume 2: Technical Appendices.

The Environmental Statement is available for viewing by the public during normal opening hours at the following locations:

- Planning Offices, South Holland District Council, Priory Road, Spalding, PE11 2XE
- The Environmental Statement will also be available on-line at www.sholland.gov.uk

Copies of all these Documents, or information on the Development may be obtained from:

ScottishPower Renewables
4th Floor
1 Atlantic Quay
Glasgow
G2 8JB
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The Non-Technical Summary is available free of charge. A copy of the Environmental Statement Main Report and Technical Appendices costs £250. In addition, all documents are available as PDF on CD/DVD for £20.00.

1 Introduction

1. This Non-Technical Summary (NTS) forms part of the Environmental Statement, which accompanies ScottishPower Renewables' planning application to South Holland District Council. It is prepared under the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI 1999 No 293) (Ref NTS 1), 'The EIA Regulations', as amended.
2. The proposed Holbeach Marsh Wind Farm, hereafter referred to as the Development, is to be situated approximately 15km north east of Spalding and 22km north west of Kings Lynn, near the settlement of Holbeach, Lincolnshire, as shown on Figure 1.1 NTS. The Development Site is centred at Grid Reference TL 411 289. The Development will comprise 8 wind turbines with a generating capacity of approximately 16 megawatts (MW). There will also be ancillary infrastructure associated with the wind turbines. In summary, the Development comprises:
 - 8 No. wind turbines of up to 110.5m in height;
 - Crane hardstandings;
 - Control building housing switchgear;
 - On-site access tracks (both new and upgraded) and watercourse crossings;
 - Operational phase meteorological mast;
 - On-site underground electrical cables;
 - Site signage; and
 - Temporary Construction Compound.
3. The layout of the Development is shown on Figure 1.2 NTS.
4. The Development will also require a connection to the local distribution network. The connection will be made via Holbeach Primary Substation at TF368 263 by either an under-ground or over-ground method. Application for the grid connection will be made by the distribution network operator (Central Networks). The grid connection point is close to the Development Site (approximately 4km south west). The grid connection is not likely to have any significant environmental effects.
5. In order to facilitate access to the Development Site for abnormal loads, some minor modifications to the private access road leading to the Development Site are required. Details of these modifications are discussed in Chapter 4 Project Description. Minor additional works outside of the Development Site Boundary, on the public highway or its verges, are also required. All of the works that fall outside of the Development Site Boundary will be within highway limits and no significant effects are anticipated. Works to the highway will be subject to a separate agreement with Lincolnshire County Council under Section 278 of the Highways Act 1980.

6. This NTS presents a summary of the principal findings of the Environmental Statement.

2 Renewable Energy

2.1 UK Context

1. Global climate change is widely recognised as being one of the greatest environmental challenges facing the world today. The principal cause is a rise in the concentration of carbon dioxide (CO₂) in the atmosphere, a major contributor being the growing use of fossil fuels to generate electricity. Renewable sources of energy are those that are not based on finite reserves stored within the earth. Using wind to generate electricity creates no CO₂ or other air pollutants, and therefore does not contribute to climate change or local air pollution.
2. The UK Government set a domestic goal of reducing CO₂ emissions to 20% below 1990 levels by 2010 and launched the UK Climate Change Programme in November 2000. This programme outlines the target areas and policies through which it aims to achieve this domestic target. Renewable sources of energy are an essential element of this climate change programme.
3. On 24 February 2003, the UK government published its Energy White Paper: Our Energy Future - creating a low carbon economy (Ref NTS 2). In this, the Government established a goal of cutting the UK's CO₂ emissions by 2050, with 'real progress' by 2020, further strengthening their commitment to the development of renewable energy generation.
4. In 2002, the UK Government placed a 'Renewables Obligation' on all UK licensed electricity suppliers to provide 10% of their electricity from renewable sources by 2010 and 15% by 2015. Generators that fail to meet their targets will be forced to pay a 'buy-out price', which is effectively a financial penalty. The primary purpose of this obligation is to assist the UK in meeting its National and International targets for greenhouse gas reduction, which are the main causes of climate change. It also helps to promote a secure, diverse, competitive energy supply market, stimulates the UK renewables energy industry and makes a contribution to rural development.
5. The UK Government reiterated its commitment to cut the UK's CO₂ emissions by 60% by 2050 and by 26-32% by 2020 against a 1990 baseline in May 2007, with the publication of "Meeting the Energy Challenge: A White Paper on Energy" (Ref NTS 3). In October 2008, the new Department for Energy and Climate Change was created. The Secretary of State, David Milliband, announced that the Climate Change Bill was to be amended to provide a target of 80% reduction in CO₂ emissions by 2050.
6. The Climate Change Bill was introduced into Parliament on 14 November 2007 and became law on 26th November 2008. The Climate Change Act 2008 sets legally binding targets for greenhouse gas emission reductions of at least 80% by 2050, and reductions in CO₂ emissions of at least 26% by 2020, against a 1990

baseline. The 2020 target will be reviewed in the near future to reflect the move to all greenhouse gases and the increase in the 2050 target to 80%.

