



GE Wind Energy

Gunfleet Sands Offshore Wind Farm Non Technical Summary



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Further copies of this document may be downloaded from the project website www.gunfleetsands.co.uk

Copies of the full Environmental Statement may be obtained for a fee from:

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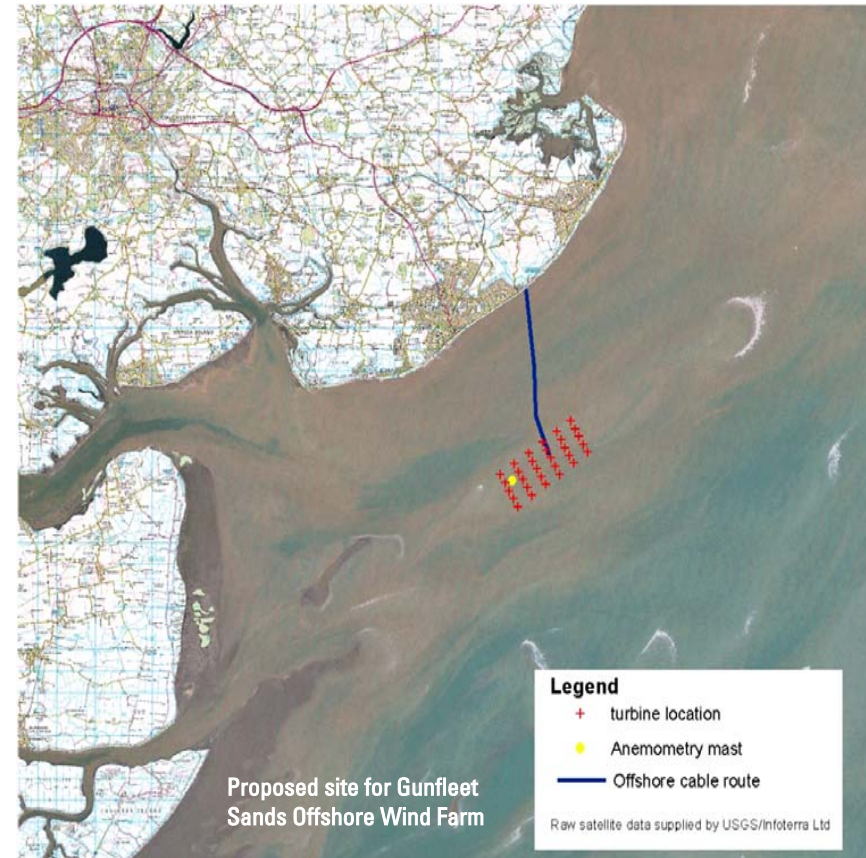
NON TECHNICAL SUMMARY

Introduction

This document summarises the findings from an Environmental Impact Assessment of the proposed Gunfleet Sands Offshore Wind Farm Development. GE Wind Energy is applying to the UK government to develop a 30 turbine wind farm on Gunfleet Sand, 7 km off the Essex coast.

The UK is situated in an ideal location to harness wind power, and has done so for many centuries on a small scale. This particular offshore project has developed over several years to find the most appropriate balance between environmental and economic concerns. At full capacity this wind farm will generate 108MW of power, contributing to the government's commitment to increasing the UK energy supply through renewable means. It will help conform to the Kyoto protocol, which commits the UK to supplying 10% of its electricity from renewable sources by 2010. Europe as a whole aims to generate 22% of its electricity from renewable sources by 2010.

In the 1990s, the government provided incentives for non-fossil fuel power generation. The Gunfleet Sands Offshore Wind Farm Project has had a Non-Fossil Fuel Obligation Grant since 1998. Locally, there is a strong impetus to develop renewable power generation within the East of England.



Consents Procedure

Various licenses are required to install structures at sea, and to generate power. The relevant policy for this project includes:

Food and Environment Protection Act 1985 (FEPA) – Section 5

This is required to put structures on the seabed, and lay cables to shore. It also covers associated work for monitoring, such as taking seabed samples.

Coast Protection Act 1949 (CPA) – Section 34

This considers any disruption or danger to navigation, so is applicable to the structures and maintenance while the wind farm is in operation as well as the construction period.

Water Resources Act 1991 – Section 109

This covers any cabling that goes in, over or under a watercourse that is part of a main river. It is applicable to the onshore cable leading to the grid connection point.

Crown Estate Act 1961 – Section 3

The Crown Estate is required to give consent to any structure or cable over Crown Estate seabed or foreshore.

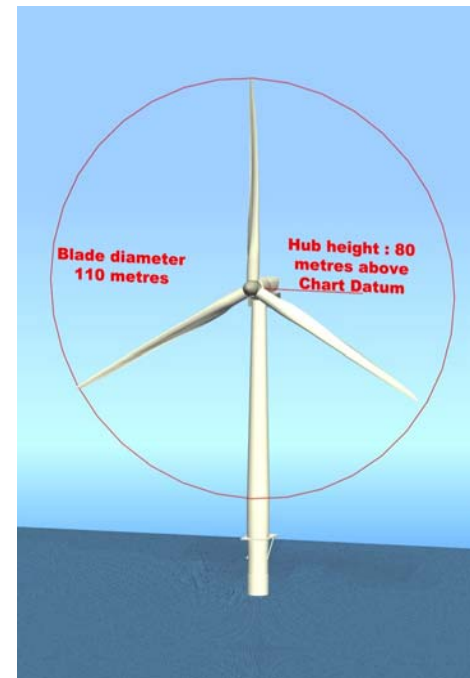
Transport and Works Act 1992 (TWA)

An Order under the TWA can alter the right of navigation. It will be used in conjunction with the Local Planning Act to grant planning permission for the development.

Other legislation must also be adhered to with respect to noise, protected species, archaeology, wrecks and landscape/seascape assessment.

Project Description

The wind farm will consist of 30 turbines located in a 10 km² (2 x 5 km) box on Gunfleet Sand. This sand bank is located 7 km to the south-east of Clacton-on-Sea, Essex. The estimated power generation is enough to supply 85,000 homes, more than the entire number of registered “dwellings” in Tendring District itself.



Each turbine will be a maximum of 80 m high from Lowest Astronomical Tide (LAT) (Chart Datum) to the nacelle (hub height). The blade diameter will be up to 110 m, so that each blade has a maximum length of 55m. This means that the blade tip will reach up to 135 m above LAT. The proposed turbines are GE Wind Energy’s 3.6MW model, which have variable pitch control. This means that the blades feather into the wind to control the speed of rotation. Overall, this produces a more reliable level

of power generation, and a safer braking mechanism.

The foundations for the turbines will be monopiles (steel cylinders), which will be driven into the seabed to a depth of 35-38 m. The turbines will be erected in a staged process so that the foundation is put in position, the tower is erected and then the blades are lifted into place. Construction is anticipated to take 4-6 months.

The turbines will generate electricity at 33kV – subsea cables will connect small groups of turbines and lead to an offshore sub-station, situated in the middle of the turbines. There, the power will be transformed to 132kV and cabled to shore.

The proposed landfall point is situated near the radar mast at Holland Haven. The cable will be trenched from the offshore sub-station to approximately 250 m from the coast, and then directionally drilled beneath the sea defences and the promenade. The cable will surface in a disused quarry within Holland Haven Country Park. It will then be trenched, and drilled where appropriate, to the grid connection station near Cook's Green. The favoured route for this passes beside Frinton Road, along the north-east side of Holland Marshes, and then along Great Holland Road to the grid station. The cable will be buried for the whole route, so there will be no overhead power lines or external structures except within the existing grid station.

Although dependent upon planning permission, the provisional schedule for the wind farm is to start construction in 2003. Onshore work could start during the autumn, with offshore work continuing in 2004.

There will be a temporary 500m exclusion zone around works during construction and, once in operation, around maintenance works. In addition, there will be a permanent exclusion zone around the offshore sub-station for safety reasons. However, there will be no other prohibited areas within the wind farm, so that vessels can move freely through the development.

Environmental Impacts

Physical

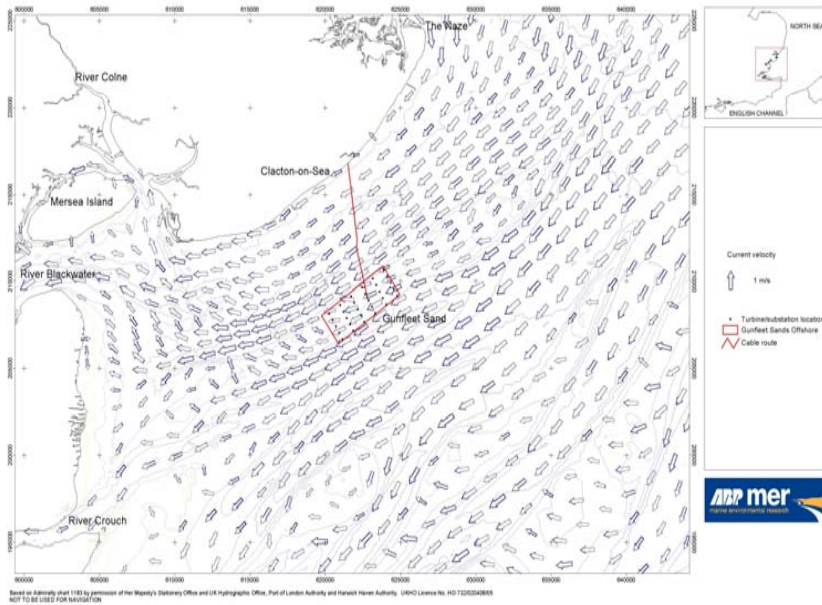
Morphology and Currents

Gunfleet Sand has been shown to be a stable feature, with sediment movement occurring only near the surface of the seabed. The tidal range exceeds 4 m at spring tides, producing strong currents. There is a net clockwise flow around the bank, as the ebb tide dominates in the Wallet, and the flood tide dominates in East Swin.

Although the presence of the turbines will decrease the flow locally behind each monopile, this effect will not extend beyond the development area.

Scour and Sediment Movement

Scour (erosion of sediment around the structures) is predicted to reach an equilibrium within a few days of the installation of the monopiles. The scour is estimated to form a cone of 30m diameter, with a maximum depth of 1.34m close to the monopile rising to the



Schematic of flood tide flow

surrounding seabed within 15m. However, the intention is to use scour protection in the form of artificial fronds which will minimise the scour. This means that sediment movement is very localised and will not impact on other areas along the coast.

Water Quality

Analysis for metals in seabed samples, showed that there were very low concentrations of contaminants in the offshore sediments. Consequently, any resuspension of this sediment during construction,

or operation will not increase contaminant transport, and therefore not affect the local water quality.

Biological

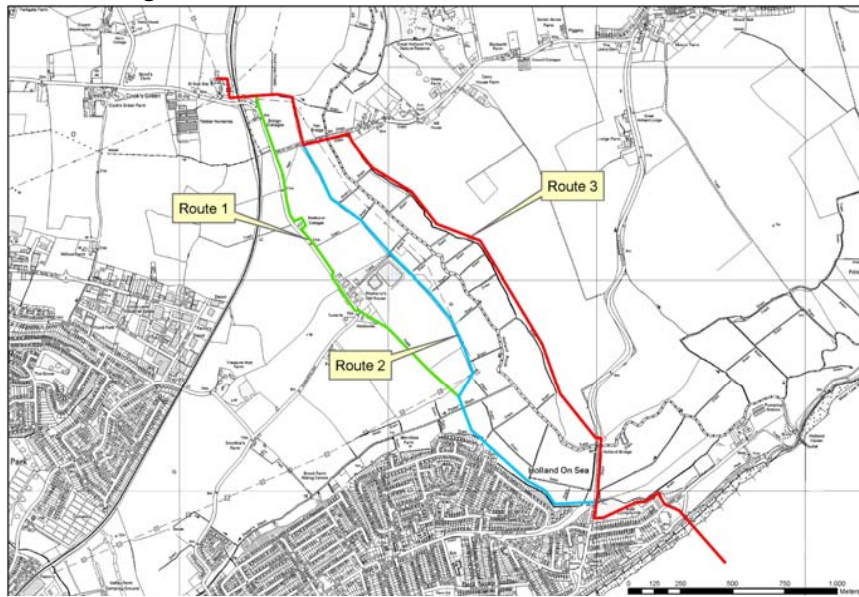
Terrestrial Habitats

Onshore, two of the three potential cable routes pass through the Holland Haven Marshes Site of Special Scientific Interest (SSSI). Botanical species were most diverse in this region, although Holland Haven Country Park also contained varied species. The vegetation near the ditches within the SSSI, included water dropworts, and would require the cable to be directionally drilled in these areas so that these specimens were not affected. In addition, particular trees and hedges would require care (such as hand digging around the roots) when trenching. The third possible cable route, which does not pass through the SSSI, is the favoured route and does not contain any sensitive species. Although the turf should only be lifted for 3-4 days, it must be ensured that good cabling practices are followed with the correct replacement of turf, so that the habitats will recover from the disturbance quickly.

The directional drilling rig will be located in the disused quarry in Holland Haven Country Park. A survey found individuals of Great Crested Newt here. These must be protected (with fencing or relocation) whilst construction work is ongoing. Common lizard was also found in Holland Haven Country Park and may need to be relocated during installation work. The timing of all onshore construction work should be sensitive to the breeding seasons of the species found.

Birds

Direct effects on birds would occur if habitat were disturbed during the breeding season. However, if construction is timed to avoid this



Proposed route options for the underground onshore power cable

period, and the preferred cable route is followed (which does not pass through the SSSI), there will be no significant impacts.

Many studies have been done to assess the effect of wind farms on bird populations. In general, migrating birds change course to avoid turbines. The turbines themselves do not have a direct effect on bird populations, as there are no emissions. There does not appear to be

loss of habitat as birds adjust to the presence of turbines and so there is no loss of feeding ground. In addition, with less fishing over the bank, the fish population might increase, so improving the food stock.

Benthic Fauna

Offshore, benthic communities (organisms which live on the seabed) will be directly affected by the loss of sandy habitat (total 0.00715% of the development area) where the monopiles are placed, but also by the addition of hard substrata – the monopiles themselves. Initially there will be localised scour (although minimal due to scour protection) and increased suspended sediment through the construction period as the seabed reaches equilibrium with the new structures. However, this region is already a dynamic environment, so the species present are suited to high loads in suspension and changing morphology.

Fish

The presence of the turbines is likely to deter trawling and drift netting across the bank. This will consequently provide an area of protection for fish on top of the bank itself. The resuspension of sediment will not affect fish in general, but would impact on spawning fish such as herring which lay their eggs in mats attached to the seabed. Consequently, construction must be scheduled to avoid spawning periods, particularly mid-January to May. While in operation the wind farm will generate some noise and vibration; although audible by certain species of fish, studies have shown that they will rapidly become accustomed to it. During construction, intermittent noise from the piling may cause alarm or startle responses, but this will be a temporary effect.

Marine Mammals

This area of the southern North Sea is known to have sparse marine mammal populations. Noise levels are expected to be at lower frequencies than those used by dolphins and porpoises for echolocation to hunt prey, so they should not be affected. Seals use sound for communication, and are likely to show a startle reaction to any sudden noise (such as piling), but will remain unaffected by the wind farm during operation. However, to ensure minimal impact on both fish and mammals pile driving should start gently to allow individuals to move away from the noise source.

Human

Marine Infrastructure

The proposed location for the wind farm does not affect other marine usage such as pipelines, cables and dredging. An archaeological search has identified a number of locations, which are confirmed or potential wrecks/artefacts. In particular, 5 sites fall within the turbine area or close to the original proposed cable route. Consequently, the cable route has been modified to avoid these artefacts. The proposed route onshore will not affect any archaeological sites.

Fishing

Discussions with local fishermen have been important in identifying the main fishing areas, and methods used. During construction, there will be a 500m exclusion zone around the works, where fishing will be not be possible. However, once the turbines are in place, fishing can resume throughout the development site, other than around the sub-station. The restriction to mobility due to the turbines may prevent

trawling and drift netting within the area. As a consequence of this, the bank may protect fish and so locally boost stocks.

Employment

The wind farm will bring limited employment to the region. Prior to construction on site, components for the turbines and generators will be required, which will be sourced locally if appropriate. During construction, a port such as Harwich will be used as a base, and once in operation, a full-time maintenance and supervision crew will be required locally.

Tourism

The development may become a tourist attraction both during construction and once in operation. It is the closest proposed wind farm to London, and may attract additional day visitors. There is a potential for locally run boat trips to see the turbines, and it provides an offshore feature for leisure craft.

Navigation

The turbines will be located on the sand bank itself, avoiding identified navigation channels. A study which investigated the vessel collision risk calculated a collision return period of 34,014 years. In addition, the wind farm will be clearly marked to ensure vessels are aware of the turbines, and navigational notices will be issued whenever work is to be undertaken. The lighting requirements have been agreed in consultation with Trinity House; lights will be located on each corner turbine, and one turbine in the middle of each outside edge. Furthermore, there will be radar reflectors positioned beside the lights and foghorns on the corner turbines. All turbines will be painted



yellow up to approximately 12m above the Highest Astronomical Tide level.

As stated, the turbines will have radar reflectors to ensure that vessels can identify them, but the structures also fall within the zone of the navigation radar situated at Holland Haven. The turbines may cause signal saturation immediately behind each tower. Methods to avoid signal disruption are being discussed with the Port of London Authority. Although the wind farm will also be apparent on aviation radar, it is situated at sufficient distance from airports for the effect to be negligible. Similarly, television and radio signals will not be affected.

Noise

During construction, the main noise source will be due to the driving of the monopiles. It will be possible to hear this on land when the wind is towards the shore. However, the audibility will remain below

levels considered to be a nuisance, and is predicted to be below the recognised sleep disturbance criteria. There will also be increased vessel traffic, but this noise will be at a lower level.

Once operational, the noise and vibration will be dependent upon the speed of rotation of the turbines. This will therefore reach a maximum at a wind speed of 12 m s⁻¹ or above - the optimum speed for generation, when the blades revolve at 15 revolutions per minute. However, modelling has shown that the noise levels are low, and even with an onshore wind, the turbines are unlikely to be heard on the foreshore. At night, when background noise is generally lowest, the noise will remain well below sleep disturbance criteria.

Offshore, the noise is not predicted to be audible by seals lying out of the water, as this tends to occur on Buxey Sand rather than Gunfleet Sand. However, it is important not to disturb seals which may

approach Gunfleet Sand during pupping season (June to August). During construction the piling will be audible by fish and marine mammals, and is likely to cause avoidance action. Consequently, hammering should start gently so that any fish and mammals in the vicinity have time to move away. Monitoring should continue through construction to determine whether bubble curtains are also necessary to protect species within the water.

Visual

Tendring is a coastal region, and therefore the interaction between landscape and seascape is a key factor. This is an important tourist destination, and people enjoy looking across the sea, so the wind farm will have a noticeable affect on the view. The turbines will be visible to some extent from Walton-on-the-Naze, along the Tendring Peninsula coast, and on the Maldon Peninsula. The closest position, and therefore the most visual impact, is on the seafront in Clacton-on-Sea. However, the wind turbines are laid out so that the image is not visually uncomfortable, and will add interest to the seascape. This is currently provided by vessels travelling along the navigation channels. In addition, the weather will create a changing seascape, with the turbines becoming more or less variable with different conditions. Overall, the impact of the wind farm is not considered to be detrimental to the landscape and seascape regions.

Cumulative Effects

The nearest proposed offshore wind farm in this first UK round is at Kentish Flats, off the North Kent coast. The centres of the two proposed wind farms are 31 km apart. Consequently, there will be areas offshore, and on the Maldon Peninsula where both wind farms are visible. Onshore, only a small area of land will be affected, and due to sea defence and other structures in the foreground, the presence of both wind farms is not deemed to be intrusive.

The wind farms are sufficiently distant not to cause any cumulative effects on the physical or biological parameters (such as currents, sediment movement, bird migration and mammals). There is no location where noise from both sites will be audible. In total, the cumulative effects are considered negligible.

Summary

In conclusion, the Gunfleet Sands Offshore Wind Farm Project is not considered to have a significant adverse effect on any physical, biological or social aspects of the region, provided that the recommended mitigation measures are followed. Overall, the project has potential to bring beneficial effects to the area. Throughout the whole development good communication should be maintained with the local community to ensure they are fully informed and can contribute to the project in a positive way. In addition, the development will strengthen the region's commitment to renewable energy, providing 85,000 homes with power from a clean and sustainable source. This is a good opportunity for the area to lead the UK in a new and dynamic industry.



