

Bradwell Wind Farm



Environmental Statement Non Technical Summary

February 2006

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Proposed wind farm development at Bradwell-on-sea

Introduction

This Environmental Statement Non Technical Summary (NTS) has been produced in support of a planning application for a wind farm at Bradwell-on-sea, on the Dengie Peninsula within Maldon District, Essex.

This NTS is a stand alone document and provides a summary of the information contained within the Environmental Statement (ES). The ES itself comprises three separate volumes as follows:

- Volume 1 – comprises the full text of the environmental impact assessment (EIA) and is the main part of the ES
- Volume 2 – appendices to accompany the ES Volume 1
- Volume 3 – photomontages for agreed viewpoints and illustration of Zones of Visual Influence

The ES has been produced by npower renewables (NR) in consultation with Maldon District Council (MDC) and other consultees, with specific chapters or sections written by independent professional consultants.

Copies of the ES can be viewed during standard opening hours at the following locations:

- Maldon District Council, Princes Road, Maldon
- Essex County Council, County Hall, Market Road, Chelmsford

Copies of the full ES are available from NR at price of £60 or £10 for a CD version. Copies of the Non Technical Summary are available free of charge and can be viewed at npower renewables web site www.npower-renewables.com. Requests for any documentation should be made in writing to npower renewables together with any payment if the full ES is required to Bradwell Wind Farm Proposal, npower renewables, Third Floor, Reading Bridge House, Reading Bridge, Reading, Berks RG1 3DB.

npower renewables (NR) is applying to Maldon District Council for full planning permission to construct a wind farm of 10 wind turbines on land to the south of Bradwell-on-Sea, near

Southminster, Essex. The site comprises agricultural land, centred on grid ref: E601932 N206262 and a location plan is shown below.

NR (formerly National Wind Power) has developed a leading position in the UK renewable energy market and operate around 267 megawatts (MW) of wind generating plant at 15 wind farms, together with 55 MW of hydro-electric generating plant.

The project has evolved alongside extensive consultation with statutory and non-statutory consultees, interested parties and the public.