7. Estimates show that total UK CO₂ emissions in 2007 were 8% below 1990 levels (Ref NTS 4). Further action is needed to curb carbon dioxide emissions over the next few years if the Governments targets are to be met.
8. This UK wide commitment to renewable energy has been further strengthened through publication of the UK Renewable Energy Strategy (RES) in July 2009 following consultation (Ref NTS 5 and NTS 6). The document sets out a comprehensive action plan for delivering the renewable revolution in the UK moving forward and explains:
 - The path to 2020, and the balance of fuels and technologies that are most likely to achieve the challenging goal;
 - The strategic role the Government will adopt and the specific actions it will take to lead delivery; and
 - The opportunities for individuals, communities and businesses to harness renewable energy and contribute to action against climate change.

2.2 Regional Context

1. The 16MW installed capacity of the Development will contribute to renewable energy targets, including a Regional target for 175 MWe of energy for the East Midlands Region to come from renewable energy by 2020 (Ref NTS 7).

2.3 Environmental Impact Assessment

1. The Environmental Statement has been prepared to accompany an application for planning permission for the Development. It has been prepared under the EIA Regulations (Ref NTS 1). The Environmental Impact Assessment (EIA) process is to ensure that all significant effects that the Development is likely to have on the environment are considered. The findings of the EIA process are reported in the Environmental Statement.

2.4 Scoping and Consultation

1. Consultation with key statutory and non-statutory bodies is recognised as being critical to the preparation of the Environmental Statement. It focuses attention on key environmental issues, and opens a dialogue to discuss methodologies for undertaking further investigations and possible mitigation throughout the development of the project. As such, consultation has formed a key part of the EIA process and has continued through all stages of the design of the Development.

2. South Holland District Council were consulted on the scope of the EIA in May 2009. This took the form of a Scoping Document. The Scoping Document, with an accompanying letter, was also issued to key statutory and non statutory bodies.
3. As part of the wider consultation process, a public exhibition was held at Holbeach Hurn Village Hall on 30 November and 1 December 2009.
4. A further public exhibition will be held following submission of the planning application.
5. The sections following outline the site selection and development design process, describe the Development and summarise the key environmental issues and findings of the EIA process.

3 Site Selection and Development Design

1. Holbeach Marsh was identified as a suitable site for the Development. This was based on Iberdrola Renewables and ScottishPower Renewables' internal site selection process (Ref NTS 8). This process is designed to identify potential wind farm sites which are economically and technically viable, environmentally acceptable, and make meaningful contributions to ScottishPower Renewables' targets for renewable energy generation.
2. The site selection policy sets out a commitment not to develop within or near to National Parks or National Scenic Areas where there could be unacceptable effects. Irrespective of designation, the landscape character and nature conservation interests of all candidate sites are taken into consideration.
3. The Development Site was selected due to factors including:
 - Good wind resource;
 - Suitable site size giving significant benefits in terms of generating electricity and cutting climate change emissions;
 - Good access to the Development Site;
 - The level of designation and protection afforded to the Holbeach Marsh area through government policy, as well as relevant development plans – this includes the lack of nature conservation designations on the Development Site;
 - Close to a potential grid connection point; and
 - Relatively sparsely populated.
4. The layout of the Development has evolved in response to the site environmental constraints, including ecology and nature conservation, noise, landscape and visual and factors such as the presence of gas pipeline infrastructure. Consideration of the constraints has led to the turbines being sited in a particular way, and reduced in number from 15 to 8. In the final layout, the turbines have been arranged so as to maximise wind power capture whilst minimising environmental effects. This layout represents a balance between renewable energy generation and the technical and environmental parameters of the site.

