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27 SUMMARY

27.1 Introduction

Thanet Offshore Wind Limited (TOW), a subsidiary of Warwick Energy Limited (WEL), was created to develop opportunities for energy generation from renewable resources in the Thanet area. TOW has been awarded the rights to develop an offshore wind farm in the Thames Estuary Strategic Environmental Assessment (SEA) area by The Crown Estate under Round Two of the offshore wind licensing arrangements. This is subject to TOW being successful in gaining the necessary consents for construction and operation of the wind farm.

27.2 Thanet Offshore Wind Farm Project Details

The Thanet Offshore Wind Farm (Thanet) project is located approximately 11.3km offshore from Foreness Point, the eastern most part of the Kent coastline. The site takes up an area of 35km² of the seabed and is positioned to the west of Drill Stone Buoy in water depths of 18-25m. Between 60 and 100 wind turbines would make up the wind farm, depending upon the size of turbine chosen and based on a maximum output of 300MW, which is enough to provide electricity for 240,000 average homes.

The turbines would nominally be arranged in rows running northwest to southeast with an approximate spacing of 450m to 600m between each turbine within rows and 675m to 900m between rows, depending on the size of turbine chosen.

The maximum height of the turbines would be up to 150m from mean sea level to the blade tip in the vertically up position and the minimum clearance would be 22m from mean high water springs level to the blade tip in the vertically down position.

The turbine nacelle or hub, complete with three blades, would be mounted upon a cylindrical steel tower, which would in turn be supported by a foundation fixed to the seabed. The turbines would be interconnected by a buried 33kV cable network and connected to an offshore substation located within the wind farm, where the voltage would be stepped up to 132kV. From here, two export cables would be routed to shore, each buried to a depth of between 1m and 3m depending on localised seabed properties and be up to 50m apart.

A number of different foundation types were considered and evaluated for the Thanet project. The evaluation concluded that monopile and gravity base structures (GBS) would be the most likely foundation types to be used. This assessment was based on the geotechnical conditions, water depth and environmental conditions that prevail across the site.

The preferred export cable route has been developed following analysis of a number of options. The export cables would make landfall just north of the disused hoverport facility in Pegwell Bay and connect via a buried cable route along the A256 Sandwich Road to an existing substation at the disused Richborough Power Station. Electricity would then be distributed via the existing EDF Energy distribution system.

Subject to the necessary consents, construction work might begin as early as 2007 and would be expected to cost over £300m.

27.2.1 Consent requirements

In December 2003, The Crown Estate offered 12 companies/consortia, options for 15 site lease agreements spread across three strategic areas. WEL obtained two of these options, one of which is for the Thanet project. This agreement grants TOW a development option for seven years, during which time TOW must obtain the relevant statutory consents. Once these are in place, the option agreement could be converted into a full lease of the seabed for a period of 40 years.

There are a number of consents that will be required for all phases of development i.e. construction, operation and decommissioning. The main consents that will be applied for are listed in **Table 27.1**.

Act of Parliament	Consent type	Competent Authority
Section 36 - Electricity Act 1989	For construction and operation of an offshore wind power generating station within territorial waters adjacent to England and Wales, including all ancillary infrastructure.	Department of Trade and Industry (DTI)
Section 5 - Food and Environment Protection Act (FEPA) 1985	For depositing articles or materials in the sea/tidal waters below MHWS (mean high water springs) around England and Wales, including the placement of construction material or disposal of waste dredgings.	Marine Consents Environment Unit (MCEU/Defra)
Section 34 - Coast Protection Act (CPA) 1949	To make provision for the safety of navigation in relation to the export cable route.	MCEU/Defra
Section 90 Town & Country Planning Act 1990	Deemed planning permission sought as part of the section 36 application for the onshore elements of the works.	DTI

Table 27.1Statutory consents to be applied for by TOW

In gaining consent under the Electricity Act or the Food and Environment Protection Act, conditions may be imposed to control and mitigate the impact of the development.

27.2.2 The need for renewable energy

The central aim of the UK Government's energy policy is to establish a supply of energy that is diverse, sustainable and secure and is offered at competitive prices. Key to this goal is a 60% reduction of CO_2 emissions by 2050. The development of renewable energy plays a key role in the Government's strategy for carbon reduction. In particular, it has set a target that 10% of the UK's electricity supply should come from renewable sources by 2010. This has subsequently been revised to 15% by 2015, and the Government has an aspiration of increasing this further to 20% by 2020. The Government's targets for renewable energy will help the UK to meet its international obligations, but also obtain greater security of energy supply through the promotion of indigenous electricity generation.

The development of the Thanet project would help the UK move towards its goals by reducing emissions of CO_2 by approximately 36 million tonnes over its 40 year lifetime, when compared to a coal fired power station.

27.2.3 The Environmental Impact Assessment (EIA)

The EIA has been prepared in accordance with the Electricity Works (Environmental Impact Assessment) Regulations 2000 (SI 2000/1927). In addition, the requirements and advice of the DTI, in their Guidance Note 'Offshore Wind farm Consents Process' (DTI, 2004) have been followed. Other guidance includes 'Guidance Note for Environmental Impact Assessment in respect of FEPA and CPA requirements (Version 2 – June 2004)'.

Impact identification and evaluation was carried out via a number of methods and techniques including data collation and literature review, consultation, reference to relevant guidance and standards, original data collection and analysis including multivariate analysis and computer modelling, as well as experience of similar projects. The following site specific surveys were also undertaken:

- Geophysical survey;
- Fisheries and epifaunal survey;
- Benthic survey (sublittoral and intertidal);
- Bird surveys (aerial and boat based);
- Terrestrial survey (extended Phase 1 habitat survey)
- Marine traffic survey; and
- Seascape and visual character assessment.

In order to provide a consistent framework for considering and evaluating impacts, significance levels have been assigned to each impact. The assigned definitions are set out in **Table 27.2**.

A number of criteria have been utilised to determine the significance of the environmental impacts. These are:

- Magnitude of the impact i.e. local, regional or national;
- Spatial extent of the impact i.e. small scale or large scale;
- Duration of the impact i.e. short term or long term;
- Reversibility of the impact including species or habitat recoverability, sensitivity and tolerance;
- Conservation or protected status;
- Probability of occurrence of the impact;
- Confidence in the impact prediction; and
- The margins by which set values are exceeded e.g. water quality standards.

Impact Significance	Definition
Major adverse	The impact gives rise to serious concern and should be considered as unacceptable.
Moderate adverse	The impact gives rise to some concern, but is likely to be tolerable depending on scale and duration.
Minor adverse	The impact is undesirable but of limited concern.
Negligible	The impact is not of concern.
No Impact	There is an absence of one or more of the following: impact source, pathway or receptor.
Minor beneficial	The impact is of minor significance, but has some environmental benefit.
Moderate beneficial	The impact provides some gain to the environment.
Major beneficial	The impact provides a significant positive gain.

 Table 27.2
 Terminology for classifying environmental impacts

27.2.4 Decommissioning requirements

The projected life of the wind farm is 40 years of operation, after which time the site lease grants two years to complete decommissioning.

A full Decommissioning Plan for the project would be drawn up before construction commences and submitted to the DTI and others for approval. It is currently expected that the Decommissioning Plan would include for the complete removal of all offshore structures deployed in the wind farm above seabed level to ensure that no obstruction is left following decommissioning. This would include all turbines, the offshore substation and the anemometry mast. It is expected that buried cables would be left in place in line with current practice.

The Decommissioning Plan would be regularly updated in light of any changes to legislation or best practice and in particular would be thoroughly reviewed as the wind farm approaches the end of its operational life.

Each topic section within the ES provides a discussion of the likely significant impacts during the decommissioning phase for the relevant environmental parameter. It is anticipated that the nature of the impacts would be similar to those experienced during construction, but would have a shorter timescale and different intensity. It is probable that a further Environmental Impact Assessment would be undertaken at this time.