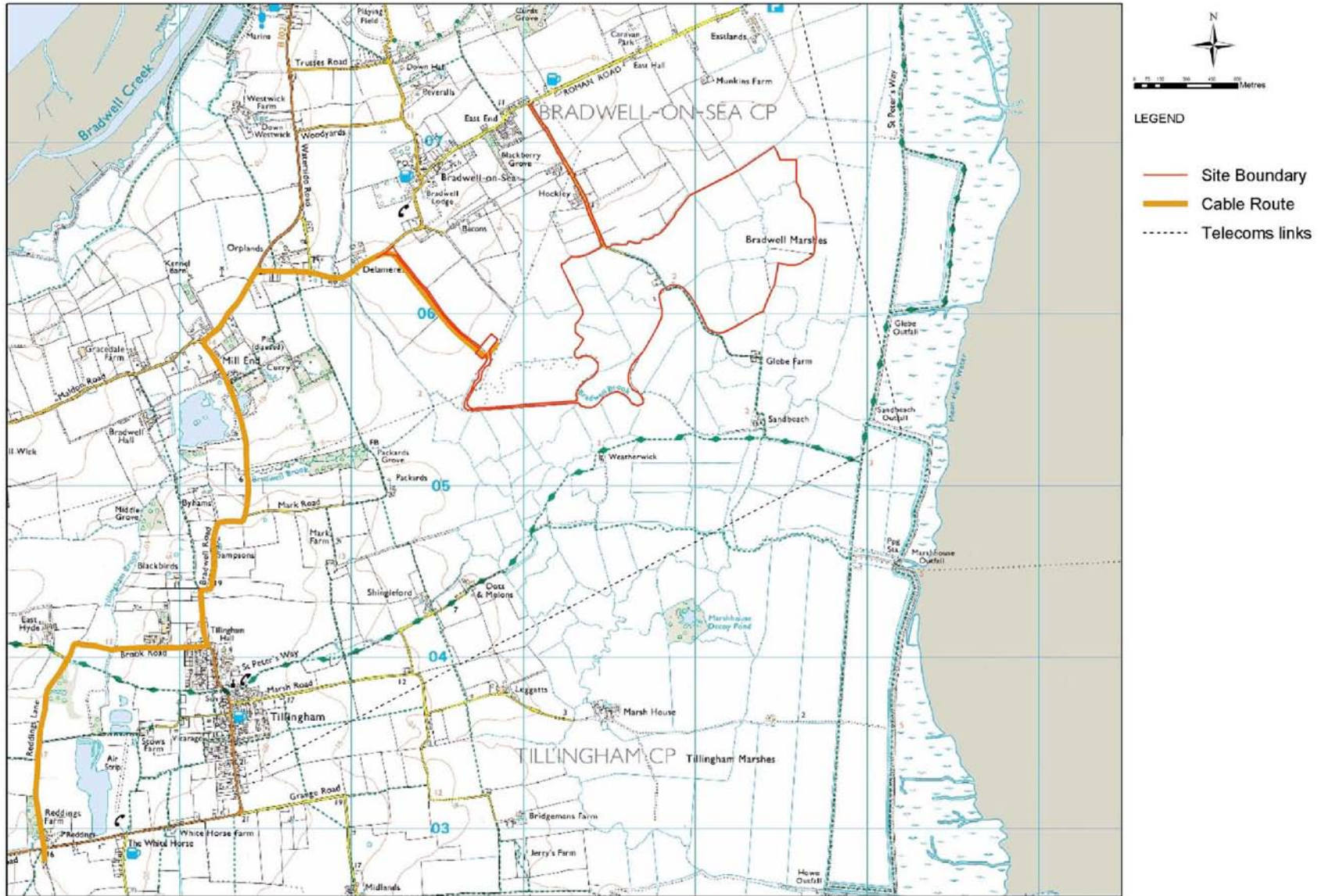
Site selection

A range of technical, environmental and economic factors need to be considered when investigating opportunities for wind farm development in the UK. These factors include wind speed, proximity of dwellings, landscape constraints, nature conservation constraints, electrical connection, access, military and aviation interests, and availability of land. There are currently no wind farms in Maldon District and opportunities for wind farms should be utilised where they are considered acceptable in terms of the above criteria. NR considered that the proposed Bradwell Wind Farm was potentially acceptable when considered alongside the above criteria and on this basis progressed the environmental impact assessment in 2005.

Project details

The proposal is for 10 three bladed turbines with solid tubular towers. The overall height to blade tip will not exceed 121m. Based on 1.5 – 2.5 MW capacity turbines, the wind farm would provide between 38,100 and 49,900 Megawatt hours (MWh) of electricity per year.

The development would comprise 10 turbines, associated access tracks, crane hard-standing



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Figure 1 Site location

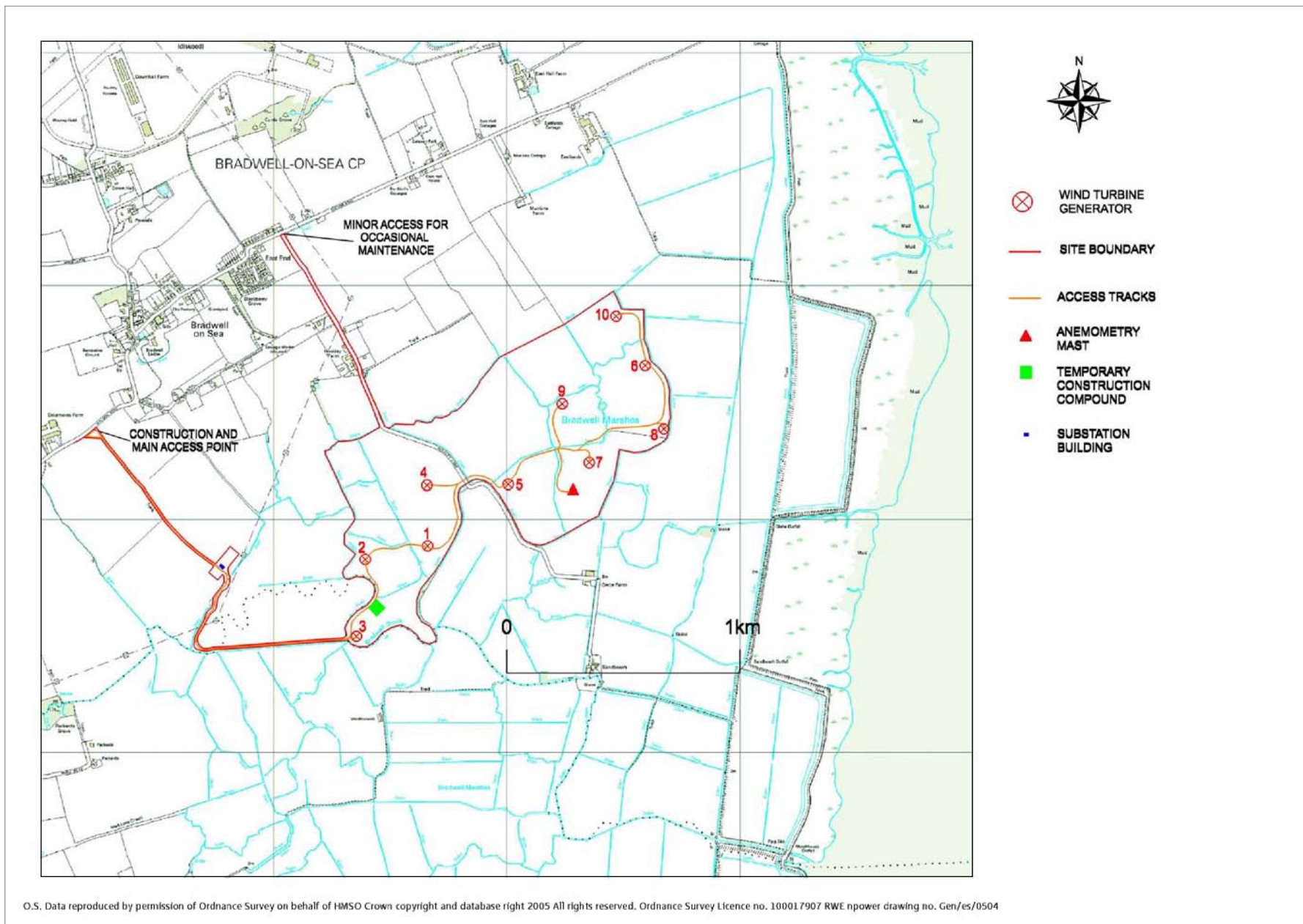


Figure 2 Site layout

areas, electrical transformers anemometer mast, a substation, electrical equipment compound and a temporary construction compound.