4 Project Description

1. The three key phases of the Development are as follows:
 - Construction of the Development;
 - Operation of the Development; and
 - Decommissioning of the Development.
2. The planning application for the Development has been submitted for the erection of 8, 3-bladed, horizontal axis, wind turbines with a maximum height to blade tip of not more than 110.5 metres (m). The layout of the turbines is shown on Figure 1.2 NTS.
3. The Environmental Statement has been undertaken based on a model turbine. It is based on a set of parameters which form the basis of an assessment of the likely significant environmental effects. For some topics within the EIA, specific data relating to a turbine, such as the Gamesa G87 2MW turbine, has been assessed to provide an example of a turbine that would operate within such parameters. Based on current technology, this will give the Development an installed capacity of approximately 16MW.
4. The finish and colour of the turbines is likely to be matt grey.
5. Ancillary to the turbines themselves, will be a number of structures and infrastructure requirements including a control building, access tracks, crane hardstandings, a operational phase meteorological mast, underground power cables and a temporary construction compound (see Figure 1.2. NTS).
6. The total land take for the Development infrastructure is approximately 3.2 hectares (ha), with an additional 2.544ha required on a temporary basis during the construction phase.
7. The design has made use of existing farm tracks where possible. New tracks have been designed to follow the field boundaries to ensure the land remains usable for agricultural purposes.
8. Consent is sought for a period of 27 years comprising 25 year operational life of the Development plus 9-14 months for construction, and following the 25-year operational life, 6 months for decommissioning. At the end of this period, the Development will either be decommissioned, or a new application made to extend its operational life. If decommissioned, all above ground structures will be dismantled, but only the top layer (less than 1m) of below ground structures removed. This approach is considered to result in fewer environmental effects than seeking to remove all infrastructure completely. All disturbed areas will be reinstated back to their original land use. On-site access tracks will either be left for use by the landowner or be removed.
9. Mitigation measures have been embedded into the design of the Development to minimise environmental effects and where appropriate, mitigation has been

proposed to address any residual environmental effects. The Contractor will be provided with a number of documents which collectively will be known as the Construction Environment Management Plan (CEMP), which must be adhered to throughout the construction period.

5 Planning Policy Context

1. South Holland District Council are required to determine the application for the Development taking account of planning policy set out within the current development plan documents for the area. At present, the development plan documents of relevance to the Development comprise:
 - The East Midlands Regional Plan (Adopted March 2009) (Ref NTS 7);and
 - South Holland Local Plan (Adopted July 2006) (Saved Policies) (Ref NTS 9)
2. Together, these documents present a range of policies setting the context for development in relation to sustainable development, renewable energy, and the built and natural environment. Due to a lack of policies relating specifically to renewable energy development in the Local Plan, in 2004 the Council adopted Supplementary Planning Guidance on Wind Energy which sets out policies for the consideration of proposals for wind turbines in the District (Ref NTS 10).
3. Alongside this study, policies of most relevance to the Development are set at the regional level (East Midlands Regional Plan), which sets out renewable energy targets.
4. The Planning and Compulsory Purchase Act (2004) (Ref NTS 11) heralds a change in the development control framework applicable to the Development. Whilst the East Midlands Regional Plan is now adopted at the strategic level, the South Holland Local Plan will in time be replaced by the emerging South Holland Local Development Framework (LDF), currently under development.
5. National planning policy of relevance includes Planning Policy Statement 22: Renewable Energy (2004) (Ref NTS 12), and Planning for Renewable Energy: A Companion Guide to PPS 22 (2004) (Ref NTS 13).

6 Ecology and Nature Conservation

1. The Development Site comprises managed arable fields separated by drainage ditches (both inundated and dry), as is the case for the majority of the surrounding landscape. A small reservoir, surrounded by broad-leaved plantation woodland and species-poor hedgerows, is present in the centre of the Development Site. A further two small blocks of broad-leaved plantation woodland are also present, off-site, immediately adjacent to the northern and western boundaries. Small areas of game cover are planted adjacent to the woodland blocks, and an existing wind farm (Gedney Marsh) comprising six turbines is located adjacent to the eastern boundary. Consultation was undertaken with a range of consultees prior to, and during the course of, the ecological surveys, and during the emerging impact assessment. The baseline ecological surveys, which underpinned the assessment,

were carried out between March 2007 and August 2009, and comprised a Phase 1 habitat survey, as well as targeted surveys for amphibians, bats, badgers, otters and water voles. A comprehensive desk study was also undertaken.

