



Galloper Wind Farm Project
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NON TECHNICAL SUMMARY

1 INTRODUCTION

1.1.1 Galloper Wind Farm Limited (GWFL) is proposing to construct an offshore wind farm in the Outer Thames Estuary and associated infrastructure to facilitate export of power to the national electricity transmission system. The proposed development is known as Galloper Wind Farm (GWF).

1.1.2 An Environmental Impact Assessment (EIA) has been undertaken of the project to predict its environmental effects. The full findings of the EIA are presented within the Environmental Statement (ES). The objectives of the ES are to ensure that environmental factors are considered throughout the project, and the decision-making process, and potential adverse and beneficial environmental impacts are identified and assessed. As a result of this assessment process, potential measures to avoid or minimise any likely significant impacts can be identified and where necessary subsequently implemented.

1.1.3 This Non-Technical Summary (NTS) provides a summary of the findings presented within the ES.

1.2 The Need for the Project

1.2.1 The UK has committed to sourcing 15% of its total energy from renewable sources by 2020 and projections suggest that by 2020, 30% or more of our electricity could come from renewable sources, compared to 6.7% in 2009.

1.2.2 There are four key drivers for the shift in energy production to renewable sources in the UK:

- The need to tackle climate change;
- The need to secure energy supply;
- The need for new energy infrastructure; and
- The need to maximise economic opportunities.

1.2.3 The UK is well suited to producing offshore wind energy and potentially has the largest offshore wind resource in the world as well as having over 33% of the total European potential offshore wind resource. In addition, offshore wind has the potential to produce greater quantities of energy than onshore, as wind speeds are generally higher offshore and wind turbulence is lower.

1.2.4 Projects such as GWF are important in developing the renewables industry in the UK and shifting energy consumption away from non renewable sources. This will not only help the UK reach binding targets, but will also lead to benefits ranging from small scale economic opportunities to larger scale reductions in the emissions associated with global climate change.

1.3 SSE Renewables and RWE Npower Renewables Ltd

- 1.3.1 GWFL represents a joint venture between SSE Renewables (SSER) and RWE Npower Renewables Ltd (RWE NRL).
- 1.3.2 SSER and RWE NRL have been awarded the rights to develop GWF from The Crown Estate. The proposed wind farm has a capacity of up to 504 Megawatts (MW) and is an extension to the existing Round 2 Greater Gabbard Offshore Wind Farm (GGOWF) which is currently under construction.
- 1.3.3 SSER is responsible for the development and construction of renewable energy projects across the UK, Ireland and Continental Europe. SSER is the UK's leading generator of renewable energy with over 2,200MW of renewable electricity generation capacity.
- 1.3.4 RWE NRL is the UK subsidiary of RWE Innogy and already operates the offshore wind farms North Hoyle (60MW) and Rhyl Flats (90MW) in North Wales. Overall, RWE Innogy operates renewable power plants with a total rated capacity of 2,200MW and invests approximately 1.1 billion euros a year in the expansion of renewable energy within Europe.

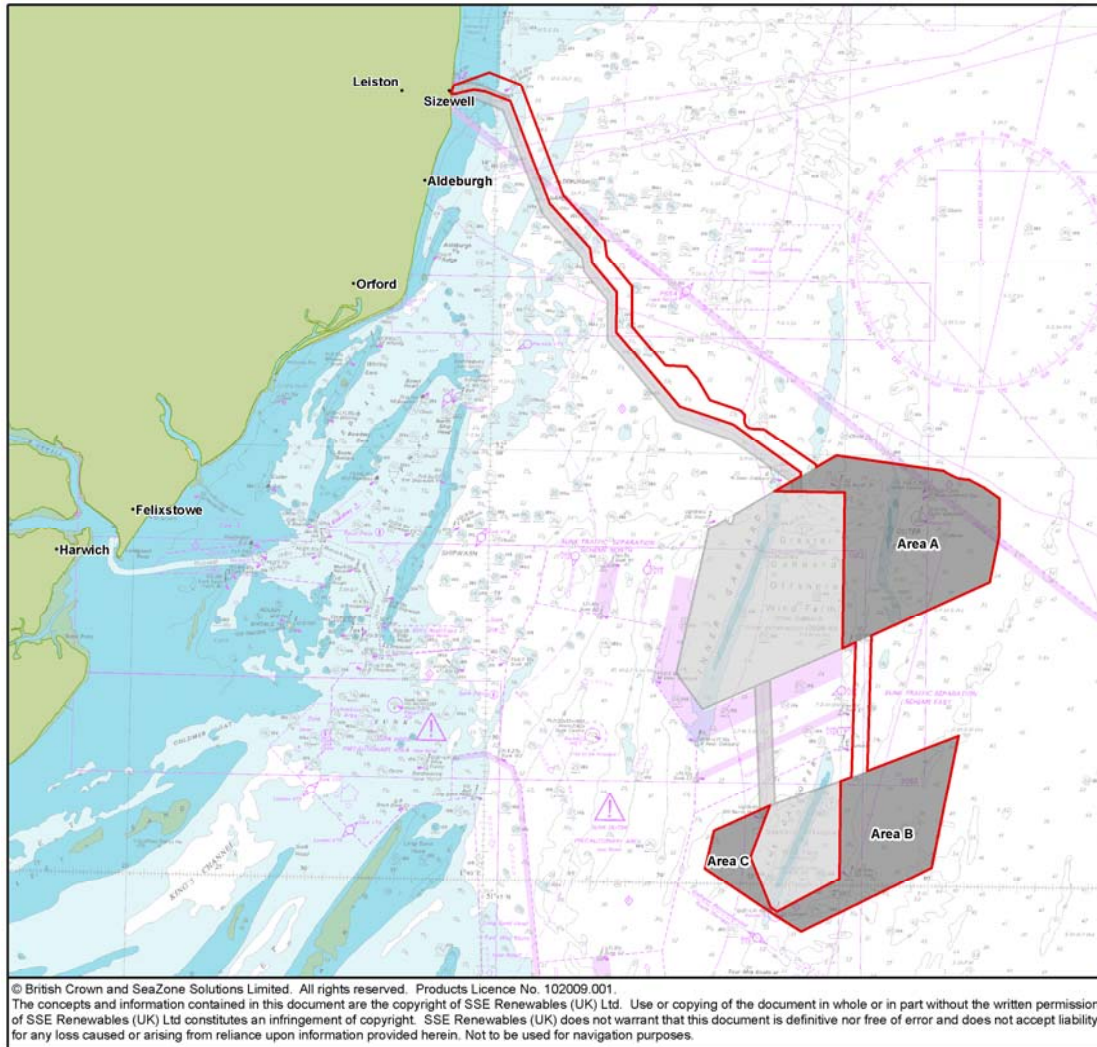
1.4 The Galloper Wind Farm Project

- 1.4.1 The GWF project comprises the installation, operation and subsequent decommissioning of GWF and associated infrastructure. The proposed wind farm will be located approximately 27km, at its closest point, from the Suffolk coast. The project will involve the development of up to 140 wind turbine generators (WTG), with a maximum capacity of 504MW encompassing an area of 183km² within three areas (termed Area A, B and C throughout the ES, see **Figure 1**).
- 1.4.2 The export cable/s will be brought to shore at Sizewell, with a proposed substation to connect the project to the national electricity transmission system via existing transmission towers constructed approximately 1km inland. **Figures 1** and **2** provide an overview of the offshore and onshore aspects of the proposed GWF project.
- 1.4.3 Detail of the key project components are summarised in **Table 1**.

