

PREFACE

This Non Technical Summary (NTS) has been prepared to support a planning application for the development of a wind farm between Tydd St Mary and Sutton Bridge, Lincolnshire.

The NTS makes up Volume 1 of the Environmental Statement (ES) which is contained within three separate volumes:

Volume I Non Technical Summary.

Volume II Full text Environmental Impact Assessment, containing technical and supporting information in appendices

Volume III Figures and plans referred to in the text of Volume II.

A separate Planning Policy Statement has also been prepared to accompany the planning application.

The ES has been prepared by RES UK & Ireland Ltd, a subsidiary of Renewable Energy Systems Ltd in consultation with South Holland District Council and in collaboration with the following specialist consultants:

Landscape Assessment LDA Design 17 Minster Precincts, Peterborough PE1 1XX	Ecology Assessment Scott Wilson 16 Priestgate Peterborough PE1 1JA	Ornithological Assessment Ecology Consulting Swallow Ridge Barn Old Cassop, Durham DH6 4QB	Hydrological Assessment SKM Alberton House St Mary's Parsonage Manchester M3 2WJ
Cultural Heritage Assessment Entec Canon Court Abbey Lawn Abbey Foregate Shrewsbury SY25DE	Noise Assessment Renewable Energy Systems TEC Unit 7000 Academy Park Gower Street Glasgow, G51 1PR	Transport RES UK & Ireland Ltd Beaufort Court Egg Farm Lane Kings Langley WD4 8LR	Planning Statement Cobbetts LLP Number 1 Whiteall Tiverside Leeds LS1 4BN

Copies of the full ES may be viewed during normal opening hours at the following locations:

South Holland District Council Offices, Priory Road, Spalding, Lincolnshire, PE11 2XE

Wisbech Library - 5 Ely Place, Wisbech, Cambridgeshire PE13 1EU

Long Sutton Library, Trafalgar Square, Lincolnshire PE12 9HB

Long Sutton Market House, 9 Market Street, Long Sutton, Spalding, PE12 9DD

Copies of the full ES are available from RES priced £150 each. A loan copy of the full ES can be supplied free of charge for limited duration. Copies of the non-technical summary are available free of charge. The non technical summary can also be viewed on the RES website web page <http://www.grangewindfarm.co.uk> Requests for either document should be made in writing, including payment if purchase of the full ES is required, to RES UK & Ireland Ltd at the address above.

TABLE OF CONTENTS

PREFACE	1
TABLE OF CONTENTS	2
LIST OF FIGURES	2
INTRODUCTION	4
NEED FOR THE PROJECT	4
DESCRIPTION OF THE PROJECT	7
LANDSCAPE AND VISUAL ASSESSMENT	9
ECOLOGICAL (NON AVIAN) ASSESSMENT	10
ORNITHOLOGICAL ASSESSMENT	12
CULTURAL HERITAGE ASSESSMENT	13
HYDROLOGY AND HYDROGEOLOGY	14
ACOUSTIC ASSESSMENT	14
TRANSPORTATION AND ACCESS	14
ELECTROMAGNETIC INTERFERENCE	17
SOCIO-ECONOMIC ASSESSMENT	17
CONCLUSIONS	18

LIST OF FIGURES

Figure 1	Site Location
Figure 2	Site Layout
Figure 3	Front and Side Elevations of a Wind Turbine
Figure 4	Viewpoint 1 - For Illustration only, refer to Volume III ES for correct viewing distance
Figure 5	Viewpoint 4 - For Illustration only, refer to Volume III for correct viewing distance



RES has an Environmental Management System which actively encourages the reduction of paper consumption and recycling where possible.

Volumes I and II of this ES and the Planning Statement are printed on recycled paper.

INTRODUCTION

The Application

RES (Renewable Energy Systems) UK & Ireland Ltd is applying to South Holland District Council for full planning permission to construct a wind farm of seven wind turbines on land between Tydd St Mary and Sutton Bridge on Tydd St Mary's Marsh. The Site (centred on grid ref: 546390, 319295; OS Grid Ref TFA 46390 319295) lies on agricultural land (See Figure 1).

The 'Proposal' is for the installation of a wind farm comprising seven 2 Megawatt wind turbines and associated electrical transformers, electrical sub-station compound and control building, a permanent (80m high) freestanding lattice wind monitoring mast, 10m communications mast and on-site infrastructure (being underground cabling, access tracks, off-site road improvements, and crane hardstandings), for a period of twenty five (25) years (See Figure 2). The Proposal shall also include temporary wind monitoring masts, rotor assembly pads, welfare facilities and a construction compound.

The wind farm would produce sufficient electrical energy to satisfy the average requirements of over 8,000 homes, equivalent to over 24% of the annual consumption of the houses in the South Holland District (2001 UK census data).

The proposal is the culmination of over 36 months of work by RES during which time the site's suitability and detailed environmental interests have been assessed. The design evolution of the project is discussed below.

The Applicants

RES is one of the world's leading wind energy companies and is part of the Sir Robert McAlpine Group, a British, family owned construction firm. At the time of writing, RES has successfully developed and/or constructed 79 wind farms worldwide and operates and maintains several others.

From long term involvement in the wind industry, RES has evolved a high level of expertise in the technical, environmental and financial disciplines essential for the development of a successful wind farm. This has been acknowledged by RES being awarded a Queen's Award for Enterprise in the Sustainable Development category recognising RES's 'comprehensive approach to the environmental and social impact assessment prior to the commencement of every wind farm project' and RES's award winning eco-friendly headquarters and education centre in Kings Langley, Hertfordshire.

NEED FOR THE PROJECT

Climate Change

There is clear evidence that the global climate is changing as a result of human activities, primarily as a consequence of burning fossil fuels. Global emissions of Carbon dioxide (CO₂) have grown by about 80% between 1970 and 2004 and represent about 77% of total anthropogenic green house gas emissions. Emission levels are continuing to rise at an increasing rate.

