

**Scroby Sands Offshore Wind Farm
Environmental Statement
January 2001**

**Non Technical Summary
Volume I**



ASBUT GROUP PLC



POWERGEN

SECTION 1

NON TECHNICAL SUMMARY

1. SUMMARY

1.1 Introduction

PowerGen Renewables Developments Ltd in conjunction with Vestas Wind Systems A/S (the Scroby partners) propose to erect 38 offshore wind turbines (equating to 76 MW) on the Middle Scroby Sands, off the coast of Great Yarmouth, Norfolk, for the purpose of generating electricity from wind energy.

PowerGen Renewables Ltd has considerable experience of wind energy development and operation and:

- has investments in 13 onshore windfarms
- is a major shareholder in Blyth offshore wind farm
- is working to a construction programme in 2001 which will deliver another 3 onshore wind farms
- is involved in a number of wind energy developments (both on and offshore) throughout the UK and Ireland.

Vestas Wind Systems A/S is one of the world's largest manufacturers of wind turbines with more than twenty years of experience in the industry. *(For more detailed information about the developers, please see Section IV).* The environmental assessment process for a wind farm on the Scroby Sands has been co-ordinated by Econet Ltd, a wind energy consultancy, in conjunction with the Scroby partners. This process has culminated in the production of this Environmental Statement (ES) which details the predicted environmental effects of the Scroby Sands wind farm and mitigating measures which could be implemented to offset any possible adverse effects during the life phases of the project.

1.2 The Environmental Statement

Consent for the wind farm will be required from various regulatory authorities and the ES forms an important part of the consultation process which will take place

The primary environmental license required to enable the Scroby Sands development is the Section 5 Food and Environment Protection Act 1985 (also known as FEPA) consent. The ES will be one the bases upon which the Ministry for Agriculture Fisheries and Food assess the scheme.

The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000 came into effect on 1 September 2000. Under Section 36 Electricity Act, these regulations must be satisfied before the Secretary of State can grant a consent and one of the requirements is the production of a comprehensive ES. This document will therefore also support the Section 36 application. This section of the ES forms the Non Technical Summary and contains the following:

- an outline of the proposed development;
- a discussion of the aims of the ES;
- a brief description of the existing environment;
- a summary of the effects and proposed mitigation measures;

1.3 The Proposed Development

The development site is located on a sand bank known as the Middle Scroby Sands which lies approximately 2.5km east from the Great Yarmouth Borough coastline, in the county of Norfolk. The Scroby Sands have been identified as being suitable for an offshore wind energy development, and in particular the Middle Scroby Sands. The proposed turbine development would cover an area of approximately 6.47km² (1.61km x 4.02km).

To the north of the proposed development area lie the North Scroby Sands and, to the east, the Barley Pice. To the south of the site lie the South Scroby Sands which contain the Little Tern feeding area and the seal haul out area. To the west of the site is the Yarmouth Road (the main sea channel), the North Denes SSSI/SPA (under consultation to be designated a European Marine Site), the Breydon Water SSSI/SPA and the Great Yarmouth Urban/Recreational and industrial coastline.

The development of the wind farm was accepted by the European Commission, Directorate General for Energy as eligible for the THERMIE programme and therefore for the award of grant moneys in 1997. The Scroby Sands wind farm would have a plated generating capacity of 76MW and would therefore be capable of providing sufficient electricity to meet the demands of approximately 52,400 households. The turbines which would be utilised are manufactured by Vestas, have a plated capacity of 2 MW, a 52 metre tower and a three bladed rotor with a diameter of 80 metres.

The machines would be linked to each other and the shoreline via interconnecting 33 kV cables. The export cables would reach the shore and be trenched from a point adjacent to the Great Yarmouth Britannia Pier in a southerly direction to a point adjacent to the Pleasure Beach. From this location it is proposed that the export cables be thrust bored under the sea wall defences and placed under the road to a connection point within the existing 33 kV sub-station located on the Admiralty Road.

The offshore site construction works would be phased to enable the shoreline cable works to commence in the winter period preceding construction. The summer weather window (from April to September) would be utilised for the construction of the turbine foundation sections, the erection of the turbines and the completion of the commissioning of the proposed wind farm.

1.4 Existing Site Conditions

The geology of the proposed development area of the Middle Scroby Sands may be characterised as fine to very fine sandy deposits on an underlying formation of hard Cragg, formed prior to the last ice age. The Scroby Sands have been subject to tidal/current/wave forces, which have altered the height and position profiles over time.