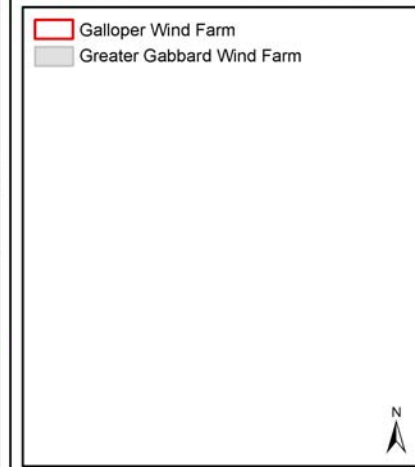
Table 1 Key project components

Key project characteristics	
GWF site area	Up to 183km ²
Minimum distance to shore	Approximately 27km (14.6 nautical miles)
Maximum capacity	504MW
Maximum number of WTGs	140
Maximum height of WTGs	195m above Lowest Astronomical Tide (LAT)
Maximum rotor diameter	164m
Minimum WTG spacing	Minimum spacing downwind = 856m. Minimum spacing crosswind = 642m
Turbine capacity	Subject to final selection. For the range of rotor diameters considered, turbines models currently on the market provide capacity in the approximate range 3.5 to 7MW capacity
Foundation type	Subject to final selection. Monopile, space frame, concrete gravity base and suction monopods are being considered
Maximum numbers of ancillary structures	Up to 4 offshore platforms (these may support substations (OSP), accommodation and or collecting equipment) 3 meteorological masts
Offshore export cable	AC transmission via a cable of 132kV. Maximum of three export cables.
Offshore inter and intra-array cables	Up to 300km of cables within the wind farm array
Cable installation method	Jetting, ploughing or trenching
Cable landfall location	Sizewell (to the south of the Sizewell power stations)
Onshore substation	Two compounds: one 132kV GWF compound (170m by 130m (2.2ha) and one 132/400kV transmission compound approximately 70m by 130m (0.9ha). Both compounds located adjacent to each other, and next to the existing GGOWF substation. The heights of

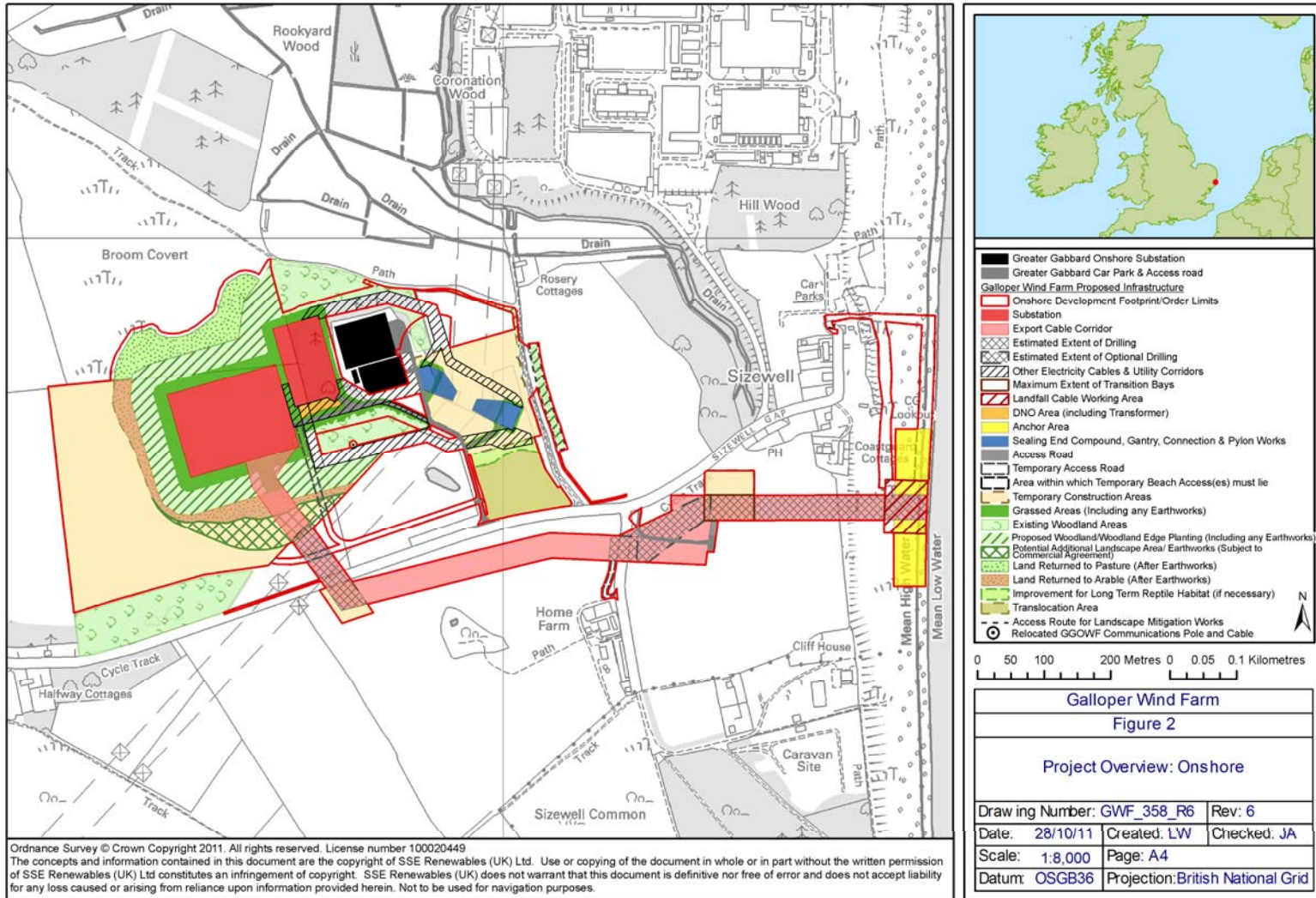
Key project characteristics	
	<p>equipment and buildings within the compound will vary. The tallest buildings within the substation will be up to approximately 14m in height. Lightning protection rods may be required on some of the buildings and will have a height of up to 3m above these buildings and a diameter of up to 50mm.</p>
Onshore transition bays	Located in arable land to the south of Sizewell Gap.
Sealing end compounds	One located adjacent to each of the two electricity transmission towers adjacent to Sizewell Wents with new overhead wires rising up to extended arms on one side of each electricity transmission tower.
Onshore cabling	Directional drilling where it is deemed necessary (see below). Open trenching for the remainder of the cable route.
Onshore cable corridor	23m to 33m wide depending on the installation technique, with up to 38m working width overall.
Directional drilling	<p>Three possible locations.</p> <ul style="list-style-type: none"> • Between cable landfall and transition bays; • Across Sizewell Hall access road; and • Across Sizewell Gap.
Onshore landscaping works	Approximately 40m wide screening landform located to the north, south and west of the proposed onshore substation development where not conflicting with cable routes. Up to 5m high with additional screening planting.



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Galloper Wind Farm		
Figure 1		
Project overview: Offshore		
Drawing Number: GWF_343_R9	Rev: 9	
Date: 28/10/11	Created: LW	Checked: PG
Scale: 1:400,000	Page: A4	
Datum: WGS1984	Projection: UTM Zone 31N	



1.5 Regulatory Consents

- 1.5.1 Under the provisions of the Planning Act 2008, all new offshore renewable energy generation developments over 100MW (including projects where an existing development is extended, increasing the cumulative capacity to over 100MW) are Nationally Significant Infrastructure Projects (NSIP). Under the Planning Act, consent for development takes the form of a 'development consent order' (DCO).
- 1.5.2 It is possible to include development associated with the generating station within the scope of the DCO. As a result GWFL has decided to include the offshore electricity substation/s, the cable/s exporting electricity to shore, the onshore substation, onshore cables and the connection to the national electricity transmission system within the DCO. All of these works are assessed within this ES.
- 1.5.3 The inclusion of the onshore works (including connection to the national electricity transmission system) within the DCO means that no separate onshore planning permission is required, as this is, in effect, included within the DCO.

1.6 Development Programme

- 1.6.1 GWFL anticipate that GWF will be operational in 2017. To achieve this, a programme of environmental assessment and consultation began in 2007 to support the consenting and environmental assessment of the development.
- 1.6.2 One of the first project milestones was the submission of the request for a Scoping Opinion for GWF to the IPC in June 2010. The request was supported by a Scoping Report, which provided an overview of the baseline conditions of the physical, biological and human environment; identified potential environmental impacts of the construction, operation and eventual decommissioning of the project and presented the approach proposed by GWFL to carrying out the EIA. The Scoping Opinion included comment from the IPC and statutory consultees.
- 1.6.3 Further consultation was undertaken through formal Section 42 consultation under the Planning Act 2008 via the submission of a Preliminary Environmental Report (PER). Community consultation under Section 47 has also been carried out in parallel with the Section 42 statutory consultation. The process for community consultation is set out in a Statement of Community Consultation (SoCC).
- 1.6.4 Key project milestones are detailed in **Table 2**.