Associated changes in temperature, sea level and other natural systems on earth are now becoming more apparent where current climate model predictions suggest that we can expect a rise in global temperatures of between 1.1 and 6.4°C by the end of this century¹, depending on what level our emissions are curtailed. This will result in further rise in global sea levels of between 20 and 60cm

¹ IPCC, 2007. Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC). Synthesis Report, Topic 3.

over the same time period, with associated changes in rainfall patterns and frequency of extreme weather events.

For the UK, these changes will be seen through hotter, drier summers and wetter, milder winters with associated higher sea levels and risk of flood events². Across the world, climate change may cause severe problems for those people who are particularly vulnerable to changes in the weather. This highlights the huge potential environmental, social and economic cost of climate change and the importance of acting to curb emissions now and reduce our use of finite resources.

Since production of electricity from wind energy has no gas emissions, there is no contribution to climate change. By displacing polluting fuels, renewable energy sources help to meet international, national and regional targets that have been set to combat climate change.

Pollution Savings

Annually, by displacing fossil-fuel generation, 16,000³ tonnes of CO₂ would be prevented from entering the atmosphere by the Grange Wind Farm.

Other Benefits

The benefits of using renewable forms of energy are not confined to tackling climate change. Environmental costs of conventional generation are avoided, including the health implications associated with poor air quality, the damage to the natural and built environment caused by acid rain and radiation related health and safety problems. In terms of energy-security, renewable energies such as wind are inexhaustible, being free are not subject to fuel-price uncertainty, are not subject to the vagaries and politics of the international fuel markets, and have no requirement for fuel transportation, drilling, or mining. Furthermore wind farms are easily and quickly decommissioned, leaving no significant adverse legacies.

International, EU and UK Policy on Renewables

The effect that industrial societies' emissions of greenhouse gases are having on the atmosphere and global climate were recognised in the 1992 United Nations Framework Convention on Climate Change (UNFCCC, 2002) which resulted from the Earth Summit held in Rio de Janeiro, and was ratified by over 150 countries. This treaty, put into force by the UK in March 1994, recognised that human-induced changes to the atmosphere were affecting the climate and set out to ensure that the so-called greenhouse gases are stabilised at a safe level.

The UNFCCC established a foundation upon which specific actions and targets could subsequently be constructed. The key building block that has been added so far is the Kyoto Protocol of 1997. The Kyoto Protocol sets legally binding targets and timetables for cutting emissions from developed countries. In February 2005 the treaty came into force making it legally binding with 141 countries, including the UK, committing to reducing their emissions. There will be the United Nations Framework Convention on Climate Change in December 2009 to continue to target international policy on climate change.

The European Union has a target to cut emissions of greenhouse gases by 8% below 1990 levels by 2008-2012. Within the EU, it has been decided that targets should be distributed non-uniformly in recognition that some countries are currently more polluting than others, whilst some are less developed industrially. The UK has set itself a target of cutting CO₂ emissions by 80% by 2050.

The UK Energy White Paper 'Our energy future - creating a low carbon economy' was published in February 2003. The Energy White Paper sets a goal of cutting the UK's CO₂ emissions by 60% by around 2050, with real progress to be made by 2020. In addition it sets the target of achieving 10%

² Defra, 2007. Climate Change. What is climate change?
<http://www.defra.gov.uk/environment/climatechange/about/index.htm>

³ See Appendix 1.1, Volume II.

of electricity production from renewables by 2010 and proposes that renewables share of electricity generation in 2020 should be double the 2010 target and set at 20%.

Since 2003, a number of annual reviews of the Energy White Paper have taken place, in addition to a government Energy Review (2006) which reaffirmed the government's commitment to reducing emissions and support of renewable energy technologies through the production of Annex D: *Renewable Statement of Need*.

In 2007, a revised Energy White Paper was published which set out the Government's international and domestic energy strategy to address long term energy challenges of climate change and security of supply. The resultant Energy Bill will make relevant legislative changes arising from the Energy Review and its various consultations.

Alongside Planning and Climate Change Bills, the Energy Bill will ensure our legislation underpins the long term delivery of our energy and climate change strategy.

By October 2008 the UK had installed over 3,100MW of wind energy capacity, onshore and offshore. This equates to approximately the power needed to supply over 1.8 million homes (BWEA, 2008⁴), approximately 6% of homes in the UK.

The Resource

The Grange Wind Farm would produce enough electricity to supply the equivalent of 8010 homes (with an installed capacity of 14MW), equivalent to 24% of the annual consumption of the houses in the South Holland District (2001 UK census data).

Public Opinion

Many public attitude surveys have been conducted throughout the UK at existing wind farms. The evidence is that there is a clear general, and site-specific large majority support for wind farms. Local support increases following the construction of a wind farm once people experience the operation of the wind farm for themselves, suggesting that concerns about the effects on an operational wind farm may be unfounded. (RBA, 1998⁵; Scottish Executive, 2003⁶, and Warren et al., 2005⁷).

Public Consultation

Information on the wind farm Proposal has been widely distributed; leaflets with information about the project were sent to over 6000 residents in March 2009. RES also held public exhibitions in Tydd St Mary and Tydd St Gote Village Hall and Sutton Bridge Constitutional Club in late March 2009. Visits to wind farms have been arranged for local residents and groups interested in experiencing a wind farm and learning more about the technology. Copies of this ES will be available at local libraries and council buildings plus information will be available on the website: <http://www.thegrangewindfarm.co.uk>

⁴ BWEA (2008), UK Wind Energy Database. Available from: <http://www.bwea.com/ukwed/index.asp> [Viewed March 2009]

⁵ Robertson Bell Associates for National Wind Power, (1998). Novar - Public Opinion Survey (Leeds: RBA).

⁶ Scottish Executive Social Research, (2003). *Public Attitudes to Wind Farms*. MORI Scotland. www.scotland.gov.uk/socialresearch/

⁷ Warren et al. (2005). *Green on Green: public perceptions of wind power in Scotland and Ireland*. Journal of Environmental Planning and Management, Vol. 48, No6, 853-875. November 2005.