27.3 Summary of Environmental Impacts

The following sections summarise the potential environmental impacts associated with the Thanet project. The following environmental parameters have been assessed:

• Hydrodynamics and geomorphology;

- Marine and coastal water quality;
- Ornithology;
- Marine ecology;
- Natural fish resource;
- Marine mammals;
- Commercial fisheries;
- Seascape and visual character;
- Shipping and navigation;
- Marine archaeology;
- Radar and transmission systems;
- Other human activities;
- Socio-economics;
- Geology, land quality and water resources;
- Terrestrial ecology;
- Landscape and visual character;
- Terrestrial archaeology and cultural heritage;
- Coastal tourism and recreation;
- Traffic and access; and
- Noise, dust and air quality.

A description of the mitigation measures that will be committed to by TOW are listed for each environmental parameter, such that environmental impacts can be avoided, reduced, minimised or mitigated. The following sections provide a summary of the key potential environmental impacts anticipated during the construction and operation of the Thanet project. As discussed above, decommissioning impacts are anticipated to be of a similar nature to construction and have been discussed for each environmental parameter within the ES, but are not included specifically in the summaries below.

27.3.1 Hydrodynamics and geomorphology

A desktop study of the hydrodynamics and geomorphological processes was undertaken to set out the existing state of knowledge and to assess the potential impact of the development. This was supplemented by a detailed geophysical study of the site.

The Thanet site lies in water depths of between 18m and 25m below Chart Datum (CD) and is exposed to severe wave conditions generated within the southern North Sea and the eastern English Channel.

The prevailing southwesterly winds blow off the Kent coast and therefore have a relatively short effective fetch length, but swell entering from the English Channel enhances the waves. The most severe conditions are generated by northerly and northeasterly winds blowing across the full extent of the North Sea. The tidal range is around 4.5m on spring tides and the area is subject to tidal currents of approximately 1m/s offshore, increasing to above 1.6m/s along the export cable route, and reducing within Pegwell Bay.

The seabed at the Thanet site mainly comprises a thin veneer of silty sand overlying chalk to the south and sandstones to the north. There are areas of exposed rock, sand waves and megaripples within the site. The export cable routes encounter superficial sands lying over chalk through the offshore section, giving way to thicker sand and silty sand over chalk and then sandstone within Pegwell Bay.

It is considered that the Thanet project would have some localised impact on the waves, currents and corresponding sediment transport regime in the immediate vicinity of the Thanet site, but is unlikely to have any significant or measurable far-field impacts in relation to the existing natural variability of the dynamic environment.

The potential for broad scale changes to the seabed as a result of the combined effect of all the wind turbines is considered to be negligible, since the foundations can be considered as independent of each other in respect of the impact on the currents and waves.

The sediment transport rate is moderate to high at the Thanet site, and there is potential for localised scour around the base of each structure. The extent of scouring has been estimated at up to 9m depth for monopiles, or approximately 2.1m for gravity base structures.

The greatest potential for scour occurs in the areas of sand waves through the central and northern parts of the site, where scour depths could reach the maximum depth and horizontal extent. Foundations in other areas are likely to suffer less scour, due to the presence of coarser surface material or less easily eroded sub-layers. The export cable routes pass through areas of active sediment transport, therefore the cables would be buried to sufficient depth to prevent future uncovering.

It has been demonstrated that the background levels of suspended sediment concentration at the Thanet site and along the export cable routes, are naturally moderately high, so that the transient impact of plumes arising from the cable burial process are unlikely to be significant.

The assessment indicates that there would be no cumulative impacts arising from the adjacent wind farms or in combination with other infrastructure and activities due to the predicted localised effects and distance separation from other activities or wind farms.

- 1. Assuming that some scour would occur for either foundation option, scour installation will be provided in the form of rock or slate, if this is deemed necessary during the detailed engineering phase.
- 2. Cables will either be diverted to less active corridors or buried to such a depth that they are always below the troughs of the seabed features, ensuring that bed forms and anthropogenic activities move over the cables without risking exposure.
- 3. Where the export route crosses the navigation approach channel to the Port of Ramsgate, the cables will be buried to -11.0m Chart Datum to allow for any future maintenance or capital dredging.

Mitigation measures during operation

 There would be a need for ongoing monitoring and management following construction of the turbines and placement of the cables to ensure that scour depths, or cable exposure, do not exceed the design limits. Monitoring will be particularly important in the area of potentially mobile sand waves within the Thanet site.

27.3.2 Marine and coastal water quality

There are two designated bathing waters and one designated shellfish water located within the vicinity of the wind farm and export cable route. Impacts on water quality have been assessed against water quality criteria set out in the Directives protecting these designations. Both Bathing Waters and the Shellfish Water currently meet the mandatory standards.

Impacts due to the resuspension of sediments during the construction phase are considered to be potentially more significant. However, the exposed location of the site, moderately high levels of natural background concentrations of suspended solids and distance of the works in relation to the designations deem the impact to be **negligible**. The impact of the resuspension of bacteria and sediment contaminants has also been assessed as **negligible**, predominantly due to the low risk of bacterial contamination and the general low level of contamination found within the sediments in the working areas.

Impacts on water quality during the operational phase are considered to be **negligible** as sediment disturbance would not be required. Adherence to standard pollution prevention guidance during construction and operational maintenance work will reduce the risks to water quality from accidental spillage.

Mitigation measures during construction

1. Ploughing would be used for cable installation, if practicable, to ensure the least amount of disturbance to seabed sediment.

Mitigation measures during operation

1. Adherence to pollution prevention guidelines and best practice guidelines will ensure risks to water quality by accidental spillage would be minimised.

27.3.3 Ornithology

A series of aerial and boat based bird surveys have been undertaken for the Thanet project covering the period November 2004 to October 2005. These surveys will continue until two years of data have been collected during the key overwintering period i.e. November to March.

The surveys showed very few red-throated divers using the Thanet site, probably due to the deeper waters in the area. Good numbers of auks including razorbill and guillemot used the site throughout the winter but showed no preference for the area compared with other parts of the outer Thames Estuary. Terns were largely absent until July 2005 and August 2005 when small numbers were seen foraging at the site, which indicates that this part of the Thames Estuary is not used by birds from nearby colonies during the breeding season for foraging. Gulls were the most common feature of the site, with herring and lesser black-backed gull forming the bulk of the numbers. Other seabirds recorded regularly at the site included fulmar, kittiwake and gannet. Common scoter were only seen very infrequently.

The amount of visible migration that occurred through the site was remarkably low considering the site's proximity to the Thanet coastline, which is the most easterly point in Kent and a first point of landfall for a variety of species migrating across the North Sea. Only two flocks of geese and two flocks of waders were observed along with the occasional swallow, house martin, swift, skua and a single redwing.

Noise levels and the presence of a number of construction vessels would be expected to disturb and displace seabirds using the area during construction of the Thanet project. Any impacts would be short term however, and given the low density of birds observed using the site, and the availability of similar feeding areas close by, a **minor adverse** impact is predicted.

Some populations of feeding and roosting waders at Pegwell Bay could be disturbed during installation of the export cables. The impact would be limited to the few days taken to cross the intertidal area and construction will be timed outside the overwintering and passage periods to avoid disturbance impacts to waterfowl populations.

It is considered that there is greater potential for impacts to birds to occur during the operation of the wind farm. Birds using the Thanet site could be affected in one or more of the following ways:

- Disturbance and displacement from feeding areas;
- Mortality through collision; and
- Barriers to movement.

Red-throated divers are the most susceptible species to disturbance and displacement, generally avoiding areas of human activity. Some level of avoidance of the Thanet site by this species is expected, but even assuming complete vacation of the site, the impact on the Thames Estuary population as a whole is expected to be minimal, given that so few birds would be involved. Studies of other operational wind farms have indicated some displacement but not complete avoidance. Other species seen at the Thanet site may also exhibit some avoidance, although this is likely to be less marked than for red-throated divers. In most instances, numbers of birds using the site were either lower or unexceptional in comparison with other areas in the Thames Estuary and there are plenty of similar habitats close by to accommodate any birds that are displaced. There is some evidence to suggest that gulls and terns may actually be attracted to the site due to the opportunities to perch and rest on the structures.

The results of the Collision Risk Assessment indicated that divers were at low risk from collision due to their low flight heights. Auks flew so close to the water that not a single bird would be at risk from the turbine blades. Gulls were at the greatest risk of collision, but even for these species, the additional mortality as a result of collision was only 0.2% of the background mortality rate. The predicted mortality rates for all other species were less than 0.2%.

The wind farm could act as a barrier to birds crossing the site, particularly during migration. Recent studies undertaken at operational wind farms have shown that birds such as geese would not necessarily detour around the wind farm and a proportion would fly between the rows of the turbine array. Some birds would completely avoid the site and increase their journey as a result. However, it is considered that the increase in distance would be minor in comparison to the whole journey travelled and unlikely to mean the difference between survival and mortality.

The Thanet project is one of several proposed, consented and operational wind farms in the Thames Estuary that could act cumulatively to increase the level of impact on seabird and migrant populations. Red-throated diver, the most susceptible species, is present at the Thanet site in such low numbers that when compared with much larger populations at the other sites in the Thames Estuary, the potential to contribute significantly to any cumulative impacts is very limited. Migrants that might avoid the Thanet site due to barrier effects could also have to detour around other wind farms, but again, the overall additional distance that could be travelled is still not thought to be significant in the context of the overall journey.

Overall a **negligible** to **minor adverse** impact is anticipated on the ornithological interest of the Thanet site.

It is anticipated that during operation, monitoring of bird populations and behaviour would be undertaken.

Mitigation measures during construction

1. Construction of the joint transition pit and cabling across the intertidal mudflats will be undertaken outside the main wintering and passage period for migratory waterfowl (September to April inclusive).

27.3.4 Marine ecology

A number of site specific surveys were undertaken in order to establish the marine ecological interest at the Thanet site and along the export cable route. These included benthic sampling, side-scan sonar, dropdown camera and a series of epibenthic trawls.

The intertidal area of Pegwell Bay is characterised by muddy sandflats. The flats are dominated by the polychaete worms *Lanice conchilega* and lugworm, *Arenicola marina* and also support populations of bivalve molluscs such as edible cockle and Baltic tellins. While the habitats and species present are of value as a food resource for wading birds, they are, on the whole, tolerant of the range of impacts that may arise as a result of the construction, operation and decommissioning of the Thanet project.

The seabed in the vicinity of the Thanet site is characterised by predominantly sandy deposits with varying proportions of silt/clay and gravel. A wide range of benthic invertebrate species was recorded from the Thanet site area, in all a total of 266 species were identified.

Multivariate analysis showed that the biological communities at each of the survey stations are very variable with few characteristics in common. This partly reflects the variability of the substrate and also the relatively small number of species recorded in many of the samples. Few of them therefore have sufficient species in common to form an identifiable group or 'community' that is statistically separable from others in the survey area.

Relatively large numbers of the reef building worm *Sabellaria spinulosa* were recorded in the benthic survey, particularly in the southern part of the site over which a more detailed survey was carried out using a combination of high-resolution side-scan sonar and seabed digital stills camera system specially adapted for use in areas of poor visibility.

The main conclusions from the *S. spinulosa* survey are summarised below:

- *S. spinulosa* occurs in moderate to low density patchy growth over much of the southern part of the Thanet site, with some areas of high density *S. spinulosa* growth occurring in the mid and western sections of the survey area.
- On the whole, there was a good correlation between the perceived distribution of *S. spinulosa* identified from the high resolution side-scan sonar data and that identified using the underwater photographs, showing this to be an effective method of assessing the overall distribution of *S. spinulosa* in this area.
- Variability evidence in the underwater photographs indicates that the *S. spinulosa* growth is quite patchy in this area, which is likely to be at least in part due to trawl damage.
- *S. spinulosa* communities have been widely reported in the area by the local fishermen and are reported to be increasing in density following cessation of beam trawling by the Ramsgate vessels. Despite this, there is reported trawling by non-UK vessels using heavy bottom gear and it remains true that the main threat to *S. spinulosa* is disturbance by heavy bottom gear by fishing vessels.

• Extensive trawl damage evident in the side-scan sonar data confirmed that this is the most likely limiting factor for *S. spinulosa* growth in the area and it is thought that this is likely to be preventing it from forming larger more consolidated reef structures.

TOW is committed to undertaking a pre-construction survey of the *S. spinulosa* aggregations in the southern part of the Thanet site. It is anticipated that this survey would inform the micro-siting of turbines and interturbine cabling in order to ensure that **no adverse** impacts on dense aggregations of *S. spinulosa* occur as a result of the construction of the Thanet project.

Overall, the biological communities recorded in the survey area are typical of coarse deposits of the southern North Sea and eastern English Channel and **no significant adverse** effects on the marine ecology due to the construction or operation of the wind farm and associated infrastructure are anticipated.

Mitigation measures during construction

- 1. Following discussions with and advice from English Nature and the Pegwell Bay National Nature Reserve Steering Group, any damage to the *Spartina* saltmarsh habitat in the vicinity of the export cable landfall that is considered to be detrimental to the future development of the habitat will be mitigated through the use of enhancement measures following the recommendation of the latest published guidance.
- 2. The footprint of habitat disturbance associated with cable laying activities across the intertidal sandflats of Pegwell Bay will be kept to a minimum, as far as practicable, by ensuring that the working width is minimised.
- 3. TOW is committed to undertaking a pre-construction survey of the *S. spinulosa* aggregations within the Thanet site. The output of this survey will be used to inform the micro-siting of turbine foundations and interturbine cables so that any potential damage to identified dense, reef-like aggregations is minimised, as far as practicable, and that future development of the reefs can occur.
- 4. Where practicable, restrictions will be enforced on the locations where vessels can jack-up and/or anchor. These restrictions will apply to areas of seabed that have been identified as supporting a particularly sensitive benthic community.
- 5. The Installation Contractor for the construction phase will be expected and contractually obliged to follow best working practice during all offshore operations, including the use and management of chemicals, lubricants and other materials.
- 6. An Environmental Management Plan will be produced as part of the contract documents to ensure that all potential pollution sources are identified and that measures are taken to limit the potential for a pollution incident to occur and to rapidly respond to any accidental release, however unlikely.

27.3.5 Natural fish resource

Information and data on the fish resource within study area was collected from a number of sources including commercial fisheries information, CEFAS and Defra data, published literature and site specific surveys carried out for other offshore wind farms. This overview information was further supplemented by carrying out fish surveys of the Thanet site, targeting adult fish species during the spring and summer seasons.

A combined total of 19 species were caught during the two sampling periods, which is less than encountered during surveys for Kentish Flats (28 species) and London Array (44 species) offshore wind farms. This number is especially low in comparison to the reported number of marine and estuarine species in the greater Thames Estuary (112 species). The most common species encountered were dogfish and dabs. Only five herring were caught during the spring sampling and none during the summer sampling. Moderate numbers of Dover sole (53), the principal species targeted by locally based fishing vessels were caught, with the majority of these being caught during the summer survey. Moderate numbers of starry smoothhound and thornback rays, which are also targeted by local vessels, were caught.

No species of national or local conservation importance or species designated by the Bern convention were caught.

The Thanet site is not an important spawning or nursery area for commercially important fish species such as herring, as those that may spawn in the wind farm site also spawn widely within the surrounding coastal waters.

Noise created during the construction period, in particular through pile driving, is anticipated to be the greatest potential risk of an impact upon fish species in the form of physiological damage and, in extreme cases, mortality. However, by adopting working practices, such as soft-start piling, these impacts can be effectively reduced and avoided.

Potential impacts during the operation of the wind farm include underwater noise and vibration, the fish aggregating effect of the structures and the influence of electromagnetic fields (EMF). The assessment shows that overall, the significance of such impacts is considered to be **negligible**.

A precautionary approach to the assessment of the potential impact of EMF emissions has been adopted and worst case scenarios have been assumed, based on current knowledge. However, it is anticipated that, with the outcomes of future COWRIE EMF studies that the overall impact on fish is likely to be **negligible**, over the lifetime of the project.