Table 2 Completed and proposed development programme milestones

Milestone	Date
Scoping Report submitted	June 2010
Scoping Opinion received	August 2010
Statement of Community Consultation advert published	June 2011
Community Consultation period (Section 47 consultation)	13 th June 2011 to 14 th July 2011
Statutory Consultation Period (Section 42 Consultation)	3 th June 2011 to 14 th July 2011
Development Consent Order application submitted	November 2011
Onshore construction works	Overall onshore construction window of 60 months
Offshore construction works	56 month offshore construction window, with commencement in Q2 / Q3 2015

1.6.5 The Scoping Report and Scoping Opinion can be downloaded from the IPC website:

- <http://infrastructure.independent.gov.uk/wp-content/uploads/2010/07/Gallop-Scoping-report.pdf>
- http://infrastructure.independent.gov.uk/wp-content/uploads/2010/09/Gallop-scoping-opinion_web.pdf

1.6.6 The PER can be downloaded from the GWF website:

- <http://www.gallopwindfarm.com/consultation.php>

1.7 Site Selection and Alternatives

1.7.1 GWF presents the culmination of a number of years of investigatory work by GWFL. In 2008, GWFL commissioned a feasibility study into the potential for further offshore wind farm development in the vicinity of GGOW F, and in 2009 The Crown Estate opened a formal bidding process for extension projects to Round 1 and 2 sites (collectively known as Round 2.5). The Crown Estate's requirements for Round 2.5 developments had significant influence on the site selection for GWF as they stated that the extension site must:

- Be of an appropriate scale to the original site;

- Take into consideration environmental parameters and other constraints;
 - Share a substantial part of one or more boundaries with the original site; and
 - Demonstrate synergies with the original site, e.g. of construction, operation, improvement of economics and / or grid connectivity.
- 1.7.2 Since award of the site from The Crown Estate in 2010, the GWF offshore site boundary has been refined following consultation with key stakeholders as part of the iterative EIA process and further investigation into the existing environmental and human parameters of the site.
- 1.7.3 A cable landfall study was undertaken in 2010. The preferred location for the cable landfall is approximately 50m to the north of the GGOWF cable landfall on Sizewell Beach on the stretch of coastline between Coastguard Cottages and Cliff House (**Figure 2**). The final choice considered a number of local receptors including the locations of nature conservation designations, residential properties and areas of archaeological importance.
- 1.7.4 Much of the coast in the Sizewell area sits within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB). Whilst AONBs are protected landscapes of national importance the Overarching National Policy Statement for Energy (EN-1) states: “*The IPC may grant development consent in these areas in exceptional circumstances. The development should be demonstrated to be in the public interest and consideration of such applications should include an assessment of:*
- *The need for the development, including in terms of national considerations, and the impact of consenting or not consenting it upon the local economy;*
 - *The cost of, and scope for, developing elsewhere outside the designated area or meeting the need for it in some other way, taking account of the policy on alternatives; and*
 - *Any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.*
- 1.7.5 *The IPC should ensure that any projects consented in these designated areas should be carried out to high environmental standards, including through the application of appropriate requirements where necessary.”*

- 1.7.6 Suffolk Coastal District Council's (SCDC) local planning policy with regard to the AONB also acknowledges that development in the AONB is acceptable where there is a n overriding national need for the development in the location, and where it can be demonstrated that there is a lack of acceptable alternative sites.
- 1.7.7 In deciding on a preferred location for the substation, GWFL have been mindful of existing planning precedent with regard to the AONB. Of particular note are the Sizewell Nuclear Power Stations (A and B) and the effect that they have on the AONB in th e Sizewell area. An onshore substation option appraisal exercise was undertaken for ten possible substation locations in the Sizewell area. The substation options were then appraised to identify any positive features and any potentially adverse environmental or technical impacts in relation to each of the options. As a result of this process seven locations were considered unsuitable for further consideration.
- 1.7.8 Further consideration of the sp ecific landscape and visual impacts for the remaining three options was th en undertaken. In addition, a per iod of community consultation was also undertaken to present the potential options to the public. Following this assessment, and taking on board community feedback, the site adjacent to the existing GGOWF substation, at Sizewell Wents, was chosen as the preferred and most suitable location for the GWF onshore substation development.
- 1.7.9 National Grid Electricity Transmission (NGET) undertook a separate option appraisal exercise to identify the preferred location for the infrastructure to connect the GWF substation to the natio nal grid. Three shortlisted options were presented at a public exhibition held in Leiston in March 2011. The majority of respondents favoured locating the transmission compound either at the existing National Grid Sizewell A substation or adjacent to the existing GGOWF substation. Di scussions with EDF Energy and the Nuclear Decommissioning Authority (NDA), regarding the future use of the Sizewell A site, concluded that it is preferable to retain the option of using the Sizewell A substation site for nuclear-related purposes. In add ition, Suffolk Wildlife Trust has submitted a consultation response to NGET stating that the site could present significant adverse impacts to the Sizewell Marshes Site of Scientific Special Interest (SSSI) due to connection infrastructure and cabling that would be required across the SSSI. The Sizewell A substation site was therefore discounted and the site adjacent to the existing GGOWF substation and the proposed GWF onshore substation development became the preferred location for the transmission elements of the onshore infrastructure.

1.8 Data Collection and Surveys

- 1.8.1 A substantial number of surveys and technical studies have been undertaken specific to GWF, in order to obtain a full understanding of the implications of the development on the site and surrounding area. These have included:

- Geophysical survey to understand the characteristics and features on the surface and subsurface of the seabed;
- Ornithological (bird) and marine mammal surveys;
- Marine biological survey including sampling and analysis of animals and plants living in the sediments of the seabed and on the surface of the seabed;
- Shipping and navigation survey;
- Landscape, seascape and visual impact assessment;
- Military and civil aviation technical study;
- Archaeological assessment of geophysical data;
- Archaeological intrusive survey within the onshore substation footprint;
- Terrestrial ecological survey to identify the main habitats onshore and the presence of any protected species; and
- Traffic survey.

1.8.2 In addition, an extensive set of survey and monitoring data, associated with the adjacent GGWF, has been used to provide an appreciation of the site characteristics.

2 IMPACT ASSESSMENT

2.1.1 The ES includes an assessment of the predicted impacts of the project. The impact assessment has been undertaken using standard EIA methodologies and has been informed by a number of other studies. Throughout the assessment it has been ensured where flexibility is maintained in the design parameters, the worst case scenario has been identified for each relevant impact and used to form the basis of the impact assessment. The worst case scenario for each receptor (and their associated impacts) is detailed and justified within each of the technical Chapters of the ES,

2.1.2 In order to ensure consistency throughout the ES, the significance of potential impacts is assigned to each parameter using the classification terminology detailed in **Table 3**. In some instances a differing methodology is required; where this is the case the methodology has been fully explained within the ES Chapter.

Table 3 Impact classification terminology

Impact Significance	Definition
No change	There is an absence of one or more of the following: impact source, pathway or receptor
Negligible	The impact is not of concern
Minor adverse	The impact is undesirable but of limited concern
Moderate adverse	The impact gives rise to some concern but is likely to be tolerable (depending on the scale and duration)
Major adverse	The impact gives rise to serious concern; it should be considered as unacceptable
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

2.2 Potential Environmental Issues

2.2.1 The ES describes the potential environmental impacts, both offshore and onshore, as a result of the GWF development. A summary of the impacts identified is presented in the paragraphs below. For each receptor, the existing conditions are summarised and the key findings of the impact assessment of the construction, operation and decommissioning activities are outlined. In addition, potential inter-relationships between parameters are considered, and cumulative effects are outlined in respect to other wind farms and activities in the vicinity of GWF.

Nature conservation designations

2.2.2 There are a number of local, national and international designated sites of nature conservation importance in the vicinity of both the onshore and offshore components of the GWF project. This assessment presented in this Chapter has been informed from the relevant technical Chapters of the ES and the GWF Habitats Regulations Assessment (HRA) Report which is being submitted alongside the DCO.

2.2.3 Those sites of most relevance to the onshore development are:

- The Sandlings Special Protection Area (SPA);
- Sizewell Marshes Site of Special Scientific Interest (SSSI);
- Leiston to Aldeburgh SSSI;

- Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB);
- Suffolk Shingle Beaches County Wildlife Site (CWS); and
- Suffolk Heritage Coast.

2.2.4 The sites considered of most relevance to the offshore development comprise:

- The Outer Thames Estuary SPA;
- The Alde-Ore Estuary SPA;
- Flamborough Head and Bempton Cliffs SPA;
- The Margate and Long Sands candidate SAC (cSAC);
- Marine Conservation Zone NG1b;
- Suffolk Coast and Heaths AONB; and
- Sizewell Rigs CWS.

2.2.5 During construction and operation **no likely significant effects** are expected on European and international designations (SAC, SPA and Ramsar) or future designations (MCZ and cSAC) as a result of the offshore, or onshore, development.

2.2.6 As a result of the noise and disturbance caused during construction it is anticipated that there will be at worst a **minor adverse** impact on the following species: cod, thornback ray, spurdog, harbour porpoise and kittiwake. For the remainder an impact of **negligible** significance is anticipated. The most significant residual impacts for statutory and non statutory sites are associated with landscape effects on the Suffolk Coast and Heaths AONB and Suffolk Heritage Coast as a result of the onshore development. Predicted impacts within 500m of the onshore development are anticipated to be of **major-moderate** significance and **major** significance for the AONB and Heritage Coast respectively, however effects beyond this will reduce rapidly. For the remainder of site assessed, the construction phase will not result in impacts any greater than **negligible** significance.