DESCRIPTION OF THE PROJECT

Site Selection and History

The proposal has been identified and designed through using OS maps (1:50,000) and a wide range of relevant documented information, RES undertook further studies and applied its own stringent site selection criteria to confirm the suitability of the Grange site for a wind farm.

- wind speed at 45m height in excess of 6m/s as estimated by the ETSU NOABL UK wind speed database.
- minimum site area greater than 2km²
- average gradients of up to 1 in 10.
- good site access.
- separation from of National Parks, European and internationally designated sites such as RAMSAR, Candidate SACs and SPA's.
- discretionary consideration of SSSI, NNR and ESA designated sites.
- appropriate minimum separation from the nearest habitations.

The suitability of this site was further confirmed through use of a Geographical Information Systems (GIS) tool, which, using similar constraints to those listed above, was able to identify the site was well-suited for a wind farm.

Following site identification, the proposal site underwent detailed investigation which included initial site visits and consultations with statutory consultees. Scoping was sought from South Holland District Council 2005 and again in 2006. Planning permission was given to erect temporary meteorological monitoring masts in 2005.

The final proposal design has benefitted from RES's engineering, technical and development experiences from around the world. It has also taken into account the findings of environmental surveys and assessments and consultations which helped RES to build a constraints map which guided the positioning of infrastructure on the site.

Land Take

The land take for a wind farm development is relatively small. The wind turbines have of necessity to be spaced apart, so as not to interfere aerodynamically with one another (array losses). The actual permanent land take is limited to the area of the towers themselves, the access tracks leading to them, the crane hardstandings (which are partly covered with topsoil post construction), the control building and the substation, totalling less than 0.87% of the site area.

The Turbines

Each turbine would begin generating power automatically at a wind speed of around 3.0 m/s (6.75mph) and would shut down at a wind speed of around 25 m/s (56mph). A diagram of a typical wind turbine is illustrated in Figure 3. Also illustrated is the transformer unit that is located at the base of each turbine. The colour and finish of the wind turbines would be agreed with the planning department, but is likely to be a pale grey semi-matt finish.

Grid Connection

All electrical cabling between the turbines and the wind farm sub-station on the site would be underground.

It is anticipated that the grid connection shall be via either an underground cable or wooden poles overhead to a transmission substation located in Long Sutton. The exact route of this connection is still to be determined by National Grid and the District Network Operator.

Construction

Construction of the wind farm will take up to 12 months. This period is somewhat weather dependent and could be affected by ground conditions found at the site. Site working would be Monday to Saturday from 6.00am to 8.00pm, however, during turbine erection and commissioning site working would be seven days a week. The expected sequence of events for the construction programme would be:

- Construct road improvements
- Fell trees where necessary on site
- construct temporary construction compound
- Construct the site access tracks, rotor assembly pads and crane hardstandings, gates and temporary fencing (if required)
- Excavate and construct the turbine foundations
- Construct the substation and install the grid connection
- Excavate the trenches and lay the power and instrumentation cables
- Erect the turbines and monitoring masts
- Commission the turbines
- Carry out land reinstatement, remove temporary accommodation, temporary compound, rotor assembly pads and crane hardstanding areas and clear the site.

Best construction, health-and-safety and environmental practice would be followed at all times.

On-Site Access Tracks

A new network of tracks would be built to provide access to each turbine (see Figure 2). The access tracks will be approximately 5m wide with widening on bends and at passing places and would be made of crushed and graded stone. The existing farm tracks have been used as much as possible in the design of the wind farm to minimise the take of additional farmland.

The access tracks have been designed to minimise environmental disturbance, landtake, and to avoid disruption to farming activity where practicable.

Foundations

It is anticipated that the foundations for the turbines would be of piled design. This would be a series of reinforced concrete piles supporting a concrete cap into which the turbine bolts are cast. Piles can be precast and hammered in to the ground or cast in-situ after the existing material has been removed with an auger. After the piles have been installed the pile cap is cast in situ and would lie up to 1m below the normal ground surface and is back filled with soil and reinstated. All spoil that is excavated would be put back on top of the foundations. Any excess spoil would be spread in areas that are not environmentally sensitive.

Operation

Wind farms are operated remotely from a central computer system. Because of this a large amount of infrastructure is not required. The wind farm site would not be permanently manned, but there would be traffic limited to small maintenance vehicles with typically four maintenance crew visits per month. In addition a local person would be employed to regularly inspect the wind farm site, generally on a weekly basis.

Each turbine would have its own internal control system interfaced to a central control system located in the sub-station. The turbines would be automatic in their everyday operation. Were a fault to develop which required an operator to intervene then the supervisory control system would make contact with on-duty staff via a mobile messaging system. The operators would be able to shut down one or all of the wind turbines remotely.

Decommissioning

The expected operational life of the wind farm is twenty five years from the date of commissioning. At the end of this period a decision would be made as to whether to refurbish, remove, or replace the turbines.

If a decision were to be taken to decommission the wind farm this would entail the removal of all the turbine components, transformers, the substation and associated buildings. Some of the access tracks could be left on site to ensure the continued benefit of improved site access for the landowners, or they could be reinstated. It is not usual to remove the buried concrete foundations from the site as this would cause more land damage than leaving them in situ. The entire foundation would be graded over with soil.

One advantage of wind power generation over other forms of energy production is the ease of decommissioning. A wind farm can be easily and quickly dismantled and the site restored, leaving no visible trace of its existence, and no pollution for future generations.

LANDSCAPE AND VISUAL ASSESSMENT

This chapter of the environmental statement assesses the visual and landscape character effects of the proposals. The proposed development is sited approximately 9km to the north of Wisbech and occupies a site comprising large open fields primarily used for cultivated vegetable crops with a number of hedgerows and small copses.