2. There are no important sites for nature conservation within or adjacent to the Development Site boundary. The Wash is located approximately 3.5km to the east of the site and is designated as an Internationally important site for nature conservation in relation to habitats it supports (as a Special Area of Conservation (SAC) and its birds interest (as a Special Protection Area (SPA)). It is also designated as a Ramsar site (as an Internationally important wetland) and is included on UNESCO's tentative list for designation as a World Heritage Site. Surfleet Lows Site of Special Scientific Interest (SSSI) is located 15km to the west of the Development Site; it is a Nationally important site designated for its wet meadows. Cowbit Wash SSSI is a Nationally important geological site, located 20km to the south west of the Development Site. A number of locally important nature conservation sites are also located within 5km of the Development Site; none of these will be affected by the Development.
3. The surveys confirmed the absence of badgers, otters and great crested newts from the Development Site. It was also determined that the Development Site did not support valuable habitats, or habitats likely to support valuable invertebrate assemblages or reptile populations. The intensively farmed habitats present are generally of low species diversity and highly unlikely to provide valuable resources for fauna. However, the Development Site was found to be used by small numbers of foraging bats and supports a small population of water voles. None of the ditches which support water voles, or suitable habitat for water voles, will be affected by the Development. Therefore no adverse impacts on this species would be expected, although the mitigation proposed in relation to marsh harriers (see below) would be expected to have a beneficial effect on the local water vole population. No bat roosts will be affected by the proposed Development. The turbines have been sited to provide an adequate buffer between features used by foraging bats (such as woodland, hedgerows and ditches) to ensure that the Development does not pose a significant risk of bats colliding with turbines.
4. Overall, no significant adverse ecological effects are predicted and no specific mitigation measures are proposed in relation to ecology.

7 Ornithology

1. Wind farms have the potential to affect birds and bird populations as a result of construction activities, operation of the wind farm and decommissioning works. The Development Site is approximately 3.5km to the west of the Wash SPA which is of International importance for birds due to the internationally important assemblages of waterfowl and waders it supports during the winter months. The Wash SPA is also designated on the basis of foraging habitat that it provides for marsh harriers which breed in arable farmland outside the SPA.
2. The baseline ornithological surveys, which underpinned the assessment, were carried out between March 2007 and September 2009. The surveys comprised transect-based breeding and wintering bird surveys and vantage point surveys and

were carried out in accordance with current best practice guidance from the Institute of Ecology and Environmental Management (IEEM) and Scottish Natural Heritage (SNH). The scope and detail of the surveys were agreed with Natural England and the Royal Society for the Protection of Birds (RSPB) and consultations with these organisations continued through the impact assessment process. The assessment also considered the potential cumulative impact of other wind farms in the area, including the adjacent Gedney Marsh Wind Farm.

3. On the basis of the desk study information, field survey results and consultation, the key species considered in the detailed impact assessment were wintering pink-footed geese, breeding and wintering marsh harrier, barn owl and wintering curlew and golden plover.
4. The only sightings of pink-footed geese occurred during winter 2007/08, when several small groups of geese in flight (a combined total of 77 birds) were recorded. Pink-footed geese have not been recorded feeding or roosting within the Development Site during the surveys. However, a flock of up to 3,500 birds attempted to land in arable fields approximately 600m to the west of the site on three occasions in November 2007. The only sighting of this species during the winter 2008/09 surveys was of a flock of approximately 3,000 birds, which were observed in flight 1-2 km from the Development Site. Given the low use of the site by this species, no significant impacts on pink-footed geese are predicted.
5. The 2008 breeding season surveys confirmed the presence of a pair of nesting marsh harriers within a wheat field to the west of the Development Site. The 2009 breeding season surveys confirmed the presence of two pairs of marsh harriers nesting within wheat fields within the Development Site. Marsh harriers were also recorded on a fairly frequent basis during the course of the 2007/08 and 2008/09 winter season surveys. The Development is likely to result in the displacement of nesting marsh harriers from the Development Site into adjacent areas. Parts of the farmland away from the turbines will be enhanced to provide valuable foraging and nesting habitat for this species, to offset any adverse effects. Given the amount of habitat available to marsh harriers in the wider area, significant effects are not predicted. The operation of the turbines is also likely to pose a collision risk for marsh harriers during the breeding season. However, given the results of the surveys and the monitoring studies carried out at the adjacent Gedney Marsh Wind Farm, significant impacts on marsh harriers are not predicted. No significant impacts on marsh harriers during the winter would be expected.
6. Barn owls were recorded foraging throughout the Development Site during the course of the winter and breeding season surveys. However, the majority of the flight observations (which were typically of single birds foraging along field drains and areas of game cover) involved birds undertaking low-level flights at heights of less than 5m (i.e. below the rotor sweep zone) and therefore no significant collision risk is predicted for this species. Barn owls may be disturbed by development activities on Development Site; although this will be unlikely to be significant given that the birds are habituated to the current agricultural operations.
7. Although golden plovers have been recorded on a relatively frequent basis during the 2007/08 and 2008/09 winter surveys, these sightings have only involved low

numbers of birds (compared to the numbers occurring at the Wash SPA), with a peak count of just 60 birds in December 2008. The majority of flight episodes have involved flocks of less than 30 birds at heights below 10m above ground level (i.e. below the rotor sweep zone). Small flocks of up to 20 golden plovers have also been recorded within fields adjacent to the site during the course of the surveys, and a flock of approximately 250 birds was recorded within a field approximately 800m to the south east. Curlews were recorded within the site on a relatively sporadic basis during the course of the surveys, with a maximum count of 50 birds in December 2008. All of the flight line observations were above 23.5m (i.e. within the rotor sweep zone). Given the low use of the Development Site by these species, no significant impacts on golden plover or curlew are predicted.

8. The bird surveys and subsequent collision risk modelling has shown that the predicted losses of curlew, pink-footed geese, marsh harriers, barn owls and golden plover would not be significant at any geographic level either in isolation, or in combination with other wind farms within 35km of the site. The potential impacts of habitat loss (construction phase) and disturbance and displacement of birds (construction, operational and decommissioning phases) are also not considered to be significant for any of these species. Mitigation is proposed in relation to marsh harriers, to encourage birds to nest and forage within the farm holding but away from the turbines, therefore offsetting any adverse effects of displacement. Overall, no significant ornithological impacts are predicted.

8 Landscape and Visual Assessment

1. The landscape in which the Development Site lies is characterised by predominantly flat, arable farmland, dissected by main roads, rivers, and drainage channels and interspersed with nucleated settlements and mature vegetation. In addition, power lines, urban development, and, directly adjacent to the Development, Gedney Marsh Wind Farm, all form part of the existing landscape. Views are generally restricted or foreshortened by shelterbelts, woodland or mature hedgerows, which contribute to a sense of enclosure.
2. The Development Site is not recognised for its landscape value through any formal planning designation. However, hamlets and the centre of a number of villages within the detailed study area are recognised as Conservation Areas, and the Wash and North Norfolk Coast Tentative World Heritage Site lies at the northern edge of the detailed study area. Other designations, including Registered Parks and Gardens and the Norfolk Coast Area of Outstanding Natural Beauty, are distant from the Development Site, falling within the broad study area.
3. The Development will create limited significant effects during construction and decommissioning, which primarily relate to temporary crane activities. In respect of the operational phase, the Development has been designed to be aesthetically compatible with the adjacent Gedney Marsh Wind Farm. As a result, the Development will not dramatically change the characteristics of the wider landscape, partly defined by the existing Gedney Marsh Wind Farm, or affect the integrity of landscape designations. With the exception of a limited number of receptors in the vicinity of the Development, where high and medium changes in

views are anticipated, visual changes will be of a low level or negligible and the proposed turbines will be readily accommodated within the expansive horizons of the landscape. This low level or negligible change applies to all high sensitive recreational routes, including the National Cycle Route, Macmillan Way, and Nene Way. In all cases the Development will appear as part of Gedney Marsh Wind Farm, which already forms a definitive component of the landscape in views and, as such, will not significantly alter the existing levels of visual amenity.

4. Gedney Marsh Wind Farm also forms the primary consideration with respect to cumulative effects, due to the perceived expansion of the wind farm within local fields of view. All other wind farms considered as part of the cumulative assessment are a considerable distance from the Development and will not be readily perceived together, such that significant cumulative effects will be very localised, diminishing rapidly with distance. Overall there will be limited significant landscape and visual effects.

9 Noise and Vibration

1. An assessment has been conducted of the noise and vibration effect of the Development on residential properties. The assessment considers both construction and operational noise and vibration effects.
2. Noise and vibration impacts associated with construction are temporary in nature. Established best practice (as expressed in British and International standards) is to assess construction noise against absolute fixed levels.
3. Wind farm operational noise is assessed, as a function of wind speed, against existing background noise levels at the same wind speed, with fixed lower limits that only affect the lowest wind speeds. Background noise monitoring was undertaken at four locations during June and July 2009 and again in October and November 2009.
4. There is no evidence of vibration due to the operation of wind turbines being perceptible beyond the immediate vicinity of the turbines.
5. Decommissioning will generate noise levels similar to construction. However, some of the more noisy activities (for example piling) will not be required. Decommissioning will also be undertaken over a shorter period with activities being less intense. The noise effects of decommissioning have therefore been addressed within the construction noise assessment.
6. The construction of the Development, both in terms of the additional traffic generated and the construction activities, will not cause significant noise effects at the noise sensitive receptors assessed. The increase in traffic noise levels resulting from construction of the Development is below 1 dB, which is considered not significant, and construction noise levels will be below the guideline noise levels. The construction noise impact is therefore assessed as not significant.
7. Operational noise levels have been predicted at the noise sensitive receptors near the Development. The assessment shows that the predicted wind turbine noise

levels at the residential locations assessed meet the day-time and night-time noise limits, except in a very narrow range of wind speeds. In the unlikely event that an excess occurred, the turbine's control system can be configured to reduce noise levels so that the impact will be not significant.