2.2.7 During operation similar impacts associated with landscape designations are anticipated with predicted impacts within 500m of the onshore development anticipated to be of **major-moderate** significance and **moderate** significance for the AONB and Heritage Coast respectively, however effects beyond this will reduce rapidly.

2.2.8 In regard to species associated with designated sites, the following species impacts are anticipated: **minor adverse** significance: allis shad, European eel, spotted ray, sea lamprey, salmon and spurdog. For the remainder an impact of **negligible** significance is anticipated with the exception of kittiwake

where an impact of **negligible-minor** adverse significance is predicted. No significant impacts are anticipated for the remainder of designated sites assessed during the operation or decommissioning phases, this is also true for potential cumulative impacts.

Physical environment

- 2.2.9 The main geological features present within the GWF site are London Clay, Crag and Quaternary channel fills. These are immobile geological units that will not be affected by the construction, operation and decommissioning of the GWF infrastructure and associated cables.
- 2.2.10 Over most of the GWF site water depths range between 20m and 40m below Chart Datum (CD). However the Outer Gabbard sandbank which lies across the northern half of the site represents a bathymetric high with deeper depressions occurring in the east of the site, reaching depths greater than 45m below CD.
- 2.2.11 The wave climate at GWF is characterised by a combination of locally-generated wind waves and swell waves that move into the area from a remote source. Surface tidal current speeds range from around 2m/s to 0.01m/s.
- 2.2.12 The GWF seabed is dominated by gravelly sand or sandy gravel, a pattern interrupted by the Outer Gabbard sandbank which lies across the northern half of the GWF site.
- 2.2.13 The potential impacts associated with the construction phase (namely the installation of WTG foundations, laying of export and inter and intra-array cables and presence of plant and vessels) on the wave climate, tidal regime and sediment transport processes are anticipated to be temporary and localised in their nature. Therefore, **no adverse** impacts are anticipated.
- 2.2.14 During operation, changes to the wave climate and tidal regimes are anticipated to be relatively small and within the natural variation. Hence, they are not expected to significantly affect the existing regimes and the associated sediment transport driven by waves and tides (**negligible to no effect**). Evidence from studies undertaken to date for GWF and the findings of the adjacent GGOWF project suggest that potential effects on seabed morphology at the GWF site will also be localised and are not be anticipated to be significant (of **negligible** significance to **no effect**).
- 2.2.15 Any effects arising from decommissioning will be of no greater magnitude than those described for the construction and operation phases and hence no significant effects are anticipated. Given the localised nature of effects anticipated, cumulative impacts between GWF and other wind farms and projects are not anticipated to be more significant than those effects identified for GWF alone.

Marine water and sediment quality

- 2.2.16 Marine water and sediment quality at the GWF site has been described using existing public sources of information (such as those from the Environment Agency), studies completed for the adjacent GGOWF and site specific surveys to characterise the chemical nature of the seabed surrounding the GWF site and cable corridor.
- 2.2.17 The baseline study found that sediment and water quality in the areas surrounding GWF is generally good. Sediment contaminant conditions for the area around GWF and the export cable corridor are below levels at which adverse effects on marine fauna are anticipated. The contaminants analysis undertaken indicated that arsenic is the most common metal contaminant in the area. Such a result is to be expected owing to historical arsenic waste disposal and inputs from other estuaries in this region.
- 2.2.18 Potential impacts during construction and decommissioning could arise due to re-suspension of contaminants and an accidental spillage of construction materials. However any re-suspension of material will be minor and localised, and contaminant levels in the sediments are below levels at which adverse effects would occur. Subsequently it is anticipated that the impacts will be of **negligible** significance. In addition, only **negligible** impacts are anticipated as a result of deterioration of water and sediment quality as a result of scour effects at the WTG structures during operation.
- 2.2.19 There is risk of pollution events as a result of accidental spillages during construction, operation and decommissioning. This potential impact has been assessed as being of minor adverse significance. With the implementation of mitigation measures, such as a site Environmental Management Plan and Pollution Control and Spillage Response Plans, it is anticipated that there will be an impact of no worse significance than **negligible**.
- 2.2.20 No further significant impacts have been identified for both the decommissioning phase, and for potential cumulative impacts with other wind farms and other activities in the region.

Offshore Ornithology

- 2.2.1 The abundance and distribution of seabirds in and around the GWF have been characterised through regular site-specific boat-based surveys and regional aerial surveys. Evidence from these surveys combined with scientific literature and observations at other regional wind farms indicate that the southern North Sea is an important area for seabirds. The avifauna of the shallow sea areas of the Outer Thames Estuary and along the east coast of the UK is typically comprised of a mixture of 'true seabirds' (for example: gannet, gulls and auk species), other species that spend part of their life cycle at sea (for example, divers and seaducks) and a wide range of species, such as waterfowl, waders and terrestrial passerines on seasonal migration, both to and from the UK and Continental Europe. The offshore ornithological

assemblage present within and adjacent to the GWF site suggests that these regional waters are used at different times by seabirds (i) overwintering in the area; (ii) foraging from nearby breeding coastal colonies; and (iii) on migration during post-breeding dispersal and pre-breeding return.

2.2.2 Based on their conservation value, relative seasonal abundance and behaviour within the GWF study area, the following species of principle concern have formed the focus of the assessment presented in the GWF ES:

- Red-throated diver;
- Great skua;
- Lesser black-backed gull;
- Great black-backed gull;
- Common guillemot;
- Razorbill;
- Herring gull;
- Arctic skua;
- Gannet;
- Fulmar;
- Kittiwake; and
- Common gull.

2.2.3 During construction, impacts in the offshore environment are associated with habitat loss, direct disturbance and displacement from construction activity (vessel activity, machinery operation and human presence) and in-direct disturbance effects through changes to prey supply and habitats. Operational impacts are associated with the risk of collision mortality with turbine rotors, barrier effects, disturbance from operational maintenance, displacement of birds within and adjacent to the GWF site and indirect effects as a result of prey availability and attraction to lit structures.

2.2.4 It is evident from the impact assessment that the majority of effects of the GWF on species of principal concern will be of **Minor adverse** or **Negligible significance**. After considering the relevant mitigation measures, the highest residual impact significance is predicted at a level of **Moderate-Major adverse significance**, associated with the predicted collision mortality of the regional summer lesser black-backed gull population. This species has an international conservation value, forming part of a protected breeding colony at the Alde-Ore Estuary SPA. GWFL undertook an assessment on the long-term trends of the SPA population and the current success of the ongoing land management to improve the site condition. It was evident that, based on the likelihood of a future recovery of the breeding colony due to reductions in predation and human disturbance, the SPA population will grow in the long term, despite the predicted additional mortality from GWF, both in isolation and in-combination with other wind farm sites, with **no significant impact on the integrity of the SPA**. It was also noted that mortality rates will also be moderated by the expected reduction in commercial fishing activities and therefore discards within the wind farm.

2.2.5 During construction and operation a **Moderate but tolerable** impact was predicted for common guillemot, largely as a result of the species' sensitivity

to direct disturbance (construction) and displacement (operation). However, it should be considered that common guillemot range widely across the south and east North Sea, regional-scale surveys suggest that the GWF site is not important this species.

2.2.6 Operational displacement may also have an impact on razorbill, however the species is also wide-ranging (particularly relevant in the winter months) and as a result the residual impact is likely to be **moderate but tolerable**.

2.2.7 It was concluded that when mitigation measures are implemented to minimise the risk of potentially significant effects on species' populations, there will be no significant impacts to any species at an international, national or regional scale, nor on any Natura 2000 site, caused by the GWF, either alone or in-combination with other projects or activities.

Marine and intertidal ecology

2.2.8 The marine and intertidal ecology resource in and around the GWF site has been characterised by a number of existing reports, surveys undertaken for the GGWOF project, and site specific surveys at GWF.

2.2.9 The shore at Sizewell comprises a beach of barren sand and shingle backed by a dynamic shingle ridge and dune habitats. Some areas of vegetated shingle are found in the vicinity of the proposed landfall along the high water mark. With the exception of the vegetated shingle (which is a Biodiversity Action Plan habitat), the intertidal studies identified that no biotopes¹ or species of any sensitivity/value within the study area. In the subtidal marine environment the majority of the seabed within GWF site comprises coarse sand or gravel and mixed sediments characterised by the so-called 'deep Venus community'. The only species of conservation importance recorded was the reef building tube worm known as the ross worm *Sabellaria spinulosa* which is included in the UK Biodiversity Action Plan (BAP) and, in its biogenic reef form, is included as a sub-feature of Annex I of the Habitats Directive. Its presence was not evenly distributed with the greatest abundance found outside of the GWF site. It was not found to occur in reef form within the study area.

2.2.10 During construction, some physical disturbance to intertidal habitats and species will occur during cable laying and associated works. A directional drilling pit will be excavated to connect the export cable/s to an onshore transition pit. However, only a small amount of the intertidal area would be disturbed during these activities and given that the communities present are ubiquitous, and demonstrate a high recoverability, no significant impacts are anticipated.

2.2.11 The construction of GWF will result in the long term loss of seabed and associated habitats within the footprint of the WTG and associated structures. In addition, there is potential for the disturbance of benthic

¹ A biotope is a community of organisms occurring in a particular environment

species as a result of the cable installation process and activities of construction vessels. These impacts have been assessed as being of **negligible** significance, and with mitigation measures in place this will further reduce to no impact for *S spinulosa*, if present at the site.

- 2.2.12 Impacts on benthic communities from both increased suspended sediments, and re-mobilisation of contaminated sediments during the construction phase are anticipated to be of **negligible** significance.
- 2.2.13 During operation no significant impacts are anticipated as a result of direct or indirect impacts on the intertidal environment, direct impacts on the subtidal environment through habitat alteration or indirect impacts through changes in current regime and alteration to existing human activity. Should *S. spinulosa* reefs be present at the site there is the potential for an impact of **minor adverse** significance on this habitat during operation, although best practice will be followed to minimise impacts on sensitive habitats.
- 2.2.14 During decommissioning, although the impact on intertidal ecology is not expected to be significant, the impact on subtidal benthos is assessed as being of minor adverse significance. If necessary, the decommissioning plan will be modified accordingly and subsequently the residual impact on subtidal communities is anticipated to be of **negligible** significance.
- 2.2.15 No significant cumulative impacts are anticipated on marine and intertidal ecology as a result of GWF and other wind farms and activities.

Fish and shellfish resource

- 2.2.16 The fish and shellfish resource has been characterised using existing information sources, surveys carried out at the GGOWF and site specific surveys at GWF. This has covered within the GWF site, as well as the wider area of the Outer Thames Estuary and southern North Sea
- 2.2.17 The regional study area is more important for finfish than shellfish. A number of species of commercial importance use the Outer Thames Estuary for spawning and as nursery grounds. Nine species of commercial importance are known to use spawning and nursery grounds that overlap or are in close proximity to the study area or, are considered to be sensitive to potential wind farm impacts. Those species include fish such as herring, cod and sole, as well as elasmobranchs (sharks, rays and skates).
- 2.2.18 The only species of conservation importance recorded from surveys in the area was twaite shad, which is listed under Appendix III of the Bern Convention and Annexes II and V of the EC Habitats Directive and is a UKBAP priority species.
- 2.2.19 Construction noise as a result of pile driving during construction can sometimes impact on fish populations because high sound pressure levels can prevent fish from reaching breeding or spawning sites, finding food, and acoustically locating mates, as well as potentially causing physical injury and

mortality. The project is predicted to have a minor adverse - negligible impact on fish populations from lethal, physical and traumatic auditory injury effects, with mitigation in the form of soft start piling reducing the impact for adult fish species to **negligible**. The impact on fish larvae and eggs would be very localised but would remain at **minor adverse** significance.

- 2.2.20 Behavioural responses were considered most relevant for the Downs herring and sole spawning grounds, as well as species of elasmobranch, where the residual impact has been assessed as being of **minor adverse** significance. The impact to other receptors discussed is anticipated to be of **negligible adverse** significance.
- 2.2.21 The remainder of impacts associated with the construction phase including direct and indirect effects, are likely to cause a **negligible** impact on fish and shellfish resource.
- 2.2.22 Operational impacts are principally represented by the generation of electromagnetic fields (EMF) from the export cables. These have been assessed as being of **minor adverse** significance due to the sensitivity of elasmobranchs and migratory species and the uncertainty associated with the long term impacts. No further significant impacts are anticipated during the operational phase.
- 2.2.23 During decommissioning, as pile driving activity will not be required, the level of impact through underwater noise and vibration will be greatly reduced, removing the main source of potential impact from this phase.
- 2.2.24 Concurrent and consecutive pile driving between GWF and other wind farms are not anticipated to have any cumulative noise impacts on sole and the Downs herring spawning grounds as there is limited scope for continued disturbance over consecutive years given the sole spawning restrictions already in place for London Array and GGOWF (there will be no overlap in construction timescales between GGOWF and GWF) and the limited impacts associated with the installation of the Gunfleet Sands and Kentish Flats Extension projects. Consequently no significant cumulative impacts are predicted.

Marine mammals

- 2.2.25 The marine mammal resource has been characterised using existing information sources, surveys carried out at the GGOWF, as well as site specific surveys at GWF. Potential impacts upon pinnipeds (seals) and cetaceans (whales, dolphins and porpoises) have been considered both within GWF and wider study area, as well as the Outer Thames Estuary and southern North Sea.
- 2.2.26 The most regularly sighted marine mammals throughout the surveys carried out at GWF and GGOWF were the harbour porpoise, harbour seal and grey seal, although pinnipeds were recorded at the site in much lower numbers than harbour porpoise. A small number of white beaked dolphin and risso's

dolphins were also recorded. In the context of seas around the UK, the Outer Thames Estuary is not noted for the diversity or abundance of its marine mammal interest. However small groups of animals, in particular harbour porpoise, could be present in the vicinity of the wind farm during construction, operation and decommissioning.

- 2.2.27 The primary potential impact identified during the construction phase is associated with construction related noise, primarily pile driving. Pile driving has the potential to result in both lethal effects / physical injury and behavioural effects on species of marine mammal present at the proposed site. In regard to the former, soft start piling and other mitigation measures will act to reduce the magnitude of the impact, however the residual impact will remain at **minor adverse** for harbour porpoise (as a result of the numbers present at the site and the sensitivity of the species) and **negligible** for all other species of cetacean and pinniped. In regard to behavioural effects the impact on all species of marine mammal assessed is anticipated to be of **minor adverse** significance.
- 2.2.28 Potential impacts as a result of injuries on marine mammals due to vessel collisions are anticipated to be of **minor adverse** significance for pinnipeds given their level of protection and the risk of collision impacts associated with the 'corkscrew-like' injuries detailed within the ES, and **negligible** for all cetaceans. Vessels made aware of the risk of potential collision and protocols will be developed as part of the MMMP. No further significant operational impacts are predicted.
- 2.2.29 In terms of cumulative impacts, if construction timescales overlapped or were successive with the closest offshore wind farm developments (principally Phase II of London Array and also, potentially, East Anglia ONE), there is potential for multiple discrete disturbance/displacement effects to occur simultaneously or in rapid succession. This may lead to a short-term restriction on habitat range and/or barrier effects (notably where sound fields overlap). However, given the relatively low numbers of marine mammals encountered within and adjacent to the GWF site throughout the year and the application of best-practice mitigation, the favourable conservation status of regional, national and international marine mammal populations is unlikely to be adversely affected by the GWF development.

Commercial fisheries

- 2.2.30 Fishing activity is represented at local, regional and international scales due to the positioning of the GWF project and the range of fishing activities associated with this part of the Outer Thames Estuary.
- 2.2.31 Key fishing activity taking place in and around the GWF site and export cable corridor comprises mainly foreign beam trawling for plaice and sole with drift netting along offshore banks for bass by local UK vessels. The inshore areas of the cable corridor are used by passive gear such as drift nets which target sole and bass, along with some localised potting activity for shellfish which occurs in close proximity to the export cable landfall.

- 2.2.32 During construction, there will be a temporary loss of access to fishing grounds within the GWF site and along the export cable corridor. This will affect different sectors of the fishing community to varying extents. The installation of the export cable/s could disrupt a significant proportion of the inshore potting grounds used by two local potting vessels from Sizewell/Aldeburgh which routinely fish parts of the export cable corridor. Mitigation measures will be put in place that comprise fisheries liaison and pre-construction discussions to agree suitable mitigation measures, and as a result impacts associated with temporary loss of access during construction and decommissioning are anticipated to be of **negligible** significance. In addition no significant impacts are likely to occur as a result of displacement of excluded vessels onto other fishing grounds, or increased steaming times for fishing vessels due to the construction works.
- 2.2.33 There is a potential residual impact of **minor adverse** significance on UK demersal / drift net vessels as a result of seabed objects and obstructions which might occur during the construction phase. Locating and recovering any lost objects and large spoil mounds would be levelled upon completion of construction phase will aid in reducing the possible impacts associated with this.
- 2.2.34 During operation the most significant impact is associated with restricted access to traditional fishing grounds for the Belgian, Dutch and French trawl fleet, fisheries liaison will help to mitigate against this impact, however it will remain at **minor adverse**.
- 2.2.35 No further significant impacts are anticipated during operation as a result of restricted access to fishing grounds for the offshore passive gear sector, displacement of fishing vessels onto other fishing grounds, effects of operational support vessels to fishing patterns, indirect effects on commercial fisheries as a result of changes in fish distribution and indirect effects due to changes in existing shipping patterns and navigation routes.
- 2.2.36 Potential impacts on fishing vessel safety during the construction and operation phase is assessed as being **As Low As Reasonably Practicable** as a result of the use of appropriate lighting of structures, which will comply with the relevant standards and requirements.
- 2.2.37 No significant residual cumulative impacts on commercial fisheries would be anticipated from the proposed GWF development.

Shipping and navigation

- 2.2.38 The main navigational features in the vicinity of the GWF site are the Sunk Traffic Separation Schemes (Sunk TSS) to the west of the GWF site and the port operations at Harwich Haven Authority (HHA) and Port of London Authority (PLA).
- 2.2.39 A site survey was undertaken which showed that an average of 12 vessels per day pass through GWF, these include cargo vessels, tankers and fishing

vessels (the majority of which were Belgian and Dutch vessels). The main destinations of the vessels recorded were Harwich Haven, the Netherlands and ports in the Thames and Medway. The GWF project is well outside the general racing and sailing areas off the coast.

- 2.2.40 Impacts associated with collision risks have been assessed on a risk based system. All other impacts have been assessed on standard significance levels.
- 2.2.41 During the construction phase, the primary potential impact identified is associated with vessel collisions; either with other vessels or with the wind farm structures themselves. With the application of a range of mitigation measures, including operating procedures, marking / lighting, Emergency Response Cooperation Plan and compliance with the relevant regulations these impacts are as low as reasonably possible (ALARP).
- 2.2.42 During the operational phase, the potentially significant impacts on commercial shipping comprise collision risk (ship to ship, drifting vessels with structures, with recreational vessels and fishing vessels) and cable route interaction. Mitigation measures including the extension of the sunk Traffic Separation Scheme, marking and lighting, Notices to Mariners, the formulation of an Emergency Response Cooperation Plan, cable burial, an anchor penetration study and continuing consultation where required. As a result the residual impacts are anticipated to be between **broadly acceptable** and **tolerable**, which are considered to be acceptable.
- 2.2.43 The effect on ship borne and shore based radar systems and re-routing of shipping have been assessed as being of **minor adverse** significance. The potential impact on Search and Rescue operations as a result of the operational GWF has also been assessed as being of **minor adverse** significance. A range of mitigation measures are detailed within the ES that have reduced the potential for impact in these areas.
- 2.2.44 During the decommissioning phase, it is expected that impacts will be similar to those identified for the construction phase, and with the application of appropriate mitigation measures it is anticipated that these will be reduced as low as is reasonably practical.
- 2.2.45 Potential for cumulative impact has been identified with the East Anglia offshore wind farm Project One (see **Chapter 16**). However, it is considered that these impacts will not result in significant adverse impacts.

Military and civil aviation

- 2.2.46 The military and civil aviation assessment encompasses potential impacts on the interests of the National Air Traffic Services Limited (NATS), NATS (En-Route) Limited (NERL), the Ministry of Defence (MOD) and the Civil Aviation Authority (CAA).

- 2.2.47 All civil aerodromes and military defence radar systems are a substantial distance from the GWF site. The impact assessment has indicated that there will be **no impacts** during the construction phase, and the same is true for the decommissioning phase. This is due to the absence of significant levels of civil aviation activity in the area, and distance of both civil and MOD radar from the GWF site.
- 2.2.48 Impacts during the operation phase have been further investigated due to the potential implications of WTGs on military and civil aviation radar. However modelling has identified that there will also be **no impacts** during this phase of the project.
- 2.2.49 No potential for impact is identified during the decommissioning phase and no potential cumulative impacts will occur over any of the development phases.

Other human activities

- 2.2.50 An assessment has been undertaken of other marine human activities within the GWF project study area including offshore wind farm projects, oil and gas activity, marine aggregate extraction, marine disposal sites, military exercise areas, telecommunications and electricity cables, pipelines and unexploded ordnance (UXO). Of particular relevance is aggregate extraction. There are numerous aggregate extraction areas within the vicinity of GWF and Cemex UK Marine Ltd has an application / prospecting area that overlaps with the export cable route.
- 2.2.51 The majority of potential impacts associated with other human activities have been assessed as being of **negligible** significance to **no impact**. These conclusions have been reached primarily due to the lack of overlap with existing activities within the GWF boundary, or due to the distance between the existing activities and GWF. In addition, for a number of potential impacts the consultation undertaken with the relevant organisations / companies has not highlighted any significant potential issues as a result of the GWF project. Through consultation specifically with the relevant aggregate extraction companies, the export cable corridor has been altered in anticipation of any future extraction activity at the site on the northern boundary of the GWF export cable corridor (Area 498), GWFL is in ongoing discussions with Cemex Marine UK Ltd and The Crown Estate with regard to the proposed aggregate extraction area which is situated inside the cable corridor.
- 2.2.52 The only potentially significant impacts that have been identified during the assessment were associated with potential damage to subsea cables during both construction (moderate adverse significance) and operation (minor adverse significance), as well as the potential impact during the construction phase as a result of unexploded ordnance (major adverse significance). However, with the application of industry standard mitigation measures, impacts associated with damage to subsea cables will reduce to an impact of **negligible** significance. By employing a UXO pre-construction survey, the

potential impact associated with unexploded ordnance will be reduced to **minor adverse**.

- 2.2.53 Impacts during the decommissioning phase are the same as those detailed for construction.
- 2.2.54 Cumulative impacts upon the aggregate dredging activity undertaken at Shipwash 507/5 as a result of its location between the GWF and GGOWF cables has been assessed as being of likely minor adverse significance. No further significant cumulative impacts would be anticipated from the GWF project on other human activity.

Archaeology

Onshore

- 2.2.55 Archaeological investigations within and around the onshore development footprint have recorded archaeological sites, deposits and find spots dating from the prehistoric to the modern period. There are a number of recorded sites and monuments in the vicinity dating from prehistoric times to the modern day. One feature, identified by aerial photography, is located within the proposed GWF substation footprint (Feature 16 - concentric semi-circular cropmark - possible ring ditch). Further intrusive fieldwork was undertaken within the development footprint between April and June 2011; however, no further evidence of Feature 16 was identified.
- 2.2.56 It is considered that the potential for recovering archaeological remains during the onshore construction is high. Without mitigation there are the potential for **minor to moderate** adverse impacts upon the archaeological resource.
- 2.2.57 A mitigation strategy will be developed in agreement with English Heritage and Suffolk County Council to ensure adverse impacts upon archaeological material are avoided. An archaeological Written Scheme of Investigation will be developed and will include a watching brief to ensure the recording of any features where disturbance is unavoidable. This will ensure that features are preserved by record.
- 2.2.58 The recording of known and unknown sites, which may unavoidably be lost or damaged within the development footprint, will increase our understanding of the feature(s) in question as well as the wider archaeological context. As such, an effect of **minor** adverse significance will remain following the implementation of the agreed mitigation.

Offshore

- 2.2.59 Given the rich heritage resource off the Suffolk coast, the construction of the wind farm and installation of export cable/s could have a significant impact. Direct impacts during construction could comprise damage, disturbance, or destruction of submerged prehistoric archaeology, shipwrecks, and crashed aircraft.

- 2.2.60 Much of the offshore area is considered to be highly sensitive in terms of offshore archaeology. The avoidance of features, by use of exclusion zones, as well as a range of other mitigation measures, will prevent potentially significant impacts arising. Without mitigation it is anticipated that there would be a major adverse impact in terms of direct and indirect disturbance upon offshore archaeological interests. Additionally, a minor adverse impact upon the 'setting and perception of the of the Suffolk Heritage Coast is anticipated. It is expected that with mitigation measures in place, the residual impacts of the development on features of archaeological interest during all of the development phases will be of **negligible** significance. During construction and operation the significance of the impact on the Suffolk Heritage Coast will remain at **minor adverse** as there are no appropriate measures which will mitigate this impact.
- 2.2.61 No further significant impacts are anticipated during the decommissioning phase, and no potential cumulative impacts have been identified.

Seascape and landscape visual characterisation (SLVC)

Landscape and visual

- 2.2.62 Much of the coast in the Sizewell area sits within the Suffolk Coast and Heaths AONB and Heritage Coast designations. A detailed onshore option appraisal exercise was undertaken in 2010, which identified Sizewell Wents as the preferred location for substation development from a long-list of ten sites.
- 2.2.63 The design of the onshore substation includes a screening landform that will be created to the north, west and south of the substation. The landform will be up to 5m high and will include planting of native woodland and scrub around the periphery of the substation. The finished floor level of the substation will also be lowered approximately 2m to increase the screening of this newly created landform. Landscape and visual effects of the substation will gradually reduce over time as the vegetation on this landform matures.
- 2.2.64 For the AONB, the effects of construction activity along the cable corridor have been assessed as moderate to major, and within the substation footprint have been assessed as major during the construction phase. The substation, sealing end compound gantries and screening bund will represent a major impact on the AONB. It is noted, however, the context for these elements is the existing infrastructure at GGOWF and the adjacent pylons and overhead wires and the Sizewell Power Stations.
- 2.2.65 During operation there will be little evidence of the cable corridor as it will be buried below ground. However, the substation, sealing end compound gantries and the screening landform itself will be new elements in the landscape, albeit set within the context of existing infrastructure at GGOWF and the adjacent pylons and overhead wires, and the Sizewell Power Stations. Within 500m of the site these new elements will represent a **major** impact upon the on the AONB.

- 2.2.66 After 15 years the screening landform will be fully vegetated and will support established trees effectively extending the wooded area of Sizewell Wents. The AONB is a site of high sensitivity and a **major-moderate** residual impact will remain up to 500m from the substation. Beyond these areas the significance of effects will reduce fairly rapidly to negligible with distance, and as vegetation, landform and development screens effects
- 2.2.67 In regard to potential cumulative landscape effects, the existing onshore infrastructure associated with GGOWF and Sizewell A and B have been taken into consideration in the assessment of construction and operation impacts. EDF Energy also has plans for new nuclear development in Sizewell (Sizewell C). The adverse landscape and visual effects of Sizewell C are likely to be much greater than those caused by GWF, due to the greater area of land cover, scale of development and operational life of Sizewell C. The combined projects will extend the areas of landscape influenced by development over a wider area of the AONB and there are likely to be cumulative adverse landscape and visual impacts. However, given the lack of information available for Sizewell C it is not possible to quantify this.

Seascape

- 2.2.68 With regard to the landscape and seascape effects of the offshore development, the primary source of potential impacts would arise from the operational phase of GWF. The turbine columns are necessarily large structures which would be introduced into the wider offshore extents of the study area. However, being sited out at sea means the WTGs would be placed in a receiving environment that has both the scale and simplicity of form to not only accommodate the development, but to also provide it with an appropriate contextual setting.
- 2.2.69 During the construction phase the presence of the construction vessels and the associated marine and intertidal activity is considered to be relatively insignificant due to the existing baseline of significant marine activity in the study area. Therefore, during the construction phase, the overall significance of the seascape effect is predicted to be **negligible**.
- 2.2.70 The magnitude and extent of visual effects would be at its greatest in views from the coast north of Orford Ness where the presence of the GGOWF and GWF would result in the a perceptible increase in the overall spread of WTGs visible on the distant horizon line. However, the distance of the WTGs from the coast north of Orford Ness and their peripheral position within the field of seaward view would combine to reduce the visual effects of this additional turbine spread. Overall the presence of the turbines is predicted to have **minor to negligible** adverse impacts on the different landscape and visual receptors. The most significant impacts (**minor adverse**) will be associated with the historic environment associated with coastal areas, Regional Seascape Units of Walberswick to Thorpe Ness, Aldeburgh Bay and Hollesley Bay and the viewpoint from Orford Ness near the Lighthouse.

- 2.2.71 Impacts during the decommissioning phase are considered of **negligible** significance.
- 2.2.72 It is anticipated that the overall cumulative effect of the proposed GWF in combination with the existing and consented wind farms of the study area is considered to be no more than **low to negligible**.

Socio-economics

- 2.2.73 The construction of GWF will require considerable capital investment, of which approximately £18-20 million will be expected to be invested in the East of England for equipment needed to install the towers, turbines and cabling. However, this represents a **negligible** impact at the scale of the regional economy from project expenditure.
- 2.2.74 Approximately 850 people are expected to be employed during the construction of GWF. Of those 40% (337) are expected to be employed in the East of England region. This represents a **negligible** impact upon direct employment in the region. Similarly impacts upon indirect employment in the region (for example providing accommodation for directly employed workers) are also expected to be **negligible** at the regional scale.
- 2.2.75 Employment levels during the operation of the scheme are expected to be low. Maintenance will be necessary throughout the lifespan of the wind farm and will create an estimated 50 full time jobs. Additionally, vessel hire and onshore support services will be necessary and will generate income. However, impacts to the regional economy associated with this level of employment are expected to be **negligible**.
- 2.2.76 Decommissioning activities are expected to require a similar sized workforce to that required during construction. As such a similar level of impact is expected upon the regional economy with regards to direct and indirect employment, i.e. an impact of **negligible** significance.
- 2.2.77 The large number of offshore wind farms proposed in this region will require a supply chain of survey vessels and construction and decommissioning vessels (plus experienced crews). A **potential minor beneficial impact** to direct and indirect employment in the region during construction and decommissioning is anticipated.

Geology, hydrogeology, land quality and flood risk

- 2.2.78 There are no identified potential sources of significant contamination along the cable corridor or at the proposed substation.
- 2.2.79 During construction there is the potential for minor adverse impacts associated with surface water contaminated with soils entering the groundwater and the nearby SSSI. However, following the implementation of best practice pollution prevention measures, the residual impacts are considered to be **negligible**.

- 2.2.80 There are not expected to be any impacts associated with the operation of GWF upon geology, hydrogeology, land quality and flood risk receptors.
- 2.2.81 The generation of waste is expected as part of the onshore decommissioning phase (demolishing the substation and removing from site). These effects are considered to be of **minor** adverse significance and can be minimised by effective implementation of a Site Waste Management Plan and strict adherence to the waste relevant legislative requirements including Duty of Care and legislation in force. Other decommissioning impacts are anticipated to be the same as those during construction and will be of **negligible** significance following appropriate mitigation measures.
- 2.2.82 No potential cumulative impacts have been identified.

Terrestrial ecology

- 2.2.83 The cable corridor and substation site have been planned to ensure that there are no direct impacts upon any international, European or nationally designated conservation sites. The cable corridor will, however, cross the Suffolk Shingle Beaches County Wildlife Site. The use of directional drilling techniques and sensitive management where vehicular access will be required along the shingle will minimise potential impacts to this locally designated site. Following mitigation a **negligible** impact is predicted.
- 2.2.84 The majority of the construction footprint of the substation (temporary and permanent footprint) falls within arable land. Approximately 4ha of arable land, 2ha of woodland and 0.7ha of pasture grassland will be lost as a result of the development. The arable land is considered to be of low ecological interest and of negligible significance. The wooded area is also of low ecological interest but given the relatively large area that will be lost a **minor** adverse impact remains after mitigation. The shingle and dune habitat, which may be temporarily disturbed by the construction works proposed on the beach, supports a more diverse ecological assemblage. These areas will, however, be avoided through the use of HDD techniques, reducing the potential impact to **negligible**.
- 2.2.85 Three bat roosts (supporting individual bats) have been identified within Sizewell Wents and will potentially be lost as a result of the proposed works. A European Protected Species licence will be required ahead of any works, and agreed with Natural England, detailing specific mitigation measures to ensure that bats are not harmed during construction. Following the successful implementation of the proposed mitigation measures a **negligible** residual impact is predicted upon bats.
- 2.2.86 The woodland edge and hedgerows support good populations of reptiles. The development of a detailed mitigation strategy in consultation with Natural England will ensure that potential impacts are reduced to **negligible**. Other species known to use the site, or have the potential to be found within the development footprint, include: badgers, otters, breeding birds and invertebrates.

- 2.2.87 There will be **no impact** to any important ecological receptors during the operational phase of the onshore electrical connection.
- 2.2.88 Impacts during the decommissioning phase will be similar to those detailed for construction and no significant cumulative impacts have been identified over any of the development phases.

Land-use, tourism and recreation

- 2.2.89 Export cable/s from GWF come ashore immediately south of Sizewell which is situated between the popular seaside towns of Aldeburgh and Southwold and within walking distance of a number of nature reserves and National Trust land which are popular visitor attractions. Much of the land-use within the onshore development envelope is agricultural. Offshore the area is popular for recreational boat users and anglers.
- 2.2.90 The proposed substation will result in the permanent loss of 4ha of arable land classified as Grade 4, which indicates generally poor quality of land and the installation of the cable system will cause temporary disruption to agricultural activities. However, landowners will be financially compensated for the disruption, and therefore an overall **negligible** residual impact is anticipated. There will be no operational impacts upon agricultural activities.
- 2.2.91 The loss of/damage to woodland and grassland arising from the construction of the substation and associated infrastructure will result in a residual **minor adverse** impact. Following mitigation procedures it is anticipated that this will reduce to **negligible** within the subsequent years owing to the growth of trees and re-establishment of habitats.
- 2.2.92 The onshore cable corridor crosses a coastal Public Right of Way (PRoW) and two long distant coastal walks. The substation is also located close to Sandy Lane (another PRoW). However, there will be no requirement for any permanent or temporary footpath closures. An impact of **negligible** significance is predicted. There may also be some short-term disruption to the small number of fishing boats on Sizewell Beach during the cable landfall activities. This will require boats to launch further up the beach, closer to the Sizewell Beach car park, during the short duration of the cable landfall (an approximately 5 month window during the onshore construction).
- 2.2.93 There are not anticipated to be any tourism impacts during any of the development phases.
- 2.2.94 Impacts during the decommissioning phase are considered to be of **negligible** significance and no significant cumulative impacts have been identified over any of the development phases.

Traffic and transport

- 2.2.95 The traffic assessment has focussed on the anticipated increase in traffic that will occur during the onshore construction phase. Expected traffic generation

associated with the proposed development has been assessed for an assumed worst case peak construction year of 2014.

- 2.2.96 Junction capacity analysis has shown that key local junctions will comfortably accommodate the worst case trips generated by the proposed works. However, a **minor adverse** impact is anticipated in relation to reduced amenity for pedestrians along the route during the most intensive periods of lorry deliveries.
- 2.2.97 A construction traffic management plan will be developed in consultation with the Highways Authority to ensure that lorry construction traffic avoids periods of peak traffic activity, such as bank holidays and other known peak periods of construction activity. Following the implementation of the construction traffic management plan the impact is expected to reduce to **negligible**.
- 2.2.98 There are no traffic impacts associated with the operation of GWF and impacts during the decommissioning phase are considered to be of **negligible** significance.
- 2.2.99 There is the potential for the Sizewell B Dry Fuel Store construction phase and Sizewell A decommissioning phases to overlap with GWF. It is extremely unlikely that the peak traffic associated with these developments will actually overlap; however should this occur it would represent a **potentially significant** cumulative impact. The construction traffic management plan will be agreed with the Highways Authority to ensure that these peak periods do not overlap.

Noise

- 2.2.100 The onshore development footprint sits in an area that is predominantly rural in nature and relatively quiet. Increased noise levels will be associated with both the construction (e.g. the noise associated with operating construction machinery and increased traffic) and the operation of the substation itself.
- 2.2.101 The expected day time construction noise generated at the substation site will include earth moving, general construction activities and piling. Along the onshore cable corridor works will include directional drilling, cable landfall activities and the construction of the onshore transition bays. There will also be the potential for construction traffic noise at nearby properties. All the predicted noise levels are beneath the noise level of 65dB L_{Aeq} , and are anticipated to be of **negligible** significance.
- 2.2.102 There is the potential for some activities (cable landfall, directional drilling and concrete pours at the substation site) may need to extend beyond the agreed working hours of 07.00 to 19.00. These will be very infrequent occasions but will represent a **potentially significant** short-term impact to the nearest properties (Home Farm, Coastguard Cottages, Sizewell Village and Rosery Cottages). The timing of these activities will be agreed with SCDC and residents will be informed of planned activities that may extend

into unsociable hours. However, a **potentially significant** short-term impact will remain.

- 2.2.103 During the operation of the substation noise levels at the nearest properties are assessed to be beneath the noise limits set by SCDC (33dB at Home Farm and Halfway Cottages and 40dB at Rosery Cottages). As such, an impact of **negligible** significance is anticipated.
- 2.2.104 During decommissioning there will be no requirement for activities to extend into unsociable hours, as there will be no requirement for continuous concrete pours or the activities associated with the cable landfall and HDD. Therefore, decommissioning noise impacts are expected to be no worse than those experienced during daytime construction. As such, the impact of noise related disturbance during the decommissioning of GWF is expected to be of **negligible significance**.
- 2.2.105 Following consultation with SCDC operational noise limits have been set in such a way as to ensure that the cumulative noise from both GGOWF and GWF operating substations will remain at an acceptable level at the nearest receptors. As such, provided that GWF and GGOWF achieve their agreed operational noise limits there will not be a cumulative noise impact.

Air quality

- 2.2.106 Air quality in the Sizewell area is considered to be relatively good, with no Air Quality Management Areas within 20km of the proposed onshore works. Sizewell is an area where SCDC do not anticipate that air quality objectives are likely to be exceeded, and background pollutant levels are well below the annual level.
- 2.2.107 Onshore construction activities have the potential to generate dust which could impact nearby residential properties and sensitive habitats, via soiling of surfaces. In the absence of mitigation, there is the potential for a localised, temporary minor adverse air quality impact. Dust suppression techniques will be implemented through a Construction Code of Practice to ensure that impacts are reduced to **negligible** during the construction phase.
- 2.2.108 GWF construction traffic increases will be below the thresholds that would trigger air quality impacts associated with vehicle exhaust emissions. In addition, exhaust emissions from on-site construction machinery will be insignificant within the context of baseline vehicle emissions. As such, a **negligible** impact upon air quality is predicted for vehicle exhaust emissions.
- 2.2.109 No significant air quality impacts are anticipated during the operation of GWF.
- 2.2.110 Impacts during the decommissioning phase are considered to be of a similar nature to those experienced during construction and with appropriate mitigation these can again be reduced to **negligible** significance.

2.2.111 No significant cumulative impacts have been identified over any of the development phases.

Electric and magnetic fields

2.2.112 An assessment was undertaken to determine whether any risks to human health could arise from the presence of electric and magnetic fields (EMF) associated with the GWF substation and associated infrastructure.

2.2.113 It is not anticipated that any EMFs will arise during the construction process as none of the electrical equipment will be energised at this stage.

2.2.114 During the operational life of GWF, the EMFs generated by the substation and associated equipment will not result in any measurable change in background EMF when measured from the closest residential property – located in excess of 200m away. The EMF values will be well below the UK public exposure guidance levels. As such there will be **no significant effect** to human health attributable to EMFs.

2.2.115 **No impacts** will arise during the decommissioning phase as no EMF will be generated following the end of electricity production.

2.2.116 GGOWF substation has a similar landfall location, cable corridor and substation location to that of GWF. The combined EMF will also be well below guideline levels and no cumulative impacts are predicted for EMF during the operation of GWF.

Cumulative impact assessment

2.2.117 The cumulative impact assessment (CIA) details the potential interactions between impacts arising from GWF, other wind farm developments and regulated activities occurring in the region.

2.2.118 Given the scale of the GWF project and its position relative to adjacent wind farm developments and other activities in the region, there is scope for cumulative impacts to occur. Many of the potential cumulative impacts associated with GWF are not considered to be significant however there are some exceptions the most notable being:

- Potential significant visual impact of Sizewell C combined with GWF (during both construction and operation); and
- Potential moderate adverse cumulative impact should the peak construction traffic associated with GWF occur at the same time as the peak traffic for the construction of the Sizewell B Dry Fuel Store and the decommissioning of Sizewell A. This can be reduced to negligible with the implementation of a construction traffic management plan.

Transboundary effects

- 2.2.119 The proposed wind farm is located 28km from the Dutch Exclusive Economic Zone, 25km from the French Exclusive Economic Zone and 19km from the Belgian Exclusive Economic Zone
- 2.2.120 Potential transboundary effects have been assessed based on a review of the detailed EIA presented in this ES and for each of the topics considered. Transboundary issues have been considered in light of the potential for likely significant effects on:
- Impacts that might occur on the environment within other European Economic Area (EEA) member states (i.e. not within the UK Regional Economic Zone (REZ)); and
 - Impacts that might occur on interests of another EEA member state within the UK REZ.
- 2.2.121 Through the assessments presented it has been concluded that there would be no likely significant effect on the environment of another EEA member state nor on the interests of any such states within the UK REZ.

3 FURTHER INFORMATION

3.1.1 The full ES is available to view or download online at:
www.gallopwindfarm.com.

3.1.2 Copies of the ES are also available by contacting:

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3.1.3 A charge may be made for hard (paper) or soft (CD/DVD) copies of the ES.