The construction phase is estimated to take approximately 12 months. Whilst there will be a degree of visual disturbance arising from construction activity, the proposals aim to minimise disturbance to the land itself and consideration has been given to the detailed siting and routing of the turbines, access tracks, cable routes and construction compound in order to minimise potential disturbance to the physical landscape. Wind turbines are sited, where possible, adjacent to existing access tracks, to minimise the need to install new tracks across agricultural land.

The site is not located within a designated landscape. Within the wider study area, sections of the landscape are protected by national and/or local designations. Of national significance is the Norfolk Coast Area of Outstanding Natural Beauty situated at approximately 25km to the north east of the site and two Areas of Important Landscape Quality located to the east of the site. Due to distance and intervening vegetation neither the national nor locally protected landscapes will experience effects upon their landscape character as a result of The Grange wind farm.

The proposed turbines would be theoretically visible from approximately 80% of the study area. However, the ZTV represents a worst-case scenario of the extent of visibility. The on-site real extent of the proposed development's visibility will be significantly reduced as a result of the screening effects of hedgerows, buildings and occasional features such as embankments or cuttings which are not incorporated into the terrain model for the ZTV. Visibility is markedly reduced towards the east of the study area due to settlement at King's Lynn and woodland vegetation. See

example Photomontages at the end of this NTS for views from South Eastern Edge of Sutton Bridge (Viewpoint 1) and the eastern edge of Tydd St Mary (Viewpoint 4).

The viewpoint and receptor group assessment anticipates that significant visual effects will be limited to an approximate 4km radius or less around the site. At distances greater than 4km, visual and landscape effects in the wider study area are generally reduced to a Minor to Negligible significance level of impact. Views of The Grange will be significant from residential properties in Tydd Gote located adjacent to the site, the Nene Way National Trail and vehicular routes in close proximity to the site.

The site lies within the National character area of The Fens. Significant effects on national landscape character, in terms of EIA Regulations, are generally restricted to a limited area of The Fens national character area. Given the extensive coverage of The Fens, the overall impact on the integrity of this character area is judged to be Negligible.

Significant effects on local landscape character areas will be limited to the site itself and the nearby vicinity up to an approximate 4km radius of the site. Locally affected character areas include the Cambridgeshire Fenlands, the South Holland District Council Settled Fens and the Wind Turbine Settled Inland Marshes but only where parts of character areas have visually sensitive characteristics is there the potential for anticipated effects. Beyond 4km from the site direct effects on the character of the landscape is considered to be Minor to Negligible and only where parts of character areas have visually sensitive characteristics is there potential for anticipated effects. This is reduced by distance, the extent of the view and the intervention of vegetation.

Within this landscape, the scale of the proposed wind farm will add a new feature to the existing local landscape resource. The introduction of a wind farm will change the character of the site itself as there are currently few distinctive landmarks or interesting features within the site. However, within the surrounding area, there are a number of vertical man-made elements which create an eclectic skyline. The Sutton Bridge Power Station is located adjacent to the site and high voltage electricity pylons extend across fields surrounding the site. Also, whilst the presence of the proposed wind farm will bring about change, this will not necessarily be a detrimental change in terms of the quality of the landscape or local views. Indeed, some people may view it as a positive change, adding interest to an otherwise unexceptional local landscape.

In summary, the cumulative visual effects, sequential or from static viewpoints, arising from the combination of The Grange Wind Farm with the ten operational, consented or in-planning developments is generally limited to an area within close proximity to the site. The cumulative developments included four operational wind farms including Gedney Marsh, Coldham, Stag's Holt and Longhill; three consented developments including French Farm, the Coldham and Stag's Holt extensions; and three sites currently in the planning process which include Wryde Croft, Nuts Grove and the Premier Foods turbines.

Although the proximity of the Premier Foods turbines to The Grange increases the availability of combined views, other developments are at too great a distance to result in cumulative visual effects. In addition, the screening effects of boundary vegetation in the landscape will potentially act to reduce the effect of the combined views of The Grange with the Premier Foods turbines and the frequency of sequential views within the study area.

Whilst the combined theoretical visibility coverage is extensive within the 25km study area, the site appraisal indicates that a combination of distance together with scale of the landscape and intervening vegetation, will limit the intervisibility and effect on landscape character and visual viewpoints/receptors. Due to the predominantly flat terrain of the local landscape, any intervening vegetation successfully screens the windfarms from each other and restricts views of the wind farms plus cumulative views on-site. With the exception of the Premier Foods turbines, the relative distance of the developments from each other reduces the number of locations from which more than two wind farms can generally be seen in the same visual sector at any one time.

ECOLOGICAL (NON AVIAN) ASSESSMENT

Scott Wilson carried out an ecological assessment of the proposed wind farm at The Grange, Tydd St Mary's Marsh, Lincolnshire.

The ecological assessment comprised a desk study, Phase 1 Habitat survey, bat activity survey and badger survey. Scott Wilson was not responsible for the bird surveys undertaken for the wind farm and the findings of these are reported separately. Based on the results of the Phase 1 Habitat survey and the desk study no other protected species surveys were required.

Only a very limited range of habitats was identified within the wind farm site and none were of any more than local significance. Most of the wind farm site is dominated by extensive, intensively managed arable farmland of relatively low ecological value. Land-take of this habitat will be limited and, providing mitigation is followed, the wind farm would be unlikely to pose a threat to the wildlife of arable farmland considered by this assessment.

The wind farm would also require limited land take of semi-mature plantation woodland, characterised by a high proportion of non-native tree and shrub species, and improved grass verge to facilitate construction of the wind farm site access track. Mitigation will be applied to ensure that these limited habitat losses do not pose a threat to wildlife. The detailed ecological mitigation scheme proposed for the wind farm will ensure that these habitat losses are compensated for through the two-for-one provision of new habitats of higher inherent wildlife value. In addition, the enhancement proposals for the wind farm will ensure significant provision of new habitats over and above the requirements for habitat compensation. In particular, the wind farm will provide approximately 3km of new native hedgerow along with new plantings of native shrubs and trees.