8. Ground-borne vibration is very rapidly attenuated over distance. Given the distances between sources and sensitive receptors, the effect is predicted as not significant for both construction and operation.
9. An assessment of the cumulative operational noise impact of the Development with the adjacent existing Gedney Marsh Wind Farm has identified that criteria are met at all receptors, except for a very narrow range of wind speeds, and the effect is considered to be not significant in terms of the 'EIA Regulations'. No significant cumulative noise effects have been predicted for noise sensitive receptors from the cumulative construction or operation of the Manor Farm proposed Anaerobic Digester and Potato Store.

10 Vehicle Movement Assessment

1. An assessment of the likely impacts of the Development on the surrounding highway network has been undertaken. The assessment has been based on the interaction between traffic movements related to the Development and existing traffic flows on the local highway network during the construction, operation and decommissioning phases.
2. For the construction phase the impacts assessed for general construction traffic are based on the traffic generations for peak months only (the peak months being months 3 and 4 for Heavy Goods Vehicle (HGV) movements and total vehicle movements). The main impact (in terms of increases in HGVs and total vehicles) of the Development will be upon the 1km of adopted local highways (Low Gate and Roman Bank) used to provide access between the Development Site and the strategic highway network. The other possible routes to the Development Site will experience relatively small increases in total traffic as a result of the Development with the largest impact being the percentage increases in HGVs on a Saturday. These impacts assume an 'upper limit' scenario of all Development traffic using these routes, which is considered unlikely. The impacts of the Development on all assessed highways are:
 - Low Gate – minor adverse;
 - A17 (East of Low Gate) – minor adverse;
 - A17 (West of Low Gate) – negligible and not significant;
 - A1101 – moderate adverse;
 - A151 – minor adverse;
 - A16 (towards Boston) – minor adverse; and

- A16 (towards Peterborough) – negligible and not significant.
3. The most significant impact will be upon the A1101. The Development will have a moderate adverse impact on the route as a result of the HGV impacts (14.5% on a weekday and 38.4% on a Saturday) and the route passing through the town of Wisbech. It should however be noted that this impact is based on an 'upper limit' scenario assumption of all Development traffic using this route, which is unlikely. The effects during construction will be localised in nature and temporary.
 4. The route for abnormal loads has been assessed from the Port of Boston to the Development Site. Some minor modifications to the private access road leading to the Development Site are required. Minor additional works outside of the Development Site Boundary, on the public highway or its verges, are also required in 5 locations. Overall abnormal loads would have a minor adverse impact.
 5. A set of mitigation measures has been devised which seeks to minimise the effects of construction traffic, in particular, through the timing of HGV traffic flows on the local road network. Following the implementation of the Traffic Management Plan the residual effects during the construction and decommissioning phases are expected to be negligible and not significant to minor adverse.
 6. During the operational phase there will be a negligible and not significant impact on the local highway network.

11 Human Environment

1. The assessment has been based on desk studies, site visits and consultation with a wide range of local and national organisations.
2. Construction and operation of the Development will result in economic benefits through opportunities for employment and contracts.
3. A Traffic Management Plan will be implemented to minimise disruption to the Manor Farm and QV Foods operations.
4. There will be a small loss of arable land of 3.2ha during the operational phase of the Development.

12 Cultural Heritage

1. A baseline survey, consultation and field walkover have been undertaken for the Development. The present landscape of the Holbeach Marsh was created by large-scale drainage from the later 17th century, and as a consequence human activity here has been very limited until recent times. No buried archaeological sites are known to exist within the Development Site Boundary and the potential for discoveries being made during construction is very low.
2. Three Scheduled Ancient Monuments (SAMs), 176 Listed Buildings and 5 Conservation Areas within a 10km study area have been identified. The closest

SAM is approximately 9.2km from the Development Site Boundary, the nearest Listed Building approximately 1.6km distant, and the nearest Conservation Area 3km distant.

3. The potential visual effects of the Development on the setting of SAMs, Grade I and II* Listed Buildings and Conservation Areas have been considered. The assessment concludes that the Development, whilst visible from (and in combination with) several of these historic assets, does not impact upon their setting.
4. The cumulative assessment concludes that other wind farms currently submitted for planning, consented or under construction within the vicinity of the Development do not combine with the Development to bring about any significant cumulative effects. No significant impacts, either direct (physical) or indirect (visual) have been identified.

13 Hydrology and Surface Water Quality

1. The Development Site is bordered by the Fleet Haven Drain along its eastern boundary and the Middle Drain flows along the western boundary of the Development Site. These waterways are managed and maintained by the South Holland Internal Drainage Board. Across the Development, water is directed via a network of local drains into the Board Drains, and is then pumped from these to the coastal waters of The Wash.
2. There are no national or internationally designated sites with a water conservation interest located within the Development Site Boundary, although one internationally designated site has been identified within a 20km radius.
3. No Environment Agency water quality monitoring sites are located in the locality of the Development Site. Data collected during spot sampling surveys undertaken in October 2007 indicate that the Middle Drain and Fleet Haven Drain have water quality attributes of Medium importance, with these rivers scoring a Grade C (Fairly Good) for water chemistry. The local drains within the Development Site are concluded to have Low importance as they share similar water quality as the larger drains, but are commonplace at the local scale. The sample data collected is considered to represent present day conditions.
4. The majority of the Development Site is located within the defended tidal floodplain, with small areas located within Flood Zone 1 where the annual probability of flooding is less than 0.1%. In the event of a failure of the flood embankments along The Wash coastline, shallow flooding (maximum depth 0.22m) across large parts of the Development Site is predicted. There is also a minor risk of flooding due to overtopping of the Fleet Haven and Middle Drains however, these watercourses have been built and are managed specifically for the purpose of land drainage and flood risk reduction. Their flow conveyance and storage attributes have High importance.
5. The Development has the potential to result in a number of effects on the surface water environment, with the greatest likelihood of effects occurring during the short-term construction phase. Potential effects include degradation of the water quality of local waterbodies, increased flood risk, culverting of drainage ditches for

access with implications for flow hydraulics and aquatic habitats and disruption of local surface water drainage patterns.

6. In terms of flood risk, in agreement with the Environment Agency, the Development has been designed to safeguard its operation during the 1 in 200 year tidal flood event and the Development will have a not significant impact on third party flood risk. This impact, which is associated with minor floodplain storage loss due to raising access tracks above existing ground level, is limited to water level increases on third party lands of significantly less than 5mm.
7. In terms of other potential effects on the surface water environment, it is considered that with the implementation of the Construction Environmental Management Plan, which will incorporate environmental management measures (including Pollution Prevention Plans and Drainage Management Plans), the residual effects of the Development will be Insignificant.
8. The potential for cumulative flood risk effects was assessed with reference to the Manor Farm Flood Risk Assessment for the anaerobic digester and potato store at Manor Farm. Cumulative water quality effects were also considered. It is concluded that there is no potential for cumulative effects on water quality, hydrology and flood risk.

14 Geology and Groundwater

1. The most significant impact on geology and groundwater from the Development is likely to result from groundwater control measures during the construction of sub surface structures which may include concrete foundations (the turbines themselves will have piled foundations) and communication and electrical cabling. There is some potential for contamination due to incidents such as accidental fuel spillages during construction.
2. The underlying solid geology at the Development Site is comprised of Upper Jurassic mudstones and silty mudstones (Ampthill Clay and the West Walton Formation). This is overlain by drift deposits; the Terrington Beds which are described as younger marine alluvium; salt marsh, tidal creek and river deposits (sandy silt, sand and clay). The thickness of the Terrington Beds is likely to be substantial. The Terrington Beds are classified as a Non Aquifer.
3. Based on the available documentary evidence, contaminated material is not expected to be present on the Development Site.
4. It is expected that the drift deposits will be displaced during the construction excavation works, however, it is unlikely that the underlying solid geology will be affected.
5. The potential effects of the Development on geology and groundwater prior to and post mitigation will be not significant.

15 Other Issues

1. When operating, the Development will not generate any emissions to air, and operational traffic emissions will be not significant. Local air quality will not therefore be affected by the operation of the Development.
2. During the construction phase, site preparation and construction activities will disturb the soil and underlying geology and also increase road traffic. This will have the potential to create temporary adverse effects on local air quality.
3. The impacts of Development construction traffic on air quality are anticipated to be not significant given the combination of the low background concentrations of pollutants with the relatively minor increases in road traffic levels on a temporary basis during the construction period.
4. Wind Turbines can reflect radio waves and can therefore be detected with radar. Reflections from turbines have the potential to be visible on radar as “clutter.” Radar operators are often concerned that wind farm clutter might affect aviation safety. Due to their height, wind turbines could also potentially present a collision risk to low flying aircraft. This could interfere with military low-level training flights.
5. In addition to desk based studies, ScottishPower Renewables has consulted in accordance with PPS22 Companion Guide (Ref NTS 13) document in order to assess the potential for significant effects.
6. The MoD (Defence Estates) are responsible for safeguarding MoD radar, communications and low flying. The MoD (Defence Estates) were consulted using the Aviation Proforma on the 21 of October 2008.
7. The MoD (Defence Estates) responded in a letter dated 5 of May 2009 with the following concerns in relation to the Development:
 - Low Flying Hazard associated with the Provost Marshal Restricted (PMR) Airspace which forms the Wash Weapons Airspace; and
 - ATC Primary radar interference at RAF Coningsby, RAF Cottesmore, and RAF Cranwell.
8. The MoD, however, subsequently withdrew their concern in relation to low flying (9 October 2009), noting that since earlier correspondence the turbine locations had been moved. MoD did advise, however, that they would wish to see safety lighting fitted to the turbines.
9. However, lighting of obstacles such as turbines and power lines is normally only carried out on structures within what is referred to as the en-route environment when they are not in the vicinity of an aerodrome and the structure is higher than 150m. As the existing Gedney Marsh Wind Farm is not lit, there are currently no proposals for safety lighting on turbines associated with the Development.
10. With regard to the second MoD concern in relation interference on ATC primary radar, discussions are on-going with the MoD (Defence Estates).

11. Consultation was undertaken with the Civil Aviation Authority who confirmed in their letter dated 7 May 2009, that the Development may have a potential impact on Wingland Aerodrome. The operators of Wingland Aerodrome were consulted, and confirmed in their email dated 12 June 2009, that they did not consider the Development to pose a problem to their operations.
12. Norwich International Airport confirmed that the Development lies outside the protected airspace that surrounds the airport. East Midlands Airport confirmed that the Development, in isolation, could be accommodated without impacting on either East Midlands or Humberside Airports.
13. There is a high-pressure gas line pipeline present beneath the Development Site. This has been considered in the layout of the Development and consultation has been undertaken with National Grid regarding slab design for track crossing points.
14. In certain meteorological conditions, such as still, cold weather, it is possible for ice to form on the rotor blades. If this occurs, two types of risk may result; ice fragments thrown from the rotor and ice fall from the turbines while shut down. Despite the low risk, one of the turbines will be fitted with an ice sensor. If the ice sensor detects ice forming on the turbine it will send an alarm to the ScottishPower Renewables control centre. Data (including webcam) will then be checked in order to determine if it is appropriate to cease operation until conditions improve. Operational procedures will also be put in place to ensure the safety of both workers and the public in relation to ice throw and ice fall. Procedures could include warning signage.
15. Shadow flicker is an effect that can occur in sunny weather when the blade of a moving wind turbine cuts through the sunlight passing into a small opening (such as a window) of a property. This effect briefly reduces/blocks the intensity of light within the room, and can cause a flickering to be perceived. Five potential shadow flicker receptors were identified within the study area. Effects of shadow flicker on these receptors have been assessed. The assessment of shadow flicker has shown that based on the upper parameters assessed, significant shadow flicker effects could occur at Home Farm, due to slightly exceeding the significance threshold. However, in practice shadow flicker effects are unlikely to be significant due to the fact that a) the building is not occupied as a permanent residence, rather as seasonal worker's temporary accommodation, and b) dense vegetation along Marsh Road is likely to block shadow effects for Home Farm. Therefore no specific mitigation proposals are identified to reduce the effect of shadow flicker.

16 References

- Ref NTS 1 Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI 1999 No 293)
- Ref NTS 2 DTI (2003) Energy White Paper, Our energy future – creating a low carbon economy
- Ref NTS 3 DTI (2007): 'Energy White Paper: Meeting the Energy Challenge', 07/1006, Department of Trade and Industry, HMSO, London,
<http://www.berr.gov.uk/energy/whitepaper/page39534.html>
- Ref NTS 4 BERR Energy Trends, March 2008
- Ref NTS 5 Department for Business Enterprise and Regulatory Reform (June 2008) UK Renewable Energy Strategy Consultation
- Ref NTS 6 Department of Energy and Climate Change (July 2009) The UK Renewable Energy Strategy
- Ref NTS 7 The East Midlands Regional Plan (2009)
- Ref NTS 8 ScottishPower Renewables, 2006, Windfarm Sustainable Development Policy
- Ref NTS 9 South Holland District Council Local Plan (2006)
- Ref NTS 10 South Holland District Council (2004) Supplementary Planning Guidance on Wind Energy
- Ref NTS 11 Planning and Compulsory Purchase Act (2004)
- Ref NTS 12 Planning Policy Statement 22: Renewable Energy (2004)
- Ref NTS 13 Planning for Renewable Energy: A Companion Guide to PPS22 (2004)
- Ref NTS 14 Department of Trade and Industry (DTI), Civil Aviation Authority (CAA), Ministry of Defence (MoD), British Wind Energy Association (BWEA) (2002), Wind Energy and Aviation Interests: Internal Guidelines