The main construction access to the proposed wind farm site would be from the Maldon Road, Bradwell-on-sea. The construction of the wind farm will be completed in approximately 13 months. The wind farm would be connected into the electricity network either via the overhead power lines on the site or an underground cable to Tillingham.

Need for and benefits of the development

Climate change is now recognised as one of the most difficult challenges facing global society over the coming decades. The effects of Climate Change are largely unpredictable, however there are likely to be more extreme weather conditions and the Environment Agency predict that sea levels are likely to rise on the Essex coast by between 22 and 82cm by 2080¹.

Wind energy is a means of generating electricity that does not produce harmful emissions or toxic waste products and is inherently sustainable.

The electricity produced from the wind farm would be equivalent to the average annual domestic electricity requirements of between 8,100 and 10,600 homes. Each turbine is likely to generate enough electricity for the annual domestic electricity requirements of between 810 and 1060 homes² and therefore two to three turbines would provide enough electricity for Bradwell and Tillingham together (assuming 877 households in Bradwell and 1015 in Tillingham).

The electricity generation would offset the production of between 32,800 and 42,800 tonnes of carbon dioxide per year³ which would otherwise be produced by coal fired generation. There are

also significant potential benefits related to the offsetting of the production of acidic gases. This offset will make an important contribution to the government's target of cutting carbon dioxide emissions by 20% from 1990 levels, by 2010. In estimating the potential annual offset of carbon dioxide it is recognised that over the life of Bradwell Wind Farm these values may change due to, for example, variation in the generating plant mix over the life-time of the wind farm.

Alongside the reduction in carbon dioxide emissions, there will also be an offset in the production of sulphur dioxide and oxides of nitrogen as these are further by-products of the combustion of fossil fuel for electricity generation.

The proposed wind farm at Bradwell-on-Sea could contribute towards the District's own objectives with regard to the provision of renewable energy in a district where there is currently no generation of electricity from wind.

Policy context

Climate change is predicted to have a wide range of impacts both globally and in the UK. In its third Assessment Report on Climate Change⁴, the International Panel on Climate Change (IPCC) outlines the likely impacts of climate change on birds, humans and ecosystems. It highlights how climate change could lead to:

- the loss of wetlands and associated bird life
- the increase in the occurrence of infectious diseases and thermal stress
- the increase in disease vectors and pests

¹ Environment Agency Website – Anglian Region

² This figure was calculated using the following: An average home utilises 4700 kWh per year (Ref: The Digest of UK Energy Statistics 2005 gives 2004 domestic electricity consumption as 117.589 terawatt-hours (TWh) which, when taken with the 25.2 million households (based on Welsh homes = 1.213 million, (<http://www.wales.gov.uk/keypubstatisticsforwales/content/publication/housing/2005/sb2-2005/sb2-2005.htm>); England = 21.109 million, (<http://www.bournemouth.gov.uk/Library/PDF/Living/Planning/Research/Mid%20year%20household%20estimates%202000%20to%202003.pdf>); Scotland = 2.217 million (<http://www.scotland.gov.uk/Resource/Doc/933/0004175.xls>); Northern Ireland = 652,000 (<http://www.detini.gov.uk/cgi-bin/downdoc?id=922>) gives an average electricity usage of 4,666 kWh per year per

household). The energy predicted to be generated by the proposal is derived from monitoring wind speeds in the area and correlating this data to wind speeds measured at Met. Office stations. This enables a calculation to be made to estimate the average annual energy production for the site based on 10 turbines each of rated capacity of between 1.5 and 2.5MW. The energy capture and equivalent homes figure relating to this project may change as more information is gathered.

³ National Grid Transco's Seven Year Statement 2004 supported the theory that an appropriate carbon dioxide emissions factor for electricity generated by wind power is in the region of 860g CO₂ / kWh (based on coal fired plant).

⁴ IPCC (2001). *Climate Change 2001: Impacts Adaptation and Vulnerability*.

- the loss of various species (as habitats are lost); and
- the migration of other species.

A recent scientific paper entitled 'Extinction Risk from Climate Change' examined the effect of climate change upon biodiversity. It estimated that up to 37% of all species of wildlife in the regions it studied could be faced with extinction due to climate change that is likely to occur between now and 2050⁵.

The objective of this proposal is the generation of electricity from a renewable source, in line with the Government target of supplying 15% of UK electricity from renewable sources by 2015 and the regional target of supplying 10% of electricity from on-shore renewable sources by 2010. Onshore wind power has been identified as a key element to meeting this renewable energy target (House of Lords Science and Technology Committee – 2004). The mechanism for achieving the targets for generation is the Renewables Obligation 2002.

National Planning Policy is set out in Planning Policy Statements PPS7 and PPS22. PPS7 – Sustainable Development in Rural Areas contains advice on development in the countryside generally, while PPS22 – Renewable Energy sets out the Government's objectives with regard to renewable energy and more detailed advice such as issues surrounding the siting of renewable energy developments in relation to the landscape. The Statement also accepts that most of the developments will be proposed in the countryside.

The Essex Structure Plan was adopted in 2001 and predates the adoption of the regional renewable energy target figures for the East of England, to which Essex will be expected to contribute, and before it was appreciated that Essex might be expected to provide a significant installed capacity of onshore renewable energy by 2010. Planning permissions for wind farms need to be in place by the start of 2008 to give a realistic chance of meeting the 2010 targets. There are currently no onshore wind farms consented in Essex.

The Structure Plan renewable energy policy supports developments provided there is no materially adverse impact on a number of criteria, which include local amenity, highways networks and microwave links and a range of landscape, conservation and heritage interests. In summary Structure Plan policies cover the following topics:

- protecting the natural and built environment
- protection of the Countryside for its own sake unless the use is appropriate to such an area
- landscape conservation
- landscape character assessments
- protection of historic landscape features
- protection of nature conservation sites
- protection of highest grades of agricultural land
- coastal protection
- historic settlements
- conservation areas including effects on their setting
- listed buildings
- protection of archaeological sites.

The Maldon Local Plan was adopted in November 2005, replacing the 1996 version of the plan. The latter did not include any policies on renewable energy. The adopted plan policy and supporting text suggests that support for the Government's commitments to reducing greenhouse gas emissions has to be tempered by the importance of the coastline in visual and nature conservation terms.

As with the structure plan there are numerous other policies which deal with specific topics which will be taken into account and these are as follows:

- protection of the countryside for its own sake
- protection of designated nature conservation sites
- development affecting local nature conservation sites
- protection of wildlife on development sites
- protection of landscape and criteria
- special landscape areas
- protection of historic landscape features

⁵ C.D.Thomas et al. (2004). *Extinction Risk from Climate Change*. *Nature*, Volume 427

- development in the Coastal Zone
- protection of the best and most versatile agricultural land
- effects of development on neighbours
- protection of conservation areas
- protection of archaeological sites
- transport infrastructure.

Maldon District Council adopted an Energy Strategy for the period 2004 – 2011 and this strategy states that the risks of supply interruptions in the Maldon District are the same as those affecting the UK as a whole and that the risk can be mitigated by development of locally sourced, small scale energy supplies and by reducing demand through energy efficiency. The strategy includes an action plan which, in recognition that there has been no major endeavour to promote renewable energy, recommends that the Council identifies the sources of renewable energy within the District and benefits from them.

This proposal makes effective use of the wind resource to provide a major additional source of renewable energy with minimal impact on issues of acknowledged planning importance. Based on the planning assessment that has been undertaken for the proposed wind farm, it is concluded that this proposal is one that does not conflict with the aims and objectives of either adopted or emerging development plans, and is consistent with the national planning and energy advice on making the best use of renewable energy resources wherever they are economically attractive and environmentally acceptable.

Hydrology

The proposed site is artificially drained and water levels on the site are managed by a network of drains that drain ultimately to the Dengie Flats via level-controlled pumping through the sea wall at Marsh House. The assessment has demonstrated that the residual impacts of the development on hydrology will be minimal and hydrological impacts are generally not considered to be significant.

During construction there may be some short term and localised water quality effects of minor significance due to the water table level and the turbine excavations. Mitigation of these minor short-term effects has been achieved partly by the identification of sensitive features, which were used to inform the wind turbine and access track layout. Watercourse crossings have also been kept to a minimum.

The construction activities and any routine operational activities will also be undertaken with full regard to current best practice and Environment Agency guidance. This will reduce the likelihood of abnormal or accidental occurrences, as well as ensure that there are response measures in place throughout the project.

The site is protected by coastal defences against a 1 in 200-year event, including allowance for sea level rise as a result of climate change. However, there is still a residual flood risk from the potential breaching or overtopping of the coastal defences. A breach analysis resulted in a worst case flood level at the site of 2.89m AOD. The proposed project has been designed and would be built so that a flood would not significantly affect the operation of the wind farm.

Ornithology

National Planning Policy is set out in PPS9 Nature Conservation and also in the PPS22 on Renewable Energy. PPS9 states that the Government's objective for planning is to promote sustainable development by ensuring that biological diversity is conserved as an integral part of social, environmental and economic development. Some identified sites and species receive statutory protection under a range of legislative provisions. The Conservation (Natural Habitats &c.) Regulations 1994 provide statutory protection for Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) and certain plant and animal species are protected under the Wildlife and Countryside Act 1981. European plant and animal species are protected under The Conservation (Natural Habitats &c.) Regulations 1994. Some other animals are protected under their own legislation.

Ornithological surveys of the proposed Bradwell wind farm Development Site and its surrounds were carried out during October 2002 – September 2005. The Study Areas were 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 bird surveys, wintering bird surveys and vantage point observations to quantify bird flight activity.

Bird populations within the zone of potential effect of the wind farm were generally low, as the wind farm was designed to avoid the more important populations and/or protected areas. They did however still include several species of conservation importance. The breeding bird community included a range of wetland and farmland species, including two species listed on Schedule 1 of the Wildlife and Countryside Act (barn owl and quail) and 7 UK Biodiversity Action Plan (BAP) priority species. The timing of construction will ensure that these species are not disturbed.

The wetland breeding bird assemblage was determined to be nationally important and the saltmarsh breeding bird assemblage regionally important within the Breeding Bird Study Area as a whole; those within the buffer zone area of the wind farm were locally important. These bird assemblages are located primarily along the coastal strip and not on the proposed wind farm site itself. The main wintering bird interest was also mainly associated with the coastal strip, and included a range of internationally and nationally important waterfowl populations including several species that form part of the qualifying interest for the Dengie and other Essex Estuaries SPAs. The 600m buffer zone around the proposed wind farm held some of these species but generally in only very small numbers. This included regular use by small flocks of golden plover, curlew and lapwing and the zone was occasionally used by foraging hen harriers, but generally its wintering bird interest was much lower than the coastal strip.

No significant effects are predicted on any of the development site's ornithological features. Notwithstanding this, habitat enhancements would be implemented to ensure that the proposed scheme delivers a net gain to the local bird populations. This would include measures such as the planting of grassland strips alongside access tracks.

As a result of the inherent design mitigation, avoiding the more important areas of ecological interest, and of the mitigation measures discussed within the chapter, there would be no significant residual effects of the proposed wind farm on any ornithological interest features, during any phase of the development.

Non avian ecology

A number of ecological studies have been carried out to determine how the non-avian ecology may be affected by the proposed development. These included surveys of habitats and flora, including badgers, water voles, bats, and great crested newts.

The main findings of the baseline survey work were:

- the wind farm site is not designated in any way for its nature conservation interest
- beyond the wind farm, the saltmarsh, inter-tidal and other coastal habitats to the east are subject to international, European and national statutory nature conservation designations, including Special Protection Area, Special Area of Conservation, Ramsar site and Site of Special Scientific Interest
- sandbeach Meadows Site of Special Scientific Interest adjoins the wind farm site in the south-east
- most of the wind farm site is covered by arable farmland. Botanical interest is restricted to field margins due to intensive farming on site. Ditches, copses and hedgerows on-site are of local importance
- no protected plant species were recorded within the wind farm site
- the study area supports a good population of badgers within the wind farm site and surrounding area
- water vole populations were identified within five ditches within the wind farm site and within two ditches adjoining the site. The majority of ditches are dry and provide an unsuitable habitat for water voles
- three non-migratory bat species were identified foraging along field boundaries, predominantly in the western part of the site. There are no bat roosts present within the wind farm site
- no evidence of great crested newt was found within the proposed wind farm site, or in either of the two ponds to the north of its boundary.

The construction of the wind turbine bases and access tracks will involve loss of habitat that is almost entirely arable farmland, with no particular conservation value. There will be minimal loss of ditch habitat. New ditch crossings have been minimised and existing ones incorporated into the site design. No ditches showing evidence of water vole occupation will be affected by crossing points. In addition, an environmental management plan will be implemented to provide a mechanism to ensure that the risk of pollution and other accidental damage during construction is minimised.

To ensure compliance with the Badgers Act (1991) and English Nature guidance, turbine foundations and access tracks have been designed to avoid badger setts. No setts are located within 80 metres of tracks or turbine bases. Any loss of foraging habitat of badgers or other species will be offset by the creation of new grassland habitat between the access tracks and field boundaries.

During the operational phase of the wind farm there are potential impacts to badgers and brown hare through disturbance; and to bats through collision with turbines. The design and layout of the wind farm have been carefully planned in order to avoid or minimise these impacts, with for example turbines set back from important bat foraging areas. The residual impacts are therefore predicted to be low or very low, and therefore not significant.

Overall no significant impacts on the site's non-avian ecological interests are predicted. In addition the wind farm will offer the opportunity for a positive impact through the creation of new grassland and enhancements to the ditch network.

Landscape

The landscape assessment concludes that the local landscape would be strongly influenced by the proposed wind farm, however it would not be transformed by it. The broader underlying character of the local landscape, whether in terms of the Coastal Landscapes or London Clay Landscapes as a whole, would not be compromised. It is considered that the landscape at the broader scale is sufficiently robust to be able to accommodate the proposed wind farm without significant adverse effect when judged at the scale of the Essex County landscape types.

In visual terms, the magnitude of effects is likely to be high locally for high sensitivity viewers dropping to medium at or around a distance of approximately 4 km to 6 km of the turbines.

That part of the contemporary landscape within which the wind farm's significant effects would be felt is not nationally valued in terms of designations. At the same time, it is not highly valued at the regional or county level. It is at the local, i.e. community and district level that the landscape is more highly valued by individuals and communities. Accordingly, whether judged positively or negatively, the proposal would give rise to significant effects in a landscape assumed to be valued highly at the

community and district levels but not so at the county, regional, or national levels. It is important to note that visual and landscape effects adjudged in this assessment to be 'significant' would not extend over any part of any nationally valued landscape (the nearest being the Dedham Vale and the Suffolk Coast and Heaths Areas of Outstanding Natural Beauty some 26 km distant).

The proposal would result in an alteration to the environment whose attributes could quickly be substantially recovered through rapid decommissioning and site restoration. Judgements concerning significant effects must be tempered in that light. Whilst influential for their lifetime or for any period that they may be in operation, visual and landscape effects arising from the proposed wind farm, whether regarded as adverse or positive, can be reversed. The landscape would not be destroyed. Rather, the receiving environment would fulfil the role of a landscape 'on loan' whose long-term environmental capital would be conserved.

It is this assessment's conclusion that the proposed development would be a positive, long-term, reversible addition to the local scene. As such, the proposed wind farm development is assessed as sustainable from a landscape resource and long-term visual amenity perspective.

Furthermore, the landscape and visual assessment cannot ignore the substantial potential contribution of up to 25 MW installed electrical capacity and the role that this may play in moving towards greater environmental sustainability and moves to reduce the effects of global warming upon which much within the landscape depends.

Noise

The noise chapter of the ES presents an assessment of the impact of both construction and operational noise from the proposed Bradwell Wind Farm on the residents of nearby dwellings.

A number of residential properties lying around the wind farm have been selected as being representative of the closest located properties to the wind farm. The minimum separation distance between the nearest turbine and the closest located residential property is approximately 600 m. Noise impact assessments have been undertaken at these properties by comparing predicted construction and wind farm operational noise levels with the existing background and ambient noise

levels at those properties, as derived from measurements made over approximately 2 separate four week periods at each location.

Construction noise impact has been assessed using the relevant methodology contained in British Standard BS5228:1997, 'Noise and Vibration Control on Construction and Open Sites'.

Calculations of construction noise levels have been undertaken using construction activity across the 13-month construction programme. The major elements of the work comprise the upgrading and development of site access tracks, the construction of the turbines and the construction of the sub-station. The noise associated with both on-site and off-site construction traffic has also been accounted for.

It has been shown that, whilst construction noise may be audible at some properties when construction work is taking place closest to those properties, the noise levels are well within levels considered to be quite acceptable for temporary construction activities.

Operational noise from the wind farm has been assessed in accordance with the methodology set out in the 1996 DTI Report ETSU R 97, 'The Assessment and Rating of Noise from Wind farms'. This document provides a robust basis for assessing the operational noise impact of a wind farm as recommended by PPS22 on Renewable Energy.

To undertake the assessment of noise impact in accordance with the foregoing methodology, the following steps have been undertaken:

- measure the existing background noise levels at the nearest neighbours as a function of site wind speed
- determine the quiet day time and night-time criterion curves from the measured background noise levels at the nearest neighbours
- specify the type and noise emission (the sound power actually emitted by the turbines) characteristics of the wind turbines
- specify the number and locations of the wind turbines
- identify the locations of the nearest, or most noise sensitive, neighbours

- calculate the noise immission levels (the noise levels resulting at a particular location some distance away from the source of noise) due to the operation of the wind turbines as a function of site wind speed at the nearest neighbours
- compare the calculated wind farm noise immission levels with the derived criterion curves.

The above steps have been applied to the Bradwell Wind Farm, with the noise impact assessment being undertaken at the eight agreed residential neighbours to the wind farm where background noise measurements have also been undertaken. In addition to this, noise impact assessments have also been undertaken at a further four locations comprising residential properties lying in the vicinity of the background noise monitoring locations.

Applying the ETSU R 97 derived noise limits at the assessment locations, it has been demonstrated that both the quiet day time and night-time noise criterion limits can be satisfied at all properties across all wind speeds. This assessment has been based on the use of manufacturers warranted sound power data for both a 2 MW and a 2.5 MW wind turbine, which are typical of the type and size of turbine which may be considered for this site.

Cultural heritage

The impact of the proposed wind farm on the cultural heritage in the local area has been assessed. The proposal is 1.4km from the Grade 1 listed chape of St Peter on the Wall. The proposal will have an impact on the wider setting of the chapel, however due to the location and the arrangement of the wind turbines this impact although moderate within limited views away from the chapel, is minor in relation to most views. The key views of the chapel are within the context of the coastline to the east away from the turbines.

There would be no significant effects arising with respect to Conservation Areas and no Listed Buildings would be directly affected whether in terms of the fabric of the building or their curtilage. In relation to listed building settings changes arising within a part of the wider setting of relevant buildings are not judged unacceptable.

There are four known or suspected Iron Age or Roman salterns of local importance within the site. None of which coincide with any of the turbines or access tracks. The wind farm components have



PHOTOGRAPH



PHOTOMONTAGE

PHOTOMONTAGE

Location: Bradwell (North-East)
OS Reference: 601251 207325
Eye level: 12.7m AOD

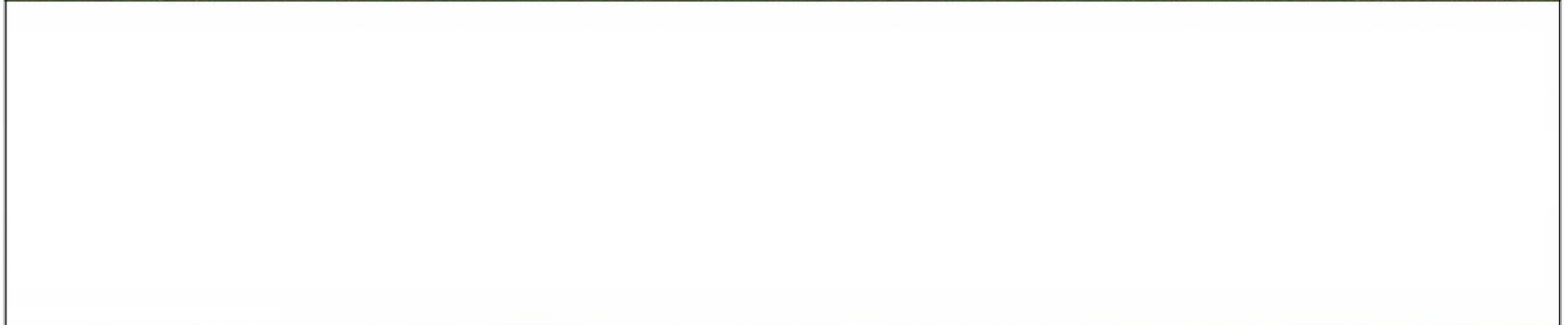


Visualisation 2

Approximate distance to nearest turbine: 1.3 km
Arc of view: 76 degrees



PHOTOGRAPH



PHOTOMONTAGE



BRADWELL WIND FARM

PHOTOMONTAGE

Location: Tillingham
 OS Reference: 599525 203135
 Eye level: 22.4m AOD



Visualisation 3

Approximate distance to nearest turbine: 1.6 km
 Arc of view: 76 degrees



been sited to avoid these features. There are no impacts upon any archaeological remains located within the boundaries of the site.

It is possible that there could be further, as yet unrecorded salterns or related features within the site. If this were to be the case, which is considered unlikely, they would only be located should a turbine location coincide. The impact upon such remains is considered unlikely to be more than of a minor impact and the wind farm proposals will have no impacts upon any other archaeological remains within or in the vicinity of the site.

Transport

The main transportation impacts would be associated with the movements of commercial Heavy Goods Vehicles (HGVs) to and from the site during the construction phase of the development.

Traffic flow data was obtained from Essex County Council for the B1021, B1018, B1010 and A414 near Bradwell-on-Sea. The data then had a growth factor applied to adjust it to the expected values in the year of assessment, 2008. Estimates of traffic generations associated with the construction phase of the project have been derived from first-principles. The maximum traffic impact associated with the construction of the wind farm is predicted to occur in the sixth month of the construction programme. During this month, an average of 38 two-way trips (i.e. 19 vehicles into the site and 19 out) are predicted to be generated on each working day.

The impact of construction-related traffic has been calculated, in percentage terms, relative to the background traffic in the year of assessment (2008). The percentage impact exercise shows that the maximum impact is 18%.

Any disturbance caused by construction traffic could be further limited through the implementation of a Traffic Management Plan, and the delay to other road users is likely to be minimal. The impacts associated with the required off-site highway works are considered to be negligible.

The total levels of traffic generation associated with each aspect of the project construction are shown in the table right:

Traffic generation for construction of the proposed wind farm

Activity	Total Loads	Total Trips (Two-way)
Delivery of Road Stone for Construction Compound	96	192
Delivery and Removal of Plant and Equipment	120	240
Delivery of Road Stone for Access Tracks	1,025	2,050
Delivery of Road Stone for Areas of Crane Operation	383	766
Delivery of Culvert Materials	10	20
Delivery of Geogrid Material	32	64
Delivery of Concrete for Sub-station and Site Entrance	65	130
Delivery of Sub-station equipment	10	20
Delivery of Cabling	4	8
Delivery of Sand	108	216
Delivery of Concrete for Turbine Bases	725	1,450
Delivery of Formwork and Reinforcing Steel	24	48
Removal of Pile Arisings	399	798
Delivery and Removal of Mobile Crane	20	40
Delivery of Turbines	60	120
Delivery of Base Rings	4	8
Delivery of Blade Hubs	4	8
Total	3,089	6,178

Source: Entec UK Ltd

Daily inspections would take place to ensure debris on the carriageway is not a significant problem.

Shadow flicker

Tall structures such as wind turbines cast shadows, which vary in length according to the sun's altitude, and position. Rotating turbine blades cast moving shadows, which could under certain conditions cause flickering at nearby properties. Two properties in the vicinity of the proposed wind farm are predicted to experience weak shadow flicker effects for short periods in mid-winter. The calculated duration of any shadow flicker event is sufficiently short to have only a temporary effect.

It is unlikely that there will be any significant nuisance impacts as a result of shadow flicker. However, if nuisance from shadow flicker occurs, available mitigation measures are available such as tree planting. In exceptional circumstances the technology exists to inhibit turbine operation during nuisance periods. Such remedies could be assured by a suitably worded planning condition.

Socio – economic effects

One of the principal aims of all planning policy is to promote sustainable forms of development, which will contribute to the local economy without adversely affecting the quality of life now or the ability of future generations to enjoy that same quality of life. Planning policy at the national level seeks to encourage diversification in the rural economy.

The proposed wind farm is likely to have socio–economic impacts both on the locality of the development and more widely across the East of England.

On a regional scale, the East of England Development Agency funded organisation “Renewables East” currently estimate that the number of full-time employees in the East of England renewable energy sector is between 600-800 people (Renewables East website at www.renewableseast.org.uk). Renewable energy developments such as the Bradwell Wind Farm would help sustain and develop this sector.

The wind farm at Bradwell could potentially generate a number of economic and social impacts. Given the nature and scale of the project, the key economic impact that can be measured is the creation and support of employment. Employment will be supported in a number of ways.