No evidence of badgers or any other protected species (excluding birds, the survey findings for which are provided separately) were found within the wind farm.

It is expected that the wind farm will pose only a very low risk to the local bat population and that the survival of the local bat population would not be threatened. Only a small bat population, comprising common and soprano pipistrelle bats along with one record of a brown long-eared bat, was recorded within the wind farm site. Daubenton's bats were not recorded from within the wind farm site but this species uses the South Holland Main Drain to the north of the wind farm. No other bat species were recorded and no bat roosts were found from within the wind farm.

Most of the bat records made during the bat activity survey were from areas that will not be closely associated with the wind turbines. This pattern of bat activity is closely correlated with the location of the most suitable bat foraging and commuting habitats. Natural England guidance on the placement of wind turbines has been implemented and the wind turbines have been offset by at least 50m from bat movement corridors. None of the wind turbines will be located any closer than 100m to the South Holland Main Drain.

The presence of bats has been a consideration in the development of the ecological enhancement scheme for the wind farm. The new woody plantings will result in new foraging habitats for bats while the configuration of these plantings will result in increased habitat connectivity over the medium term. In particular, the new and infill plantings of native hedgerow, trees and shrubs should result in a cohesive bat movement and foraging corridor between Tydd Gote and the South Holland Main Drain. In addition, a new habitat corridor will be created along the eastern boundary of the wind farm. It is expected that over the medium term these new plantings, as they mature, will result in habitat conditions that are more favourable for bats in those parts of the wind farm site that are isolated from the wind turbines and, by so doing, make relatively less attractive those areas with wind turbines.

The ecological enhancement strategy developed for the wind farm will include, in addition to the measures already described above, provision of new field boundary habitats, such as conservation headlands or sowings of nectar and/or wild bird seed mixes; barn owl boxes, bird nest boxes and bat roost boxes. All of the enhancements, when considered together, will result in a diverse range of benefits for wildlife, including new opportunities for national and Lincolnshire Biodiversity Action Plan Species such as brown long-eared, common pipistrelle and soprano pipistrelle bats, brown hare, barn owl, song thrush, tree sparrow, starling, spotted flycatcher and grey partridge.

ORNITHOLOGICAL ASSESSMENT

Methodology

Ornithological surveys of the site were carried out during 2005 and 2008, following current SNH guidance on survey and assessment methodologies. The study area was defined to include all areas in which wind turbines may be located and the areas that could be affected by them, plus a buffer zone around this. The bird surveys included breeding and wintering bird surveys, specific breeding surveys of scarce raptor species, and vantage point observations to quantify bird flight activity.

Results

Bird populations within the potential impact zone of the wind farm were generally low, as the wind farm was designed to avoid any important populations and/or protected areas. They did however still include several species of conservation importance. There was one high sensitivity species, kingfisher recorded in both 2005 and 2008 there were only single observations of this species, of birds seen flying along the South Holland Main Drain. In addition the breeding bird community included 14 medium sensitivity species: grey partridge, turtle dove, cuckoo, skylark, yellow wagtail, dunnock, song thrush, starling, house sparrow, tree sparrow, linnet, yellowhammer, reed bunting and corn bunting. A further 12 breeding species (mute swan, shelduck, kestrel, oystercatcher, stock dove, green woodpecker, sand martin, swallow, house martin, meadow pipit, mistle thrush and goldcrest) were observed.

The wintering survey results included 12 species classed as very high sensitivity, through their inclusion as a Wash SPA interest species (though only six of these were seen in non-trivial numbers), 4 high sensitivity species (through their listing on Annex 1 of the Birds Directive and/or Schedule 1 of the Wildlife and Countryside Act), two medium sensitivity (present in regionally important numbers) and 8 low sensitivity species. Five main wintering bird interest features were identified during the wintering bird surveys: pink-footed geese, golden plover, lapwing, marsh harrier, peregrine, black-headed, common and herring gulls, cormorant and mallards. There was no evidence that the study area was particularly important for any of these species

The potential effects of the proposed Grange wind farm on the Wash SPA have been considered in the EIA and the conclusion reached that there would not be any likely significant effect on any of the SPA qualifying features.

Marsh harrier, Montagu's harrier, peregrine, merlin and barn owl were all seen occasionally hunting over the study area. Numbers and frequency of occurrence of all these species were generally low. With such a low level of activity it is clear that the study area is not an important part of any breeding or non-breeding range, and collision risk would be negligible

The Kingfisher was probably breeding along the South Holland Main Drain in both baseline survey years. Kingfisher flight activity would be very much restricted to below rotor height given their usual behaviour and also to the rivers and larger drains within the study area, so there would not be likely to be a significant collision risk to this species

No species was observed regularly over-flying in important numbers and no important regular flight lines were noted. The main species of interest seen over-flying during the surveys included golden plover, lapwing, pink footed geese, cormorant, mallard, peregrine, black-headed, common and herring gulls.

Assessment

Standard collision risk modelling showed that the collision risk to all of the key species would be of negligible magnitude and not significant for any species. Birds may be displaced from a small zone around the wind turbines but this effect was predicted to be of at most low magnitude and not significant for any species. Mitigation measures would be implemented to ensure compliance with the nature conservation legislation.

The Proposal is not likely to result in any significant ornithological effects, primarily as a result of the primary mitigation measures that were incorporated into the design process.

Conclusions

It is concluded that the Proposal would comply with relevant planning policies to ornithology. Overall, no ornithological impacts are likely to occur as a result of the Proposal that would be considered significant under the EIA Regulations, nor would it result in any breach of the Habitats Regulations. The proposed habitat enhancement measures should result in a net conservation gain. In addition an ornithological monitoring programme will be implemented to provide detailed information about the effects of the wind farm on the local bird populations and on the habitat enhancement programme.