Mitigation measures during construction

1. 'Soft start' techniques will be applied during pile driving operations. This technique involves the lifting of the driving hammer a short distance at the commencement of the piling activity and gradually increasing in strength over a period of around 20 minutes. This would provide sufficient duration within which hearing sensitive species would detect the source of the sound and move away from the area in which physiological damage and mortality could occur.

27.3.6 Marine mammals

Only four cetacean species have been recorded on a regular basis in the vicinity of the Thanet project in the southern North Sea and eastern English Channel, namely the

harbour porpoise, bottlenose dolphin, white-beaked dolphin, and long-finned pilot whale. Of these, the most likely interactions would be with harbour porpoise or bottlenose dolphin, and then primarily during the construction phase when pile driving activities are taking place. The seasonal presence of the two species in the region differs slightly, with porpoises present in highest numbers between March and May, and particularly in April, whereas bottlenose dolphins are most frequently observed between May and October. Overall, the region is not considered of significant importance to seals and cetaceans.

Marine mammals are likely to be affected by construction noise and increases in vessel traffic and collision risk during construction. There is limited knowledge on the effects of construction noise on marine mammals, however, recent studies undertaken during the construction of the Horns Rev offshore wind farm in Denmark indicate that harbour porpoises were affected during piling operations over a distance of 12km, although rapid re-colonisation occurred following resumption of normal activities. Other offshore wind farm studies suggest that construction activities do not have any large scale influence on seals. Overall, it is considered that construction noise is likely to have a **negligible** to **minor adverse** impact on marine mammals.

Although vessel collisions with cetaceans and seals are a distinct possibility, the low frequency of seal and cetacean activity in the Thanet area, and their relatively small size and high manoeuvrability, suggests that the incidence of such events is very unlikely and of **negligible** significance.

Marine mammals could be affected by the operational noise and the electromagnetic fields generated by the subsea cables during operation. Although studies of the effects of offshore wind farms on marine mammals are in their infancy, available information indicates that these effects are not considered to be significant.

Mitigation measures during construction

- 1. Although the importance of this area is low for all cetacean species, including harbour porpoises and bottlenose dolphins, it is proposed that soft start procedures during piling operations are implemented in accordance with the JNCC guidelines developed for the oil and gas industry. The procedure involves the following steps:
 - Visual checks from a suitable high observation platform to note any marine mammals within 500m, beginning at least 30 minutes before commencement of piling activities;
 - If marine mammals are seen within 500m from the centre of the planned piling activities, the start of the activities should be delayed until they have moved away; and
 - Power and frequency of hammering should be built up slowly from a low energy start-up over at least 20 minutes to give adequate time for marine mammals to leave the vicinity.

27.3.7 Commercial fisheries

Information and data on commercial fisheries in the Thanet area was collated from a number of sources, including Defra Sea Fisheries, observation and vessel statistics, fisheries observation trips, consultation with local fishermen and Regulators. The assessment considered commercially important fish resources in the area, their landed volume and value, seasonality and the types of vessel targeting them.

Currently, the most valuable and widely targeted species in the area is sole. Other species of commercial importance include bass, cod, thornback ray, smoothhound, edible crab and lobster. Many vessels traditionally target a succession of species throughout the year using different techniques. This seasonal shift is presently less pronounced as a result of the declining winter cod fishery.

Fishing activity at the Thanet site involves coastal vessels operating out of Ramsgate and larger UK vessels from ports further afield and by EU member state vessels. The larger UK vessels primarily operate trawling gear to target sole, bass and cod. The majority of the non-UK fleet are made up of Belgian vessels operating trawling gear to target sole and plaice. Approximately ten vessels operate full time from Ramsgate, with a further 17 fishing on a more seasonal, part-time to occasional basis. All vessels from Thanet ports are less than 10m in length.

The majority of the Ramsgate fleet undertakes drift netting, where nets are set to drift with the tide, and static gill netting, where nets are anchored to the seabed. Areas suitable for drift netting are informally allocated amongst skippers to minimise gear conflict, which enables individual vessels to fish specific areas with drift nets.

One vessel's current drift netting area overlaps with the Thanet site and several vessels set anchor nets within part of the site on an occasional basis. Additionally, one full-time potter primarily operates in the area around Drill Stone Reef targeting crab and lobster. Vessels also fish areas encompassing the export cable route and wind farm area when travelling to and from fishing grounds.

The impact associated with construction of the wind farm site, specific to fishing vessel type, is indicated in **Table 27.3**.

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	negligible
Under 10m drift netter	Full time	1	moderate adverse
Under 10m potter	Full time	1	negligible
Under 10m drift and anchor netters	Full time	5	minor adverse
Under 10m anchor netters	Seasonal	12	negligible

 Table 27.3
 Impact of construction activities on commercial fisheries

It is anticipated that there would be a short term displacement of fish away from construction activity due to noise and disturbance, turbidity of water and seabed habitat damage or disturbance. The impact on the availability of target resources to the fishing fleet is, therefore, assessed as being localised and temporary in nature and so deemed to be **negligible** to commercial fishing operations.

Access to the fishing grounds during operation of the wind farm would be reduced by the presence of the wind farm turbines creating physical obstacles and through the likely establishment of Safety Zones around the offshore structures.

The expected level of impact of restricted access to fishing area by current fishing methods employed is shown in **Table 27.4**.

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	negligible
Under 10m drift netter	Full time	1	moderate adverse
Under 10m potter	Full time	1	negligible
Under 10m drift and anchor netters	Full time	5	minor adverse
Under 10m anchor netters	Seasonal	12	negligible

 Table 27.4
 Impact of operational activities on commercial fisheries

It is expected that fishing activity would be able to continue either side of the cable laying area during construction of the export cable route, subject to the necessary Safety Zone around the cable lay vessel. The impact of cable laying on fishing operations is expected to be **negligible**, as it is not expected to impact on revenue or costs for the commercial fishing sector.

The Ramsgate fleet do not currently overlap to any great extent with fleets from other Kent or Essex ports that may be affected by the other wind farm developments in the Thames Estuary area. Displacement of vessels out of the development areas is not expected to the extent that additional gear conflict would be significant. Assuming simultaneous construction, operation and decommissioning of the developments, there would therefore be **no cumulative impact** on commercial fisheries.

Mitigation measures during construction

- 1. Monitoring and regular communication with the local fishermen to avoid and minimise impacts during the construction operations.
- 2. TOW is committed to building on the productive working relationship established with the fishing industry. As part of this ongoing relationship, TOW will work with the industry to investigate providing appropriate assistance to those fishermen that may legitimately sustain a degree of displacement by the development of the Thanet project.
- 3. TOW will work towards the principles outlined in the 'Draft Framework for assessing the value of fishery and approaches to mitigation of possible wind farm impacts through dialogue', which was jointly produced by the fishing and wind industries.

27.3.8 Seascape and visual character

A seascape and visual impact assessment was undertaken of the offshore elements of the Thanet project on the existing landscape and seascape environment, its characteristic features and on the people who view it. Assessment included preparation of Zones of Visual Influence, indicating the visual exposure of the wind farm, wireframes and photomontages. Given the scale and extent of the Thanet project, it is inevitable that effects upon the surrounding seascape would be incurred, even though it is located 11.3km offshore.

The turbine towers are unquestionably substantial structures, but they retain an inherent repose in their appearance and form and, equally significantly, being sited out at sea, are being placed within a receiving environment that has both the scale and simplicity of form to not only accommodate the development, but also provide it with an appropriate contextual setting. Although the turbines are in themselves of a substantial scale, aesthetics and the nature of the receiving environment dictate that they are not inappropriate to offshore locations, even though there is a limited opportunity to incorporate mitigation measures to reduce their impact.

The general simplicity and open scale of the seascape, typically with an absence of visual reference points inland to sea views means that, in most cases, the Thanet project would not be seen to sit uncomfortably within its setting, even though it remains conspicuous from the closest viewpoints on days of good visibility. In contrast, depending upon the distance between the viewer/sea vessel and the wind farm, views from sea to land of the Thanet site may be more uncomfortable, as the backdrop of the coastline would provide a clear visual reference, and thus sense of scale, against which the turbine grouping would be seen.

The visual effects arising from the turbines would be greatest from the eastern coastline of the Isle of Thanet peninsula, but ease significantly with distance from the site both to the south and west, where the Isle of Thanet peninsula positively assists in restricting the visual envelope of the Thanet site to a large extent of the study area. It should also be noted that the visibility of the wind farm would be largely dependant upon the prevailing meteorological conditions at any one time. Meteorological conditions such as sea haze, fog and rain would act to obscure the view of the wind farm for a substantial proportion of time.

The proposed London Array wind farm would appear from North Foreland as a very small element in the distant background beyond the horizon and is likely to cause a **moderate adverse** cumulative visual impact in this isolated vicinity. Elsewhere, along the north coast there would be a range of cumulative impacts ranging from **minor** to **moderate adverse** with the addition of London Array and Kentish Flats

Overall, the likely seascape and visual effects arising from the Thanet project ranges from **minor** to **moderate adverse** with the main impacts isolated to the Isle of Thanet Regional Seascape Unit. The nature of the development however, with its offshore siting, the scale and relative simplicity of the marine components, the focusing of interest upon the coastal foreshore and of the Regional Seascape Units, all combine to make the Thanet project more acceptable in both visual and seascape terms. Moreover, the inevitable effects arising from the project are substantially reversible and, in the medium to longer term, are anticipated to leave **no net residual effect** upon either the seascape resource or the visual environment.

27.3.9 Shipping and navigation

A maritime traffic survey, navigation assessment and a Navigation Risk Assessment have been undertaken to study the potential impacts of the Thanet project upon shipping and navigation in the study area. The average number of ships transiting the wider area is approximately 76 per day or almost 28,000 vessels per year, the predominant vessel type being commercial Dry Cargo Vessels that account for two thirds of the total number of movements. A total of 467 vessels of all types, including Fishing Vessels, entered the Thanet site, an average of just over 16 per day.

The navigation assessment has shown that with one exception, the introduction of the wind farm should not raise the risks to shipping above levels currently being recorded at other areas around the UK coast. The traffic predictions support the introduction of an additional navigation buoy, as proposed by Trinity House Lighthouse Service in the area to the north of the Thanet site, which would mitigate the aforementioned exception.

TOW is applying to the Secretary of State for Trade and Industry to extinguish the public rights to navigation for the individual sites of the turbine towers, the offshore substation and the anemometry mast.

TOW also intends to apply to the Secretary of State for Trade and Industry for the implementation of Safety Zones for the Thanet project to protect the safety of life at sea. The requirement for Safety Zones will vary depending on the phase of the project and the activity concerned.

The wind farm towers will be painted, marked and fitted with navigation lights in accordance with the statutory requirements and will be fitted with an Automatic Identification System (AIS) transceiver and sound signals. Procedures to respond to casualties and implement Search and Rescue operations will also be established.

The increase in traffic volume during the construction of the wind farm would be low and is not expected to cause a significant increase in risk, providing suitable Safety Zones are agreed.

The Navigation Risk Assessment has shown that although the installation of a wind farm at the Thanet site would have effects on the overall risk profile of the area, the risks would all fall within the As Low as Reasonably Practicable (ALARP) zone and would be therefore be tolerable.

Some aspects of the Thanet project may even be considered to be beneficial. For example, many Ship's Masters are likely to keep the wind farm to port leaving their starboard side open for manoeuvring. This can be expected to increase lamina flow around the wind farm and reduce crossing traffic interaction thereby providing a **beneficial** impact by forcing vessels into better defined lanes.

The cumulative effects of the other wind farms in the Thames Estuary area are expected to be of **no significance**, due to their remote positions or minimal effects predicted on existing traffic flows.

Assessment of the navigational implications of the Thanet project was also undertaken given predicted increases in future traffic levels associated with local ports. The results of this research lead to the conclusion that the introduction of the Thanet project will have **no significant** impact on vessels navigating in the area for the life of the project.

- 1. TOW will work with the MCA before offshore construction commences to develop detailed and effective Search and Rescue plans.
- 2. Establish Safety Zones of 500m around each offshore structure and cable laying vessel.
- 3. Issue Notices to Mariners warning of construction activities.

Mitigation measures during operation

- 1. Placement of an additional navigation buoy, as proposed by Trinity House Lighthouse Service in the area to the north of the Thanet site.
- 2. The wind farm will be monitored around the clock with the potential for remote shutdown in the event of an incident or a request from the Maritime and Coastguard Agency.
- 3. Observation of the effects on traffic around the proposed navigation buoy will be made during the early life of the wind farm to check the vessel traffic flow predictions made.
- 4. Safety Zones would be established as follows:
 - Safety Zone of 500m around each offshore structure to exclude all vessels of 300GT and above from entering the site;
 - Safety Zone of 500m around each offshore structure to exclude fishing with drift nets or trawls; and
 - Safety Zone of 50m around each offshore structure to exclude all vessels other than when authorised by the wind farm control room or in an emergency situation

Given implementation of the stated mitigation measures the risks identified all fall within the acceptable range with normal operating precautionary measures in place.

27.3.10 Marine archaeology

A desktop assessment of the potential impact of the Thanet project on the archaeological resources below mean low water (MLW) was undertaken by using a variety of sources, including the National Monuments Record, the Kent Sites and Monuments Record, the UK Hydrographic Office and marine geophysical data. In addition, a variety of topographic, sea level, historical and archaeological data has been studied to assess the known and potential archaeological resource within the development area. The archaeological potential of the area includes submerged palaeo-landscapes or derived artefacts and wrecks and related maritime remains.

On the basis of their age, and the rarity of Palaeolithic and Mesolithic finds underwater, any such sites which are found would be of high, and probably national archaeological importance. The discovery of terrestrial sites from later periods within the marine study area is also possible. Any such sites would provide evidence for the lost coastline of that period, and thus are likely to be of high local or regional importance. The desktop assessment identified a number of wrecks and features of archaeological interest within the footprint of the wind farm and the 2km buffer zones around the export cable routes. Any of these located at the surface or at depth reached by construction could be directly impacted by excavations and foundation installation. Four marine sites were recorded within 150m of the export cable routes and 12 within the footprint of the wind farm array.

All impacts to archaeology would be permanent and any direct impacts on these sites would have a permanent and potentially significant effect if they were shown to be of archaeological importance.

No impacts over and above those experienced during the construction phase are anticipated.

Mitigation measures during construction

- 1. The basic principle with regard to any known archaeological sites is one of avoidance. Where this is not possible, the site would normally be investigated such that its importance could be determined, and a suitable level of mitigation works undertaken. In order to effectively mitigate any potential impacts on known sites and palaeo-landscapes within the study area, all aspects of any further archaeological work will be detailed by a Written Scheme of Investigation (WSI), which would be subject to the approval of Kent County Council Heritage Conservation Group's Principal Archaeologist and English Heritage's Maritime Team.
- 2. In order to prevent damage to known wreck sites and geophysical anomalies with archaeological potential, it may be appropriate to place Construction Exclusion Zones around each site. If the project plans cannot be altered to avoid an archaeological site, then the site would be subject to a process of evaluation to establish importance and extent followed by excavation if necessary.
- 3. Vibrocore and borehole surveys undertaken as part of the detailed design on the Thanet project would, wherever possible be subject to phased archaeological analysis. This is currently considered to be the most cost effective and reasonable way of mitigating the effect of development impacts upon submerged prehistoric sites.

27.3.11 Radar and transmission systems

In order to assess the potential effects arising from the Thanet project on aviation radar systems, the standard wind farm developer's application pro forma was submitted to the Civil Aviation Authority (CAA), National Air Traffic Services (NATS) and the Ministry of Defence (MOD) at an early stage in the development process. Dialogue was also initiated with marine radar and radio, telephone and television transmission system operators. None of the consultees contacted had any concerns regarding the Thanet project.

An initial assessment of the line of sight area indicated that the following known radar systems could be affected by the development:

- Kent International Airport;
- London Southend Airport;
- Maritime and Coastguard Agency, North Foreland;

- Port of London Authority, Margate; and
- BAE Systems, test sites at Bushy Hill and Dengie Flats

Of these, only the potential effects on Kent International Airport's radar are still being investigated. This effect relates to the upper blade tip of the wind farm being visible to the radar with a potential consequence that small aircraft at low altitude may not be detected. Flight trials have been undertaken over the Thanet site at a variety of heights to determine whether the turbine blades would be visible to the radar at Kent International Airport. Preliminary observations suggest that the wind farm would not be visible to the radar system at KIA.

Mitigation measures during operation

1. In the event that the flight trials do not prove conclusively that aircraft could not be seen above the wind farm at blade tip height, then by implication, the turbine blades could still be visible to the radar, although it is still not anticipated that there would be any significant effects due to the distance of the Thanet site from the radar. If these effects were deemed to be significant then a number of other mitigation measures would be explored.

27.3.12 Other human activities

Offshore human activities include oil and gas operations, marine aggregate extraction, marine disposal sites, telecommunications cables, military exercise areas and unexploded ordnance.

The Thanet site is not currently licensed for oil and gas exploration and production and it is considered extremely unlikely that any oil and gas reserves will be identified within this area in the future.

Aggregate extraction activities are ongoing 24km to the north of the site at Kentish Knock and Long Sand. The nearest marine disposal sites are located to the south of the site in Pegwell Bay (TH140) and to the east of the site at South Falls. No capital or maintenance dredging activities currently occur in the navigation approach channel to the Port of Ramsgate. However, agreement in principle with the Harbour Master on burial depth of the export cable when crossing this channel has been agreed to be 11m below Chart Datum.

The export cable route would cross three telecommunications cables to the southwest of the Thanet site, one of which is out of service. The location and method of crossing the two in service cables would be agreed with the cable operators. A length of the out of service cable would be cut to allow unimpeded routing.

Military practice and exercise areas (PEXA) are areas of coastal waters, which are available for use, or are in active use by the military, and in many cases involve the firing of live ammunition. Three PEXA areas are relevant to the Thanet site, however consultation with the Ministry of Defence (MOD) indicates that they would not object to the Thanet project.

Unexploded ordnance may be present in the Thanet area as a result of historic wartime activities. In order to minimise any impacts during construction, a munitions survey would be conducted over areas likely to be affected by construction.

- 1. A munitions contamination survey would be conducted over the wind turbines and jack-up vessel footprint, and export cable route with at least a 5m overlap around the perimeter.
- 2. Site safety instructions will be prepared to include necessary actions to be taken in the event that an item of ordnance is located. In addition, prior to and during the construction phases, munitions awareness briefings will be given to all contractor's site and ship's staff.

27.3.13 Socio-economics

Kent is a relatively prosperous sub-region within the national context, however, it lags behind the growth and development of the South East as a whole. Kent is the 12th largest economy out of the 53 British sub-regions. It has an industrial structure with a lower proportion of the workforce (20%) employed in knowledge intensive sectors than elsewhere. However, the number of people employed in these sectors increased faster in recent years than nationally and across the South East.

The unemployment rate is below the national average but above the South East rate. There are continuing disparities between the more prosperous parts of west Kent and the disadvantaged communities and areas of east Kent. The most disadvantaged part of the county is Thanet, which scores highest in the region using the National Indices of Deprivation.

The project has the potential to generate the following key socio-economic impacts during construction:

- Direct effects on local employment;
- Indirect or supplier effects;
- Induced effects;
- Direct effects on commercial fisheries; and
- Indirect effects on tourism.

The potential for direct employment has been estimated to be between 592 and 986 man years, with the construction phase expected to last over a one to two season period. It is anticipated that a substantial part of the required materials and especially services such as security, accommodation, transport, contracting would be sourced locally or nationally through the existing supply chain within the UK.

The induced effects would also result from the new spending power generated from the direct and indirect employment. Given the total project investment of in excess of \pounds 300 million, the effect on the national and local economy is expected to be of **moderate beneficial** significance.

Thanet District Council is currently considering an extension to the facilities offered by the Port of Ramsgate in order to diversify its activities and respond to the wind energy sector's requirements. If expansion were to proceed within the timeframe of the Thanet project, it may be possible to base the construction activities for the wind farm at the Port of Ramsgate. Consequently, an impact of **beneficial** significance would be anticipated.

Access restrictions to the construction site would have an impact on commercial fisheries, which have been estimated to be of **negligible** to **moderate adverse** significance, depending on the fishing methods deployed. Indirect impacts on tourism due to temporary disruption during construction are considered to be of **negligible** significance.

Once operational, the wind farm would have less significant socio-economic impacts in terms of generated man years and supply chain. However, up to 20 full time jobs would be created at the onshore operation and maintenance base, which is likely to be located at the Port of Ramsgate. It is estimated that the operation and maintenance phase would generate the equivalent of 39 to 66 man years of work each year. Of these jobs, it is anticipated that most of these would be employed within the Thanet local area. Overall, the expected employment generation or support is considered to be of **minor beneficial** significance to the Thanet and Kent areas and the national economy.

The impact on commercial fisheries during operation has been estimated to be of **negligible** to **moderate adverse** significance, depending on the method of fishing deployed.

The impacts on tourism during the operational stage of the wind farm would be associated with the visibility of wind turbines and the perception of the people who see them. Given the well developed nature of the majority of the Thanet and Dover coastline, it is considered that the wind farm would be acceptable to visitors. A recent survey carried out by Greenpeace regarding the proposed Scarweather Sands offshore wind farm at Porthcawl reported that 83% of the interviewed visitors said that the wind farm would make no difference to them returning to the beach. In conclusion, **no significant adverse** impact on tourism is anticipated and **no significant adverse** impact on local tourism revenues is expected.

In terms of cumulative effects, it is considered that the Thanet project, together with other Round One and Round Two projects, represents a significant step in stimulating the development of a renewable market, its supply chain and relative national employment. It is clear that the development of offshore wind farms in the Thames Estuary area and in other locations in the UK would foster continuity in the demand for services and would help to attract investments and long term commitments from the business community.

27.3.14 Geology, land quality and water resources

Information on the geology, hydrology, hydrogeology and land quality in the vicinity of the landfall site, onshore cable route and substation extension was collated in order to assess any impacts from the construction phase on these resources.

There are a number of interest features in the area, including a Site of Special Scientific Interest (SSSI) designated for its geological interest, aquifers at depth and nearby main rivers and watercourses. The construction activities would not, however, directly impact on any of these features due to distance separation. The working area of the onshore cable route will be demarcated with fencing to ensure that this remains the case.

Pollution prevention guidance will also be adhered to as part of good construction practice and be incorporated into a Method Statement.

Potential areas of historic contamination such as the substation extension will be subject to a site investigation to ensure that any contaminated material disturbed as a result of excavations or other construction activity does not pose a risk to nearby sensitive receptors or construction workers. Overall, **no impacts** are anticipated.

Mitigation measures during construction

- 1. To ensure that water quality is not affected during the installation of the cables, the following pollution prevention guidance (PPG) documents from the Environment Agency will be adhered to and will form part of the construction method statement:
 - PPG1 General Guidance for the Prevention of Water Pollution;
 - PPG5 Works in, Near or Liable to Affect Watercourses;
 - PPG6 Working at Construction and Demolition Sites;
 - PPG8 Safe Storage and Disposal of Used Oils; and
 - Control of Water Pollution from Construction Sites A Guide to Good Practice.
- 2. Accidental spillages of fuels or oils from vehicles or the directional drilling rig could have potentially adverse impacts on local soil or groundwater. In order to reduce these impacts, the following good construction practice measures will be adopted:
 - Adherence to advice provided in the Environment Agency's 'Pollution Prevention Guidelines' on working at construction sites and near water bodies;
 - Any spillage of fuel or chemicals that occur will be cleaned up immediately and the Environment Agency informed if appropriate; and
 - Equipment will be used in accordance with the manufacturer's recommendations, including servicing frequencies to ensure optimum operation.
- 3. An intrusive site investigation will be undertaken prior to construction within the substation extension area to determine the actual risks and, where necessary, determine the measures required to ensure that there is no significant risk to both the on and off site receptors listed below:
 - Construction workers;
 - Building and structures;
 - Shallow groundwater within the gravel layers of the Alluvium;
 - Deep groundwater with the chalk aquifer; and
 - Surface waters (e.g. River Stour).
- 4. Regarding storage and disposal of any construction wastes, the following good construction methods will be adopted.
 - The Contractor will have a Duty of Care with regard to any waste generated on site, meaning that they will be responsible for the safe storage, transportation and eventual disposal of the waste;
 - Waste will be stored in designated areas away from surface water drains. Skips will be covered to prevent rainwater accumulation and waste/litter blown out;
 - Wastes will be segregated to avoid potential cross contamination by 'contaminated' and 'inert' wastes where appropriate;

- No burning or disposal of wastes on site will take place; and
- Any waste carriers and receiving landfill sites will be registered.

Mitigation measures during operation

1. Good practice and pollution prevention and control measures will be taken to avoid any spillages or contamination.

27.3.15 Terrestrial ecology

The majority of the onshore cable route would be buried below the A256 Sandwich Road. Habitats within the study area include rough and amenity grassland, arable, scrub and small areas of broadleaved woodland mostly characterised by common and widespread species. The cable route crosses a small section of the Sandwich Bay and Hacklinge Marshes Site of Special Scientific Interest (SSSI) and runs adjacent to a 450m stretch of Roadside Nature Reserve (RNR), which is located along the east of the A256 Sandwich Road.

Protected species were identified within the study area during the Extended Phase 1 Habitat survey, although significant adverse impacts on these species are not anticipated as a result of the construction activities due to distance separation. However, there remains the potential for species such as reptiles, breeding birds and water voles, to move into an area that would be directly impacted by construction activities.

Given the successful implementation of the stated mitigation measures, in addition to the preparation of an Environmental Action Plan, impacts are anticipated to be **minor adverse** to **negligible**. Any mitigation measures if required will be implemented in accordance with English Nature and Environment Agency guidance. **No impact** is envisaged during the operational stages.

Mitigation measures during construction

Hacklinge Marshes Site of Special Scientific Interest

- 1. The working corridor will be minimised and demarcated to avoid unnecessary disturbance to other areas of the SSSI from movement of plant or storage of materials;
- 2. On site dust damping will be undertaken if required to prevent the creation of dust; and
- 3. Liaison will take place with English Nature regarding works inside the SSSI.

Roadside Nature Reserve (RNR)

4. The RNR would be demarcated with fencing to ensure that construction activities did not overspill into the area.

Reedbed

- 5. Demarcation of the working area, therefore avoiding the area of reedbed; and
- 6. Excavated spoil to be stored in areas away from the reedbed to avoid run off.

Trees and hedgerows

7. If any tree or hedge removal is necessary as part of the construction phase, these will be reinstated using native species of local provenance.

Nationally scarce plant species

- 8. Avoidance of areas of nationally scarce plants through mitigation during the design process;
- 9. Adequately fence both areas of nationally scarce plants prior to construction commencing; and
- 10. Brief construction team about areas to avoid, via a Construction Method Statement.

Japanese knotweed

- 11. The Cable Contractor will be informed of known locations of invasive plant species and such areas will be designated as "controlled areas" during construction works;
- 12. When working in "controlled areas", measures will be taken to ensure all vehicles, equipment and clothing are free of seeds and plant fragments before leaving the area;
- 13. All soil and plant material from these "controlled areas" will be regarded as "controlled waste" and will be subject to legal controls in terms of transportation and disposal off-site;
- 14. Best practice guidance provided by the Environment Agency will be adhered to; and
- 15. Post-works monitoring will be carried out to ensure that the Japanese Knotweed has not spread.

Common lizard

16. Measures to prevent killing or injury of common lizard will be put in place prior to the commencement of construction works via mitigation measures to exclude common lizards from the working area.

Bats

17. No mitigation measures required.

Water vole

- 18. A further water vole survey will be carried out prior to the construction of the onshore cable route if banks of ditches are to be disturbed;
- 19. Any bank vegetation will be checked for nests prior to construction, then strimmed to ground level to at least 1.5m beyond the bank top. The strimmed material will be left on the banks for at least three days to allow water vole and other mammals to disperse naturally. If any burrows are present, the turf will be stripped using hand tools and the material left on site for a further three days. If there are any delays to the construction period, the vegetation will be kept strimmed to ground level. Any water vole exclusion exercise would be carried out under the supervision of an appropriately experienced ecologist;

20. Any water vole dispersal exercises will take place at the appropriate time of year i.e. April to end May or September to October, thus avoiding the breeding season and the winter when water voles are least active. The methodology will be approved by English Nature and Environment Agency prior to commencement; and

21. Reinstatement of banks where necessary following the construction period.

Birds

- 22. Work to be completed outside the breeding season, or if this is not practicable, all scrub habitat within the required working width will be removed during the period September to February;
- 23. Any suitable bird nesting habitat remaining within the working width of the route prior to the start of works should be checked for nesting birds;
- 24. Minimise working area to reduce the impact on breeding birds; and
- 25. Brief construction workers on the implications of the Wildlife and Countryside Act.

27.3.16 Landscape and visual character

The likely landscape and visual effects arising from the onshore elements of the Thanet project have been assessed. Effects upon the existing landscape, its character and features, and upon those who view it, would inevitably occur during the construction phase, however, it is considered that these would only have a collective significance of **minor adverse** at worst and would be limited to an isolated area of Pegwell Bay and the A256 Sandwich Road corridor. Elsewhere impacts would be **negligible**.

The nature of the onshore development, being fairly isolated and largely underground would mean that the landscape and visual effects arising from these works are temporary in nature, with the exception of a small extension to the existing substation at Richborough Power Station and a manhole cover as access to the underground joint transition pit. The small extension to the existing substation would not create any new impact on the existing industrial built characteristics of the power station site and impacts would be **negligible**. All vegetated or open areas that have been disturbed will be reinstated to ensure no net residual effect upon either the landscape resource or the visual environment.

Mitigation measures during construction

- The selected onshore cable route has taken account of areas of valued and high quality landscape, seeking to avoid these wherever possible. These include Pegwell Bay National Nature Reserve and Country Park, and the River Stour, both of which lie within the locally designated Special Landscape Area. The selected onshore cable route will also seek to minimise intrusion into and disturbance to the nationally designated marine areas within Pegwell Bay.
- 2. Where cable routing unavoidably disturbs areas of existing vegetation, these will be replaced with appropriate new planting of species of similar habit and type. Details of these will be agreed with the Local Authorities.

27.3.17 Terrestrial archaeology and cultural heritage

A desktop archaeological assessment was undertaken covering the export cable route above mean low water (MLW). A high number of archaeological sites were identified within the coastal study area, although very few of them lie within the 500m impact zone around the onshore works.

Whilst there are no known Palaeolithic sites within the study area, there is potential for the discovery of as yet unknown archaeological finds from this and other eras. There is a large body of evidence to suggest this potential, particularly in terms of the human occupation history of the region.

Construction of the onshore cable route to Richborough Power Station would only cut through layers of made ground and debris previously associated with road building. There would therefore be **no impact** on archaeological resources within this area. Cable installation may have an impact on the coastal alluvial deposits in the intertidal and those skirting Pegwell Bay.

In order to minimise impacts on areas of potential archaeological interest, a walkover survey of the intertidal would be undertaken and Exclusion Zones would be introduced, should any significant discoveries be made. A watching brief during construction of the trench and joint transition pit between the shoreline and the A256 Sandwich Road will also allow sufficient time for the inspection of any exposed archaeology. Given any significant discoveries, further mitigation methods would be proposed in liaison with Kent County Council's Archaeological Officer and English Heritage's Maritime Team where necessary.

Given these mitigation methods, it is predicted that any impacts on the terrestrial archaeology as a result of the development would be **negligible**.

Mitigation measures during construction

- 1. It is proposed that all aspects of the proposed terrestrial archaeological work be detailed into a Written Scheme of Investigation, to mitigate the impact of the onshore works upon known sites, and establish the presence of any unknown sites.
- 2. In the event that any significant features are identified within the intertidal section of the onshore cable route, then these would be marked as Exclusion Zones on scheme masterplans. Where the Exclusion Zone would impinge on construction and an archaeological origin to the feature is suspected, then further archaeological investigation such as geophysical survey or evaluation trenching will be undertaken in order to resolve the situation.
- 3. Further mitigation would include a watching brief during construction, with sufficient time available for archaeological inspection of any exposed archaeology.
- 4. A watching brief will be carried out during construction in the area of the cable route above mean high water (MHW). Provision would be made for the recording and sampling of any archaeological deposits that may be revealed.

27.3.18 Coastal tourism and recreation

The main tourist areas in Thanet are the coastal towns of Ramsgate, Broadstairs and Margate. These towns attract visitors because of their coastal location and the available facilities such as hotels, restaurants and shopping centres. Data from the Thanet District Council Tourism Services indicate that between 2002 and 2005, nearly 800,000 enquiries were made to the local tourist offices. Tourism expenditure is estimated to have been approximately £44.96 million in 2000, generating 4,860 direct and indirect jobs. Other important tourist destinations within the study area include Sandwich Bay and Deal, both located in Dover District.

There are numerous recreational opportunities along the Thanet and Dover coast including bathing, scuba diving, surfing, and watersports. The main recreational activities at Pegwell Bay include walking, bait digging and kite surfing at low tide and surfing at high tide. In addition, it attracts visitors with a special interest in geology, because of its geologically important chalk cliffs.

The Royal Yachting Association has indicated that the Thanet site is subject to light recreational use, while in the wider area, the main routes of interest for the Thanet project are the heavily used recreational route along the coast from Ramsgate to the north, and the medium used recreational route from Kent to Europe.

There would be an increase in shipping movement to and from the wind farm site during construction of the Thanet project. In addition, the site would not be accessible during the construction phase to boats, other than those involved in the construction activities. Safety of navigation would be ensured at all times by measures including Safety Zones and Notices to Mariners, where appropriate.

Temporary restrictions on the use of a relatively small section of the intertidal and beach area would be in place during the onshore works at the northern end of Pegwell Bay. However, the duration of the works within Pegwell Bay is anticipated to be in the order of ten days and no access point to the Bay would be affected. Notices would be posted to provide information on the works, programme and a point of contact for relevant recreational groups and associations. The impact of the onshore construction works on traffic and access is estimated to be of **negligible** significance.

It is considered that the construction works would not deter tourists from visiting the area, and would not adversely affect the quality of their stay. Overall, the impacts on recreational activities and tourism are anticipated to be of temporary nature and limited spatial extent and are therefore considered to be of **negligible** significance.

The wind farm may cause some disruption to recreational yachting once operational by possibly requiring a diversion, although it is not anticipated that recreational craft would be excluded from the wind farm. Provided that navigational safety requirements are met, overall the disturbance to recreational boating is anticipated to be of **minor adverse** significance.

The impacts on tourism during operation would be associated with the visibility of the wind turbines and perception of them. Recent surveys carried out by Greenpeace and MORI regarding wind farms reveal that no detrimental effects on tourism can be

anticipated. On the contrary, **minor beneficial** effects may arise, as the wind farm could become a local attraction.

A number of wind farms are currently being planned within the Thames Estuary area. However, given their relative distribution and the insignificant level of impact to tourism and recreational activities of each of them, **no significant adverse** cumulative impact on tourism and recreational activities is anticipated.

27.3.19 Traffic and access

The onshore cable route would, for much of its length, be buried beneath the A256 Sandwich Road. The section of road south of the Ebbsfleet Lane (B2084) and Ramsgate Road (A256) roundabout, which includes Sandwich Road, suffers from significant congestion during peak hour flows, with queues and delays on a regular basis. Disruption to the local traffic network would be anticipated during the installation of the onshore cable route and during the delivery of plant and materials, which would include up to 42 lorry loads delivering the cables over a period of four to six weeks.

All works within the highway will be undertaken in accordance with the New Roads and Street Works Act (1991) and deliveries will be timed to avoid the morning and afternoon peak traffic flows. In addition, further discussions will take place with the Highways Authority to agree other traffic management requirements as well as the maintenance of access to residences and businesses. Overall, a short term **minor adverse** impact is anticipated.

The affected stretch of road also includes part of the recently consented improvement works along the A256, known as East Kent Access, Phase 1C. The programme for these works is unclear at the present time and discussions will therefore take place with Kent County Council to ensure that there is minimal disruption to the stretch of road as result of the two projects.

Mitigation measures during construction

- 1. In order to minimise the amount of disruption to the local road network, deliveries would be programmed outside the morning and evening peaks.
- 2. All work in the highways will be carried out in accordance with the New Roads and Street Works Act (1991).
- 3. It is anticipated that cable ducts would be laid during the works associated with Phase 1C of the East Kent Access so as to minimise the need to excavate the road again at a later date and, hence, reduce the potential for disruption to other road users.
- 4. Access to all existing residences and business premises would be maintained at all times as far as possible, with road users and nearby residents and businesses warned in advance of the works and any particular elements of disruption.

27.3.20 Noise, dust and air quality

Noise during the construction phase of the onshore cable route could arise from plant and machinery involved in the excavation of the cable trench. There are a number of sensitive receptors in the form of residents of the village of Cliffs End that front onto the A256 Sandwich Road, which comprises the onshore cable route. Exposure to elevated noise levels at these locations is anticipated for the very short duration while excavation works are adjacent to the receptor. The levels would decrease significantly with increasing distance. Given the implementation of the construction noise mitigation measures, including daytime working within normal working hours and liaison with local residents, a highly localised **minor adverse impact** is anticipated.

The only construction activity associated with the wind farm that could have a significant effect on sensitive receptors such as residences is noise from the installation of driven monopiles, resulting in a potential low frequency impulsive 'thump' sound. A standard noise calculation shows that receiver noise levels at landfall, some 11km away, would be well below normal rural background noise levels in the UK, which are normally in a range of 35-45dB(A). Impacts of **negligible** significance are anticipated during construction. **No impact** on either noise or air quality is anticipated during either the operational or decommissioning phases of the Thanet project.

Mitigation measures during construction

- 1. Consent under Section 61 of the Control of Pollution Act (1974) would be sought from the Local Authority. The consent could include the following mitigation measures:
 - All relevant residents within 200m of the works would be informed in writing in advance of the proposed works commencing. This information would include a timetable of works, a schedule of working hours, the extent of works, and a contact name, address and telephone number in case of complaint or problem;
 - An information board would be displayed at the site to provide a contact name and telephone number, to which the public can channel their queries, any problems would be attended to as soon as possible;
 - Standard noise limits would be applied, as recommended in BS 5228 Parts 1, 2 and 4 BSI, 1997 and 1992, respectively. All plant and machinery would meet the relevant British Standards i.e. all equipment would be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers;
 - The movement of vehicles to and from the site would be controlled, and vehicle engines would not be revved or allowed to idle near residential property;
 - All personnel involved in the construction works would be made aware of the need to keep noise to a minimum through appropriate training;
 - Potentially noisy activities would be kept as far away as possible from noise sensitive locations;
 - Equipment that directs noise in a certain direction would be oriented so that the noise that it emits travels away from the noise sensitive sites;
 - Equipment would not be left running between work periods;
 - Materials would be lowered rather than dropped; and
 - Liaison with the Environmental Health Officer would be undertaken to determine acceptable noise limits.

27.4 Conclusion

Overall, given the successful implementation of the stated mitigation measures as committed to by TOW, as well as further dialogue with interested parties and Regulators, it is not predicted that the Thanet project would have any long term unacceptable impacts. The project would however make a significant contribution to both regional and national renewable energy targets and reduce CO_2 emissions by up to 1 million tonnes per year.