During the construction of the proposed Bradwell Wind Farm, the project will provide short term employment. It is estimated that 30 full time workers will be required for the duration of the building period (estimated at 13 months) although the exact number may fluctuate. In addition local businesses are often best placed to secure contracts for elements of the construction.

The proposed project will also result in opportunities for indirect job creation and support within the local economy e.g. through employment supported by the wages and salaries of workers employed both directly by the wind farm and indirectly by its suppliers.

With regard to tourism, the majority of visitors to the East of England region are based in the United

Kingdom and therefore it would be reasonable to expect that relevant surveys completed in the UK would be representative of the views of a high proportion of tourists visiting the region.

The RSPB commissioned surveys in 2001 regarding the public views on different forms of power generation and found that only 3% of respondents were opposed to building onshore wind farms in Britain. Whilst the figure rose to 14% opposition if the wind farm were to be sited within 3 miles of their own home, the original figure suggests that tourism in general should not be affected by the construction of a wind farm in the locality.

A recent Scottish MORI study showed 91% of those questioned would not be put off revisiting an area if wind farms were present and that 80% would be interested in visiting a wind farm if it was accessible to the public.

It is expected that the wind farm will not generally attract significant visitors from outside the Dengie. However it will be a feature of interest on the Dengie for a number of visitors.

Electromagnetic interference and aviation

Electromagnetic waves are used in a variety of communications and any large structure has the potential to interfere with their propagation and eventual reception. The magnitude of the interference effect is generally dependent upon the size of the structure and its construction material. Wind turbines are slender and the rotor blades are primarily constructed from non-conductive materials, reducing the potential for interference, although the tower is usually steel and rotor blades contain some conductive materials for lightning conduction. The movement of the turbine also may cause any effects to vary with the rotation of the blades or the yaw of the turbine. The potential interference effects of wind turbines are however highly location dependent and the relocation of turbines by just a few metres can in some instances resolve problems.

Two radio links were identified by BT in the area and a 100m clearance is required from the Blade Tip to the path identified. The changes to the scale of the wind farm have resulted in the removal of turbines close to the BT radio link from Dengie Marshes to Tillingham. The wind farm proposal has been designed so as to ensure that the blade tip from the closest turbines to the BT radio link between Dengie Marshes to West Mersea is 100m away.

There should therefore be no interference to these links caused by the wind farm.

Safeguarded airports are usually consulted on any development proposals within a radius of 30km. The proposed wind farm is within the consultation zone of Southend Airport which is the only safeguarded airport within 30km of the wind farm proposal.

Whilst Bradwell Wind Farm would lie approximately 22km from Southend Airport, there is a need to ensure that safe operation of the airport will not be affected by the presence of the wind farm. It is expected that returns from Bradwell Wind Farm would appear upon the primary radar screen some or all of the time. This is based upon the experience of other UK airports within close proximity of operating wind farms. The wind farm is considered unlikely to have a detrimental effect because of this, however if concern remains over the effect on the radar, measures are likely to be available to mitigate this.

The changes to the scale of the proposal have resulted in a significant change in the nature of impacts in all areas. The level of clutter that has the potential to appear on the radar screen has been significantly reduced due to the deletion of 16 turbines from the original proposal and in particular deletion of turbines to the south of the site, closest to the runway centre-line.

Grid connection

From the on-site substation two options are available for connecting to the electricity network. Option 1 is the preferred route and Option 2 will only be used in the eventuality that Option 1 becomes unavailable or impracticable.

The options are as follows:

- **Option 1 33kV Underground Cables to Tillingham Substation**

An underground cable will be laid towards the Maldon Road and run along this road and the minor roads of Bradwell Road, Brook Road and Reddings Lane to Tillingham substation.

- **Option 2 Connection to the Existing Overhead 132kV Line at Bradwell Wind Farm**

The electricity will be connected directly into the overhead 132 kV power lines running through the site.

The table below illustrates the key features of the two possible options:

Option 1 33kV Underground Cables to Tillingham Substation	Option 2 Connection to the Existing Overhead Line at Bradwell Wind Farm Site
<p>No additional external compound is required.</p> <p>A control room building will be required measuring approximately 10 x 15m.</p>	<p>An outdoor electrical equipment compound is required in addition to the control room building for Option 1. The total size of the compound is approximately 50 x 70m.</p>
<p>This option requires the installation of underground power cables outside the main wind farm site. These will run along the road to Tillingham.</p>	<p>This option does not involve installation of power cables outside the main wind farm site.</p>

Conclusions

A full environmental impact assessment of potential significant effects has been carried out for the proposed Bradwell Wind Farm. It is concluded that significant effects are likely to arise as a result of the proposal. The proposal would however provide environmental benefits through the production of electricity from a renewable source in accordance with Government, Regional and local objectives. It is therefore considered that the proposed Bradwell Wind Farm, if built, would be beneficial to both the local and wider area.



PHOTOGRAPH



PHOTOMONTAGE

npower
renewables

BRADWELL WIND FARM

PHOTOMONTAGE

Location: South East of Tollesbury
 OS Reference: 596689 209810
 Eye level: 10.9m AOD



Visualisation 8

Approximate distance to nearest turbine: 6.2 km
 Arc of view: 76 degrees