CULTURAL HERITAGE ASSESSMENT

Introduction

The cultural heritage assessment assesses the likely direct and indirect effects of the Proposal upon cultural heritage features and the historic environment during the construction, operation and decommissioning phases of the Grange wind farm. The full cultural heritage assessment is presented in Section 8 of Volume 2 of the ES and is accompanied by Figures in Volume 3.

Methodology

Standard desk-based sources were consulted and field visits were undertaken to identify and assess the cultural heritage resource within the study area. All designated cultural heritage features within a 5km radius were also assessed for likely visual effects of the Proposal. Sites were assessed for direct physical effects, visual effects, cumulative effects and residual effects.

Physical Effects

Direct physical effects upon identified cultural heritage features during construction have effectively been avoided at the design stage and no significant effects are predicted.

For mitigation of direct physical effects it is recommended that sensitive sites are fenced off during construction and that an archaeological watching brief is undertaken during construction in areas identified as being likely to contain cultural heritage remains to identify and record unpredicted sites that might be revealed. The facility to adjust the location of turbines and associated infrastructure through micro-siting of up to 50m will further mitigate any potential direct effects on unknown features.

Visual Effects

Visual effects on cultural heritage features are to a large extent inevitable during the operational life of the windfarm. These effects are likely to be greatly reduced or nullified following decommissioning. The visual effects of the Proposal upon cultural heritage features surrounding the development area will decrease with distance from the development. There are no significant effects predicted on cultural heritage features in the area.

Conclusions

Most likely or significant impacts from development have been avoided at the design stage. Suggested archaeological inputs during construction are anticipated to be sufficient to mitigate the

effects of the development upon any unforeseen features, or upon those whose location is uncertain.

There will be no direct physical effects from the development on any cultural heritage features beyond the development area.

The Proposal would comply with policies relating to cultural heritage effects in the development plan.

HYDROLOGY AND HYDROGEOLOGY

Possible impacts on water and geology from the proposed Grange Wind Farm development are related to the potential for sediment transport, water and soil pollution, interruption or alteration of surface and groundwater flows and flooding. The sensitive features on and around the site include watercourses, drainage ditches, designated sites and the groundwater system were identified during field visits and desk studies. Consultation with the North Level Internal Drainage Board, South Holland Internal Drainage Board, the Environment Agency and South Holland District Council was undertaken to establish the sensitivity of the water environment.

The site is located on flat farmland surrounded by flood defence embankments. The site is underlain by the Quaternary coastal and fluvial alluvial deposits, glacial till, beneath which are Jurassic Amphill Clays.

There are no water abstractions, including private water supplies identified within 2km of the site.

The assessment was conducted for the construction, operation and decommissioning periods. Potential effects such as sediment runoff, fuel or chemical spills, alteration of flow patterns and flooding were considered.

Mitigation to reduce or eliminate potential effects has been undertaken through careful design of the project and during construction would be managed according to best practise guidelines. These factors have been considered in the assessment of potential effects.

Mitigation measures have been outlined to prevent and minimise impacts to groundwater and surface water resources as far as is practicable during the construction and operation of the wind farm.. These measures focus on reducing and controlling runoff from access tracks and preventing/managing spills, leaks or concrete contamination of groundwater and surface water. Such measures will ensure that the South Holland Main Drain, the North Internal Main Drain, the River Nene and The Wash estuary are unaffected by the proposal and it would be in accordance with the development plan policies relating to hydrology and hydrogeology.

ACOUSTIC ASSESSMENT

Introduction

Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities. The effect of noise can therefore be a material consideration in the determination of planning applications.

As described by the Office of the Deputy Prime Minister in the companion guide to PPS22: Renewable Energy:

“There are two quite distinct types of noise source within a wind turbine. The mechanical noise produced by the gearbox, generator and other parts of the drive train; and the aerodynamic noise produced by the passage of the blades through the air.”

“Since the early 1990’s there has been a significant reduction in the mechanical noise generated by wind turbines, and it is now usually less than, or of a similar level to, the aerodynamic noise.”

“Aerodynamic noise from wind turbines is generally unobtrusive; it is broad band in nature and in this respect is similar to, for example, the noise of wind in trees.”

Aerodynamic noise is usually only perceived when the wind speeds are fairly low. In higher winds, it is generally masked by the normal sound of wind blowing through trees and around buildings.

Guidelines

The framework most commonly used within the UK for assessing the impact of noise from wind farms is the Department of Trade and Industry’s ‘The Assessment and Rating of Noise from Wind Farms’, referred to as ‘ETSU-R-97’. The methodology described in this document was developed by a working group comprised of a cross section of interested persons including, amongst others, environmental health officers, wind farm operators and independent acoustic experts. It provides a robust basis for assessing the noise impact of a wind farm and has been applied at the vast majority of wind farms currently operating in the UK.

The ETSU-R-97 document is endorsed for use in assessing and rating noise from wind energy developments within England by PPS 22 (in addition to developments in Scotland by PAN 45 and within Wales by TAN8 (paragraph 2.16)).

The basic aim of ETSU-R-97 in arriving at the recommendations contained within the report was the intention to provide:

“Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities.”

The report makes it clear from the outset that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that would arise through the development of renewable energy sources.

Methodology

To make an assessment of the acoustic impact of The Grange wind farm proposal, the following steps have been taken:

- the noise emission characteristics of the wind turbines have been determined;
- the locations of the wind turbines have been determined;
- the locations of the nearest, or most noise sensitive, neighbours have been determined;
- an estimate of noise levels at the nearest neighbours, using a sound propagation model have been made;

The model employed (the ISO 9613:2 model) takes account of attenuation due to geometric spreading, atmospheric absorption, ground effects and barriers. It has been shown by measurement-based verification studies that this model, like others, tends to slightly over-estimate noise levels at nearby dwellings.