The area of sea to the west of the proposed development site is currently utilised for fishing interests, sewerage discharge, spoil deposit grounds for the port dredging and as a navigation channel (Yarmouth Road) for commercial and pleasure vessels accessing the Port of Great Yarmouth.

The beach area to the west of the proposed Middle Scroby Sands development is recreational in nature with some important nature interests, namely the nesting area of the Little Terns covered by the SSSI/SPA North Denes sand dune complex. The nearby coastline may be characterised as being recreational in nature i.e. the Pleasurebeach, Seaworld, Amusement Arcades, hotels and caravan park settlements. To the west of the site, approximately 1km inland, is the North Denes heliport, utilised to meet the service demands of the Southern/Central North Sea Gas & Oil interests.

To the south of the proposed development area lie the South Scroby Sands, which contain areas of sand exposed during low tide periods. These exposed sand bank features are utilised as haul out areas for the seal population. Within this area is also to be found the Little Tern feeding area for the Scroby Sands.

To the east of the proposed development area lies an area of sea known as the Barley Pickle; the Barley Pickle is situated between the Scroby Sands and the Middle Cross.

To the north of the North Scroby Sands is a feature known as the Cackle Shoal, an area of sandy/gravel sea deposits which is dynamic in nature and lies at the mouth of the Yarmouth Road navigation channel.

Whilst other potential interactions have been assessed, and reported, in the ES, the areas of most importance may be summarised as follows:

- Climate & Air Quality
- Archaeology
- Noise
- Tourism
- Seals
- Birds – including Little Terns
- Traffic
- Site Benthos
- Fisheries
- Sandbank Movement and Wave Actions
- Visuals

1.5 Summary Of Effects & Mitigation

Each of the areas addressed during this assessment has been evaluated with respect to effects and mitigation in the construction, operational, and decommissioning phases of the proposed development.

Climate & Air Quality

Overall it is judged that there would be no significant impact on the climate and air quality due to the limited requirements for component transport (to be accomplished mainly by sea), and the existing industrial/urban conditions.

Archaeology

The Hydrographic Office has been consulted concerning any historical wrecks or war graves that may be present; and has confirmed that no such interests are registered for the Scroby Sands.

Noise

A predicted base line noise survey was undertaken by Vestas with reference to the operational noise contribution of their V80 – 2MW turbines. In setting the criteria for this assessment, the legislation and standards used included the following:

- Danish Statutory Order On Noise From Wind Turbines
- Planning Policy Guidance No. 22
- Noise Working Group (DTI, ETSU)

None of the operating noise levels will exceed the above standards and therefore no noise impacts are expected from the wind farm. In addition, no significant construction or decommissioning noise is expected.

Tourism

No adverse effects are predicted on tourism within the Great Yarmouth Borough during the construction, operation or decommissioning of the wind farm. During the 20 year operational life of the wind farm, it is anticipated that the wind farm would be an additional attraction and therefore create a positive contribution to the local tourist industry.

Traffic

Due to the low level of HGV traffic associated with the development, it is considered unlikely that any significant congestion or delay would result. Existing HGV concentrations within the Port area are already relatively high and development generated traffic would not significantly increase the HGV flows.

Shipping related traffic would be confined to the existing port facilities and navigation channels. As the associated marine traffic would be concentrated outside of the marked navigation channel, any interaction with the local shipping traffic would be minimal.

It has been concluded that no environmental hazards would occur as a result of impacts from either drifting ships or collisions with stray ships. Only stray ships (ships out of control without orientation) above 100–200 DWT will present a potential danger to the wind turbines. However, the risk of stray ships entering the site area would be reduced significantly the turbine array would be naturally protected by the restrictive water depths to be found across most of the proposed development site area. The wind turbines would act as a highly visible navigation

aid to recreational and shipping marine traffic. The turbines will be painted yellow from Mean Sea Level to 11m in height. They will also be equipped with yellow flashing navigation lights (as per Trinity House regulations).

Aviation

Following consultation with the CAA, MOD and the North Denes Heliport it has been confirmed that there would be no significant effect on civilian or military fixed wing operations.

Seals

The major areas associated with the seal haul out are located approximately 1 km south of the proposed development area. Whilst the area has no specific designation, the interests of the seals have been carefully assessed. It is proposed that offshore construction would commence in the spring with the foundation installation to the south of the site and progress to the north, avoiding proximity to the seal haul out area during any pupping periods that may occur. The actual turbine erection is proposed to take place from the north to the south, thus minimising effects on seals later in the year during moulting (predominantly August).

The combination of this construction strategy, combined with the distance of the site from the seal population, will ensure that any influence of the development on the seals would be temporary in nature, with no discernible effects on the local seal population numbers.

Bird Life

Significant areas for birds are located to the west of the proposed development area. The Great Yarmouth North Denes SSSI/SPA lies some 3 km from the proposed development area and the Breydon Water SSSI/SPA some 5 km. The North Denes area is of particular importance for its breeding colony of Little Terns, and the Breydon Water for supporting over wintering waterfowl – Bewick Swans and Bean Geese. The Breydon Water population of Bewick Swan are of international importance, and the Yare Valley is the most important site in Britain for Bean Geese.

As both populations of Bewick Swan and Bean Geese are located well inland, there is no indication that there will be any effects from the proposed wind farm. Therefore the Bewick Swan and Bean Geese interests appear to be secure with no conflicts identified. The North Denes Little Tern population does frequent the southern shallow water area of the South Scroby Sands an area which is in excess of 1 km from the proposed development.

Due to the nature of the Little Terns low flight pattern across the water and the distance of the site from the feeding area to the south of the development site, it is considered that the risk of affecting the Little Terns would be very low.

Benthos (seabed inhabitants)

A base line Benthic survey was undertaken at the site to identify any communities resident on the proposed development area. The highest concentrations of different species were found well outside the construction area, whereas the proposed construction site contributed the lowest number of individuals /m².

Within the proposed development area and the surrounding area, no nationally rare or Red Data Book species were recorded in the samples taken. With the

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Within the proposed development area and the surrounding area, no nationally rare or Red Data Book species were recorded in the samples taken. With the

incorporation of the mitigating measures proposed, any potential effects there may be on the Benthos would be very localised around the proposed foundation structures, with the said structures probably offering the advantage of increasing the local Benthic diversity.

Each monopile would have a base surface area of approximately 10m² with scour protection material of about 340m². Installation of 38 monopiles on Scroby Sand would result in the loss of about 13,300m² of natural seabed although 97% of this would be areas covered with scour protection material. The scour protection material is likely to have a more diverse fauna. In terms of biomass, the loss would be more than compensated for by the increase in the biomass of the epifauna colonising the monopiles and possibly the scour protection material.

There would be some loss of the natural habitat but no loss of benthic species would be likely in the area as a whole, as a wide area of natural sediment would remain. It is likely that over 50 taxa (species), not currently inhabiting the mobile sands, would colonise the monopiles and scour protection material, which would represent new habitats not previously present in the area.

The net result would be a likely increase in the biomass and biodiversity of the area with a small reduction in the area covered by the natural seabed habitat.

Fisheries

Nearshore fishing activities in the vicinity of the Yarmouth Road are presently affected by shipping movements within the channel and it is not anticipated that the construction, operational or decommissioning traffic would increase these effects significantly. Close liaison with local fishing activity interests should mitigate any interactions which may arise during the cable lay from the site to the shoreline. Any effects that may arise would be very localised and of a temporary nature. The cable bringing the electricity onshore from the wind farm would be buried to a minimum depth of 2 metres below the sea bed level to minimise the risks of snagging by any fishing gear which may be utilised in the area.

Water Quality

Effects on water quality have been identified within the immediate vicinity of the proposed turbine foundation structures and would be due to the scour effect disturbance on the surrounding sediment i.e. localised movement of sand. It is considered that this should be viewed in the context of the present sewerage outfall pipe which is sited to the west of the proposed development area and the harbour dredging spoil site to the south west of the proposed development area.

Sand Bank Movement and Wave Action

The sand banks are an important element in the present coastal defences of the East Anglian coastal zone. Worst case wave modelling based on a 5 metre square foundation (instead of the predicted 3.5m metre cylindrical being utilised) has indicated that the foundation sections would have the capacity to modify waves in their vicinity, but this should be viewed in the context of the foundation section blocking only around 1% of the area of an incoming wave.

Associated scour effects would be localised to within less than 10 metres of the foundation, but with the proposed mitigation by scour protection, this figure would be further reduced.

The Middle Scroby Sands are the most stable part of the Scroby Sands Bank complex, and it has been concluded (within the study undertaken) that "it is important to stress that development on the offshore banks should not be to the detriment of the bank system as a whole and the shoreline with which it interacts".

Order of magnitude analyses have been made of the effects of Scroby Sands wind farm on the stability of the coast at Great Yarmouth. Analyses have also been made of the effect of the proposed scour protection on the sediment transport on the sands.

Regarding coastal stability, placing a wind farm on the Scroby Sands will increase the flow resistance on the "Sands" which would lead to an accretion of sand, i.e. an increase in height. The increase in height will theoretically be very small (of the order 1 cm) compared to the natural variations of ± 3 metres over the last 150 years.

The increased flow resistance will also lead to a displacement of the sand bank system. The horizontal movements will also theoretically be small (of the order 10 m) compared with the extent of the banks (1.5–2 km wide and 10–12 km long). The magnitude of the natural variations in the horizontal plane cannot be derived from the surveys or from the literature, but is likely to be in the order of magnitude 100m judging from various surveys. This is merely a shift back and forth depending on time of the year and on large storms. These fluctuations take place around an average position since it is a fact that the banks have stayed in position at least during the last 150 years. The contribution from the wind turbines will therefore be small compared with the natural variations.

The order of magnitude calculation indicates that up to 50 wind turbines would have a negligible effect on the overall bar pattern.

The slight increase in height of the Scroby Sands will lead to a smaller wave exposure of the coast at Great Yarmouth. This will reduce the local rate of sediment transport along the coast with the order of magnitude 1% of the total. This is a magnitude which is much smaller than the seasonal variations.

Regarding scour, the installation of up to 50 wind turbine foundations within the Middle Scroby Sands will generate some very localised small-scale group scour effect on the Middle Scroby Sands. This scour will show itself as a number of depressions in between the wind turbines. The depressions will be of limited extent and will not interlock. Therefore, the group scour effect will not contribute to the changes of the general height of Scroby Sands.

The special scour protection of pebbles and quarry run placed in the scour holes which will develop naturally around the foundations will not influence the local sediment transport, because the transport can take place over them. The scour protection material is composed in such a way that it will mix with the sand and create a gradual transition from the natural seabed to the scour protection. In this way edge scour is avoided. The scour protection material is expected to sink 0.3 m into the natural seabed on an average basis. Should the natural variation (± 3 m) lower or raise the general height of Scroby Sands, the proposed scour protection will follow the seabed up or down. During this movement the coarse scour protection material will be spread over a larger area. This process will itself make the seabed more stable in the immediate vicinity of the pile foundation.

Television/Radio/Radar

The siting wind farm development is such that the possibility for interference to existing TV, Radio and Radar services within the general coastline area is negligible.

1.6 Direct Benefits Of the Proposed Development

The development would give rise to a number of benefits including the following:

- The supply of 76 MW of electricity from a renewable energy source.
- Enough electricity to power 52,000 homes
- An estimated annual reduction of approximately 97,000 tonnes of CO₂ production by a coal fired power station (assuming 76 MW turbine total plated capacity and based on energy yield calculations utilising the Vestas V80-2MW machines). CO₂ is the principal greenhouse gas associated with global warming.
- Additional employment and associated revenue within the Borough during the construction, operation and ultimate decommissioning of the proposed wind farm.
- Scroby Sands would be the first utility scale offshore wind farm in the UK and would engender confidence in the technology, thereby enabling future UK developments.
- Additional tourist attraction to those already located in the local Borough.
- Education opportunities with reference to offshore wind energy.
- The proposed development would provide a unique opportunity to evaluate, at an early stage in offshore wind farm development within the UK, sediment movements, scour effects and Benthic interactions over time.
- The foundations offer the possible opportunity of being able to offer greater bio diversity around the foundation structures proposed.
- The turbines would also act as a physical navigational aid for a presently unmarked shipping hazard.

(Section III provides more detail about the Need for and Benefit of the Wind Farm)

1.7 Further Studies Proposed

The Environmental Assessment has identified subject areas where the general knowledge bank could benefit from further offshore monitoring for this and future development activities elsewhere. To ensure that any potential effects are more fully understood and where appropriate mitigated, the developers have committed to undertaking further surveys during and post construction into the Interaction of the wind farm with the following:

- Seals
- Little Terns
- Benthos
- Bathymetry (Sediment Movements)

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