- the indicative background noise levels for these neighbours, based on a background noise survey have been determined;

As background noise levels depend upon wind speed, as indeed do wind turbine noise emissions, the assessment of background noise levels at potentially sensitive neighbouring locations requires the measurement of not only noise levels but concurrent wind conditions, covering a representative range. These wind measurements are made at the wind turbine site rather than at the properties, since it is this wind speed that will subsequently govern the wind farm’s noise generation.

At The Grange, background noise surveys were considered from 3 nearby properties. These measured levels have been used to infer the background noise levels at other nearby properties as the ETSU-R-97 document recommends.

- the relevant noise limits have been determined through analysis of background noise surveys and assessment guidelines;

The general principle regarding the setting of noise criteria by the ETSU-R-97 document is that limits should be based relative to existing background noise levels, except for very low background noise levels, in which case a fixed limit may be applied. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest properties and the impact that the wind farm may have on this environment. ETSU-R-97 considers that absolute noise limits applied at all wind speeds are not suited to wind farms in typical UK locations and that limits set relative to the background noise are more appropriate in the majority of cases.

The ETSU-R-97 guidelines state that different limits should be applied during day and night-time hours. The day-time limits are intended to preserve amenity (outdoor), while the night-time limits are intended to prevent sleep disturbance (indoor).

The background noise data collected at The Grange has been analysed as recommended by ETSU-R-97 to determine the relevant noise limits.

- the predicted noise levels at the nearest neighbours have been assessed in light of the determined relevant noise limits.

Results and Conclusion

The acoustic impact for The Grange Wind Farm proposal on nearby neighbours has been assessed in accordance with the relevant guidance on wind farm noise as outlined above. The proposed wind farm would comprise 7 wind turbines.

Noise levels due to the operation of the proposed Wind Farm have been predicted at nearby properties over a range of wind speeds.

The acoustic assessment criteria have been determined through analysis of measured background noise at 3 nearby locations according to the relevant guidance.

For those properties considered the predicted noise levels are within noise limits at all considered wind speeds. The Grange Wind Farm proposal therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby properties would be regarded as acceptable.

TRANSPORTATION AND ACCESS

The majority of suitable onshore sites for wind farms are of a rural or semi-rural nature. Road networks to such sites will often require some degree of upgrading to accommodate construction and turbine delivery traffic.

Various routes for delivery of abnormal loads and construction traffic have been considered. Site investigations and computer modelling have identified the preferred access routes. It is proposed that turbine components would be delivered to a port in the NE of England, typically Goole. These abnormal loads would travel to site via the Motorway network to the A1 at Newark-on-Trent and then travel along the A17 to Sutton Bridge, the delivery would turn down the A1101, accessing the site by either North Road or Middle Road, with minor improvement work required to the highways to allow the abnormal loads to pass through. The final route and a traffic management plan will be agreed with the appropriate authorities. The use of Sutton Bridge Port has been assessed and isn't suitable for the delivery of the abnormal loads due to the road infrastructure leaving the port being unsuitable for the long loads required. Also consultation with turbine manufacturers showed that some manufacturers would not deliver to the port due to technical restrictions.

There are no weight restrictions on the route identified.

Traffic management measures will be implemented prior to and during the construction phase in consultation with the relevant Highways Authorities and the police to minimise any disturbance to local residents and ensure the safety of other road users during construction. Increased traffic levels would be experienced during the 12 months of construction but these effects are temporary and any disturbance to local residents and other road users will be short term when considered over the life of the project.

The site access options and the various on-site and off-site routes have been examined for suitability by an engineer from RES.

It is considered that the proposal would not conflict with policies in the development plan relating to transport and access.

ELECTROMAGNETIC INTERFERENCE

As with any large structure, wind turbines can potentially interfere with communication systems that use electromagnetic waves as the transmission medium (e.g. television, radio or microwave links). Any effect depends on the turbine design and location and the fact that wind turbine rotors are not stationary.

It is possible for wind turbines to cause interference to local TV reception either by obstruction or by reflection. Viewers situated forward of the wind farm (where the aerial is pointing through the turbines) may have their signals periodically obstructed by the rotating blades causing a 'scattering' of the signal. Viewers situated to the side may experience periodic reflections from the blades, giving rise to a delayed image or 'ghost'.

RES has gained considerable experience in this area and in practice problems are only experienced when the receiver already has a poor signal. Generally TV interference problems are predictable and normally there is a range of solutions available.

It is also possible for a wind farm to interfere with a TV rebroadcast (RBL) links or super high frequency (SHF) links that carry the TV signal between transmitters. However such interference is predictable and is screened by the network operators.

Limited analogue reception within the area is provided from the transmitters at Sandy Heath, Waltham, Belmont and Tacolneston. RES has performed a full technical assessment through prediction modelling and field studies of the scale and location of TV interference that might occur as a result of the wind farm. The results showed that any interference caused by the proposed wind farm is not predicted to be widespread, with potential interference restricted to properties within Sutton Bridge and Tydd Gote.

It has been shown that mitigation can be achieved either by an improved aerial installation, aerial redirection or by conversion to digital. RES would be prepared to enter into a legally binding agreement to ensure that it identifies and rectifies any interference problems at its own cost. If the proposal gains planning permission, RES would use the results from a pre-construction signal survey to plan any necessary remedial measures.

The wind farm will not have an effect on microwave links as they have been avoided through the careful siting of turbines during the design of the wind farm.

The Civil Aviation Authority and Defence Estates have been consulted regarding the wind farm proposals and have not raised any objections.

SOCIO-ECONOMIC ASSESSMENT

Onshore wind energy is now competing directly with conventional generation in terms of raw costs of production. However wind has a range of additional benefits that are strategic, environmental and long term in nature. These values are not yet all internalised into the economic value of wind-

produced energy, but their existence should not be overlooked. Government support is an acknowledgement and reflection of these benefits.

The construction and operation of the proposed wind farm would have a positive effect on the local economy, in terms of local employment during the construction phase, and also in the longer term from landowner rentals, business rates, local services, and employment of maintenance staff.

On a national level the UK demand for wind turbines and wind farms will help establish, mainly via inward investment, a substantial new UK industry providing long term skilled jobs serving both the home and overseas markets. Manufacturing benefit is already being experienced.

RES is keen that the proposed wind farm becomes a feature of the area, attracting interest from locals and visitors alike. Proposals for a community fund are intended to provide tangible benefits to the local community and to enable worthwhile initiatives throughout the wind farm's life.

Wind farms are subject to local business rates of 46.2p in the pound (2008/2009 rates), and attract a rateable value of £5,000 per MW of installed capacity, which means that the Grange wind farm would contribute approximately £32,00 per annum to government services.

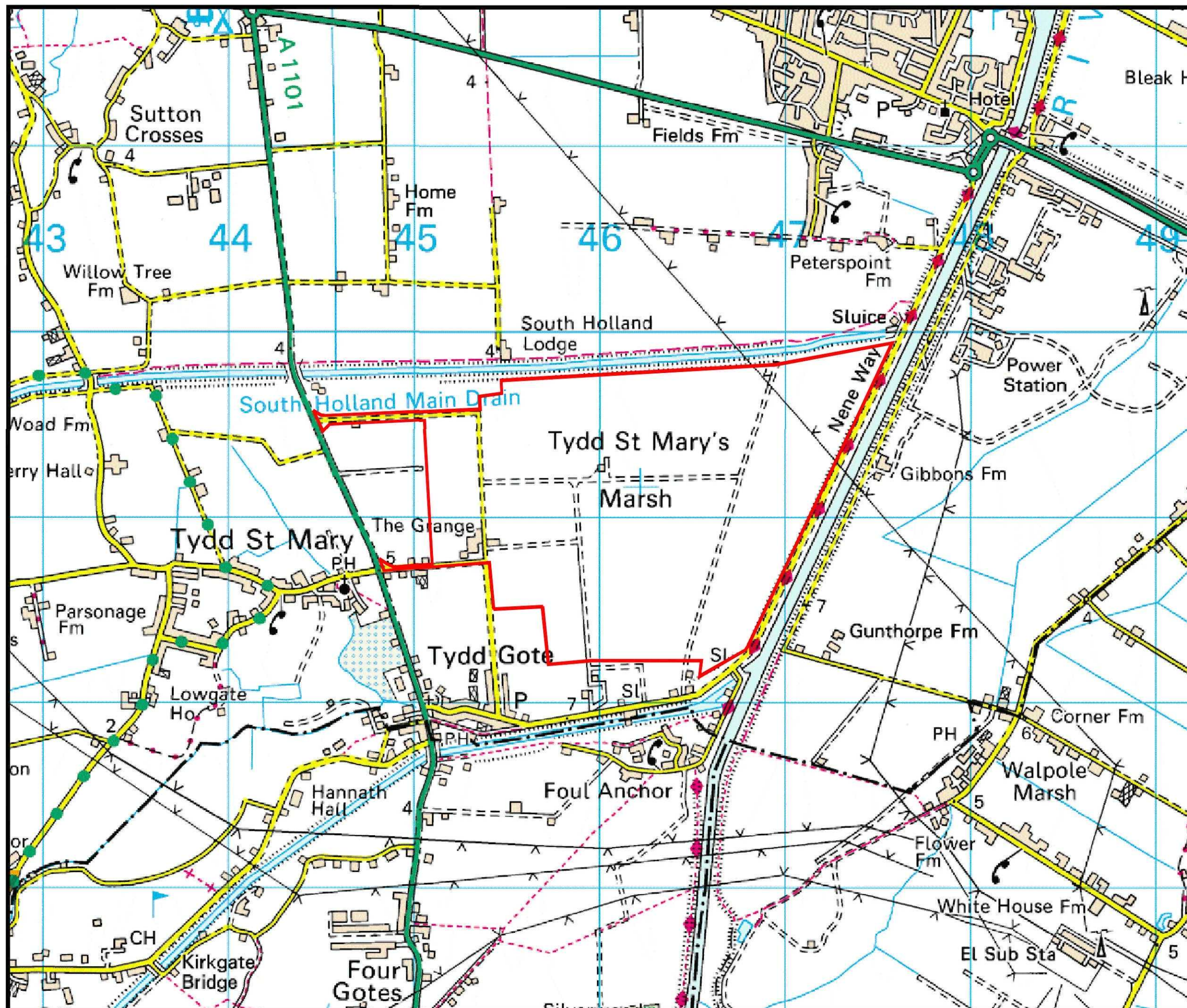
Wind farm developments are a new yet important form of rural diversification. Host farms derive rental income from the turbines, and the new income stream generally helps sustain the economic viability of the farm business. These new finances allow investment in the other aspects of the farm business, which in turn spins off into local economic benefit. Via this route, the effect of the wind farm on the local economy would be a positive benefit.

Modern wind turbines are remarkably safe given their size and relatively short evolution. Safety of the Grange wind farm will be ensured through adherence to relevant design standards, construction practices and operational procedures.

CONCLUSIONS

The likely effects of the Grange Wind Farm have been reviewed. It is considered that the proposed wind farm would have few significant adverse environmental effects on the local environment and of these most can be reduced or prevented through mitigation measures.

In addition the proposed wind farm has associated positive environmental effects related to displacement of fossil fuels and the contribution that the scheme will make to the Government's renewable energy targets.



THE GRANGE WIND FARM

FIGURE 1.1

SITE LOCATION

REPRODUCED FROM ORDNANCE SURVEY DIGITAL MAP DATA © CROWN
COPYRIGHT 2008. ALL RIGHTS RESERVED. LICENSE NUMBER 0100031673.

LEGEND

Site Boundary

LAYOUT DWG	N/A	T-LAYOUT NO.	N/A
DRAWING NUMBER			
01582D2202-04			
SCALE - 1:20,000			
ENVIRONMENTAL STATEMENT 2009			
THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION			