





Rampion Offshore Wind Farm – Scoping Report



Robin Rigg Wind Farm (for illustrative purposes only). E.ON Climate and Renewables.

SEPTEMBER 2010

RSK general notes**Project No:** P41318**Title:** Rampion Offshore Wind Farm – Scoping Report**Client:** E.ON Climate and Renewables**Issue Date:** September 2010**Revision:** Rev02-Final**Issuing Office:** Helsby

Authorised by:		Project Manager	Date:	9 September 2010
Authorised by:		Project QA Rep	Date:	9 September 2010

RSK Environment Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the Quality Management System of RSK Environment Ltd.

TABLE OF CONTENTS

1	INTRODUCTION	7
1.1	This Document	7
1.2	Overview of the Proposed Development	7
1.3	Introduction to E.ON Climate and Renewables	8
1.4	Consenting Process	9
1.5	Requirement for Environmental Impact Assessment	10
1.6	The Scoping Process	10
1.7	Stakeholder Consultation.....	11
1.8	Document Structure.....	11
2	THE PROJECT.....	12
2.1	Need for Renewable Energy	12
2.2	Project Description – Offshore Elements.....	13
2.2.1	<i>Wind Turbines.....</i>	<i>13</i>
2.2.2	<i>Foundations.....</i>	<i>14</i>
2.2.3	<i>Offshore Substations.....</i>	<i>16</i>
2.2.4	<i>Inter-array Cables</i>	<i>17</i>
2.2.5	<i>Export Cables</i>	<i>17</i>
2.2.6	<i>Landfall</i>	<i>17</i>
2.3	Onshore Elements.....	18
2.3.1	<i>Onshore Cables</i>	<i>18</i>
2.3.2	<i>Onshore Substation.....</i>	<i>19</i>
2.4	Construction Programme.....	19
2.5	Operational Phase.....	20
2.6	Decommissioning.....	20
3	PLANNING POLICY CONTEXT	22
3.1	Planning Context.....	22
3.1.1	<i>Regional Spatial Strategy.....</i>	<i>24</i>
3.1.2	<i>Local Planning Policies.....</i>	<i>24</i>
3.2	Habitats Regulations	26
3.3	Other Key Consents	27
3.3.1	<i>Marine Licence.....</i>	<i>27</i>
3.3.2	<i>Planning Permission.....</i>	<i>27</i>
4	EIA PROCESS	28
4.1	Introduction	28
4.2	Approach to EIA	28
4.3	Data Gathering.....	30
4.4	Scoping.....	30
4.5	Assessment	30
4.5.1	<i>Overview.....</i>	<i>30</i>
4.5.2	<i>Assessment Criteria</i>	<i>31</i>
4.6	Mitigation Measures and Enhancement	32
4.7	Cumulative, Secondary and Indirect Impacts	33

4.8	Alternatives	33
5	OFFSHORE EIA TOPIC AREAS TO BE ASSESSED.....	35
5.1	Overview	35
5.2	Bathymetry, Geology and Hydrodynamics	36
5.2.1	<i>Preliminary Environmental Baseline</i>	36
5.2.2	<i>Key Potential Environmental Impacts</i>	39
5.2.3	<i>Proposed Assessment Methodology</i>	39
5.3	Benthos and Sediment Quality	41
5.3.1	<i>Preliminary Environmental Baseline</i>	41
5.3.2	<i>Key Potential Environmental Impacts</i>	43
5.3.3	<i>Proposed Assessment Methodology</i>	43
5.4	Fish and Shellfish Ecology.....	45
5.4.1	<i>Preliminary Environmental Baseline</i>	45
5.4.2	<i>Key Potential Environmental Impacts</i>	46
5.4.3	<i>Proposed Assessment Methodology</i>	46
5.5	Nature Conservation.....	47
5.5.1	<i>Preliminary Environmental Baseline</i>	47
5.5.2	<i>Key Potential Environmental Impacts</i>	51
5.5.3	<i>Proposed Assessment Methodology</i>	51
5.6	Marine Mammals.....	52
5.6.1	<i>Preliminary Environmental Baseline</i>	52
5.6.2	<i>Key Potential Environmental Impacts</i>	54
5.6.3	<i>Proposed Assessment Methodology</i>	55
5.7	Marine Ornithology	55
5.7.1	<i>Preliminary Environmental Baseline</i>	55
5.7.2	<i>Key Potential Environmental Impacts</i>	60
5.7.3	<i>Proposed Assessment Methodology</i>	61
5.8	Landscape, Seascape and Visual	62
5.8.1	<i>Preliminary Environmental Baseline</i>	62
5.8.2	<i>Key Potential Environmental Impacts</i>	63
5.8.3	<i>Proposed Assessment Methodology</i>	63
5.9	Marine Archaeology	65
5.9.1	<i>Preliminary Environmental Baseline</i>	65
5.9.2	<i>Key Potential Environmental Impacts</i>	67
5.9.3	<i>Proposed Assessment Methodology</i>	68
5.10	Navigation and Shipping.....	69
5.10.1	<i>Preliminary Environmental Baseline</i>	69
5.10.2	<i>Key Potential Environmental Impacts</i>	72
5.10.3	<i>Proposed Assessment Methodology</i>	72
5.11	Civil and Military Aviation.....	74
5.11.1	<i>Preliminary Environmental Baseline</i>	74
5.11.2	<i>Key Potential Environmental Impacts</i>	75
5.11.3	<i>Proposed Assessment Methodology</i>	75
5.12	Socio-economics	75
5.12.1	<i>Preliminary Environmental Baseline</i>	75
5.12.2	<i>Key Potential Environmental Impacts</i>	76
5.12.3	<i>Proposed Assessment Methodology</i>	77
5.13	Commercial Fisheries.....	78
5.13.1	<i>Preliminary Environmental Baseline</i>	78
5.13.2	<i>Key Potential Environmental Impacts</i>	80
5.13.3	<i>Proposed Assessment Methodology</i>	80
5.14	Other Marine Users	81
5.14.1	<i>Preliminary Environmental Baseline</i>	81

5.14.2	<i>Potential Environmental Impacts</i>	84
5.14.3	<i>Proposed Assessment Methodology</i>	85
6	ONSHORE EIA TOPIC AREAS TO BE ASSESSED	86
6.1	Overview	86
6.2	Agriculture and Soils.....	87
6.2.1	<i>Preliminary Environmental Baseline</i>	87
6.2.2	<i>Key Potential Environmental Impacts</i>	91
6.2.3	<i>Proposed Assessment Methodology</i>	92
6.3	Air Quality	92
6.3.1	<i>Preliminary Environmental Baseline</i>	92
6.3.2	<i>Key Potential Environmental Impacts</i>	93
6.3.3	<i>Proposed Assessment Methodology</i>	93
6.4	Ground Conditions and Water Resources.....	93
6.4.1	<i>Preliminary Environmental Baseline</i>	93
6.4.2	<i>Potential Environmental Impacts</i>	94
6.4.3	<i>Proposed Assessment Methodology</i>	95
6.5	Ecology and Nature Conservation	97
6.5.1	<i>Preliminary Environmental Baseline</i>	97
6.5.2	<i>Key Potential Environmental Impacts</i>	98
6.5.3	<i>Proposed Assessment Methodology</i>	99
6.6	Archaeology and Cultural Heritage	106
6.6.1	<i>Preliminary Environmental Baseline</i>	106
6.6.2	<i>Key Potential Environmental Impacts</i>	108
6.6.3	<i>Proposed Assessment Methodology</i>	108
6.7	Landscape and Visual Impact.....	109
6.7.1	<i>Preliminary Environmental Baseline</i>	109
6.7.2	<i>Key Potential Environmental Impacts</i>	111
6.7.3	<i>Proposed Assessment Methodology</i>	113
6.8	Noise and Vibration	115
6.8.1	<i>Preliminary Environmental Baseline</i>	115
6.8.2	<i>Key Potential Environmental Impacts</i>	115
6.8.3	<i>Proposed Assessment Methodology</i>	115
6.9	Recreation.....	116
6.9.1	<i>Preliminary Environmental Baseline</i>	116
6.9.2	<i>Key Potential Environmental Impacts</i>	116
6.9.3	<i>Proposed Assessment Methodology</i>	116
6.10	Transport.....	117
6.10.1	<i>Preliminary Environmental Baseline</i>	117
6.10.2	<i>Key Potential Environmental Impacts</i>	117
6.10.3	<i>Proposed Assessment Methodology</i>	118
6.11	Electric and Magnetic Fields.....	119
7	STRUCTURE OF THE ENVIRONMENTAL STATEMENT	120

Figures

Figure 1.1: Zone location and indicative area of search for the onshore cable route	9
Figure 2.1: Typical offshore wind farm monopile foundation type.....	14
Figure 2.2: A steel tripod foundation, a subset of the multi-piled foundation types, which can be used for an offshore wind turbine	15
Figure 2.3: Typical offshore wind farm, gravity base foundation structure.....	16
Figure 2.4: Photograph of an offshore substation at Robin Rigg Offshore Wind Farm.....	17
Figure 2.5: Photograph showing the existing Bolney substation site.....	19
Figure 3.1: Planning authorities in the vicinity of the cable corridor (inner zone)	24
Figure 4.1: Location of Round 3 zones identified by Crown Estates following the SEA process	34
Figure 5.1: Bathymetry in the vicinity of the zone	36
Figure 5.2: Predicted seabed habitats in the vicinity of the zone (interpreted from the EUNIS seabed classification database, publicly available from the MESH project).	42
Figure 5.3: Coastal and marine conservation-designated sites.....	49
Figure 5.4: Marine conservation zone project areas.....	50
Figure 5.5: Extent of offshore ornithological surveys	61
Figure 5.6: Wrecks identified in the vicinity of the zone	66
Figure 5.7: Navigational features in the vicinity of Zone 6.....	69
Figure 5.8: Vessels by type passing through the area	70
Figure 5.9: Main destination ports of vessels passing through the zone	70
Figure 5.10: Vessel density map.....	71
Figure 5.11: Extent of civil and military aviation radar and military practice areas in the vicinity of the zone.....	74
Figure 5.12: Recreational activity and facilities overview	76
Figure 5.13: Average annual landing values of UK and foreign vessels into UK ports by method (2000–8) (MMO)	79
Figure 5.14: Average annual landing values of UK and foreign vessels into UK ports by species (2000–8) (source MMO)	79
Figure 5.15: Locations of marine aggregate extraction.....	82
Figure 5.16: Newhaven disposal site and location of seabed obstructions.....	83
Figure 6.1: Indicative onshore cable corridor.....	87
Figure 6.2: Agricultural land use (From DEFRA Agricultural Land Classification).....	89
Figure 6.3: Environmental Stewardship Agreements.....	90
Figure 6.4: Designated conservation areas.....	99
Figure 6.5: Recorded archaeological sites	107
Figure 6.6: Landscape designations	111

Tables

Table 1.1: Zone coordinates (WGS84).....	7
Table 4.1: The EIA process	29
Table 4.2: Mitigation strategy.....	32
Table 5.1: Hydrodynamic conditions expected across the proposed development area	38
Table 5.2: Location and timing of spawning and nursery grounds for major commercially important fish species within the vicinity of the zone (Coull <i>et al.</i> , 1998).....	45
Table 5.3: Designated conservation areas in the vicinity of the proposed Rampion Offshore Wind Farm	48
Table 5.4: Key species breeding along the eastern English Channel coastline	57
Table 5.5: Key species wintering or passing through eastern English Channel coastal counties	58
Table 5.6: Number and percentage of surveillance sightings recorded within the boundaries, 2000–9 (MMO).....	78
Table 5.7: Marine aggregate sites located within the vicinity of the zone	81
Table 5.8: Marine disposal sites.....	82
Table 6.1: Summary of soil types and characteristics within the indicative cable corridor	91
Table 6.2: Summary of nature conservation designations within the indicative cable corridor	97
Table 6.3: Landscape designations.....	110
Table 6.4: Count of road/rail crossings.....	117

Appendices

Appendix 1	References
Appendix 2	Glossary

The Sussex Biodiversity Record Centre is acknowledged as the source of baseline ecological data presented in a number of the figures included in this report.

1 INTRODUCTION

1.1 This Document

E.ON Climate and Renewables UK Rampion Offshore Wind Limited (EC&R) is proposing the development of the Rampion Offshore Wind Farm, located off the Sussex coast. As a nationally significant infrastructure project (NSIP) and, owing to the size and nature of the project, an environmental impact assessment (EIA) will be produced in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. EC&R has commissioned RSK Environment (RSK) as 'lead EIA consultants'.

This document is a scoping report prepared to support a request for a scoping opinion from the Infrastructure Planning Commission (the Commission). This process will also provide feedback on any additional information given in the Environmental Statement (ES) in support of an application for a Development Consent Order (DCO) to be submitted in due course to the Commission for the Rampion Offshore Wind Farm.

1.2 Overview of the Proposed Development

On 4 June 2008, the Crown Estate announced its proposal for the third round of offshore wind farm leasing. Following the earlier demonstration Round 1, and Round 2, which identified strategic search areas in the Greater Wash, Thames Estuary and Liverpool Bay areas, Round 3 opened up the potential for 25GW of offshore wind energy in the UK renewable energy zone and English and Welsh territorial waters. Nine zones were identified using the Crown Estates marine resource system (MaRS) and the government's strategic environmental assessment, and developers were invited to bid for the zones.

Following a competitive tendering process in January 2010, the Crown Estate announced the successful bidders for each of the nine Round 3 offshore wind zones. EC&R successfully secured the development rights for Zone 6 ('the zone'), located off the Sussex coast in the south of England.

The zone is located in the English Channel, off the south coast of England and extends from approximately 13km to 25km offshore, occupying an irregular elongated area, approximately 28km in an east to west direction and approximately 10km in the north to south direction. The zone has an overall area of 271km². Figure 1.1 overleaf shows a location map of the zone and the zone coordinates are presented in Table 1.1. The nearest coastal ports are Brighton, Newhaven, Shoreham-by-Sea, Littlehampton and Worthing.

Table 1.1: Zone coordinates (WGS84)

Longitude	Latitude
0°21'55.857"W	50°41'11.354"N
0°13'45.701"W	50°42'24.827"N
0°04'26.231"W	50°40'39.195"N
0°03'08.190"E	50°37'46.941"N
0°06'01.051"W	50°35'02.086"N
0°20'10.654"W	50°35'44.110"N

At present, EC&R is proposing to develop a project wholly within the zone, which covers 167km² or approximately two-thirds of the total zone area. This area is identified as the Site Development Area in Figure 1.1. The area has been chosen given its relatively shallow water, and the fact that it is far away from navigation and shipping lanes. The project has been named the Rampion Offshore Wind Farm, following a competition held among local schools to choose a name for the wind farm.

The area identified as the red line boundary for the Rampion Offshore Wind Farm is shown in Figure 1.1. For the purposes of the EIA this boundary represents the maximum extent of the area where there is potential for development (including the export cable to shore). The siting of the wind farm will be refined throughout the development process as a result of engineering, environmental and technological studies.

The provisions of EC&R's agreement with the Crown Estate (TCE) require the developer to consider future development of the entire zone. At the present time, due to technological and economic constraints associated with deeper water areas of the site, these areas have been excluded from the Rampion Offshore Wind Farm project definition. However, the baseline data surveys are being undertaken across the entire zone. Should future development become possible, then new and separate scoping, EIA and DCO applications would be submitted in relation to any future scheme.

The offshore elements of the Rampion Offshore Wind Farm cover the works from below mean high water mark. The offshore aspects of the project will comprise offshore wind turbines and their foundations, offshore substations, subsea array cables between the turbines and offshore substations, and export cables between the offshore substations and the shore. The wind farm will have a target zone capacity (TZC) of 665 MW.

The onshore elements of the project relate to the works associated with the onshore electricity grid connection from mean high water mark to the connection with the national grid transmission system. It is intended that the Rampion Offshore Wind Farm will be connected to the terrestrial grid via alternating current (AC) technology to a connection in the vicinity of Bolney substation in Mid Sussex. An indicative area of search for the onshore cable route (including the landfall) is indicated on Figure 1.1.

1.3 Introduction to E.ON Climate and Renewables

EC&R is a global business responsible for the operation and future development of all renewable energy activities within the E.ON Group, as well as for handling international carbon abatement projects. The company is one of the UK's leading renewable energy companies, with a portfolio of 18 onshore and three offshore wind farms, as well as an award-winning, dedicated biomass-renewable energy plant, near Lockerbie. The company is committed to offshore wind technology and has already invested around €1 billion into offshore wind activities in Europe.

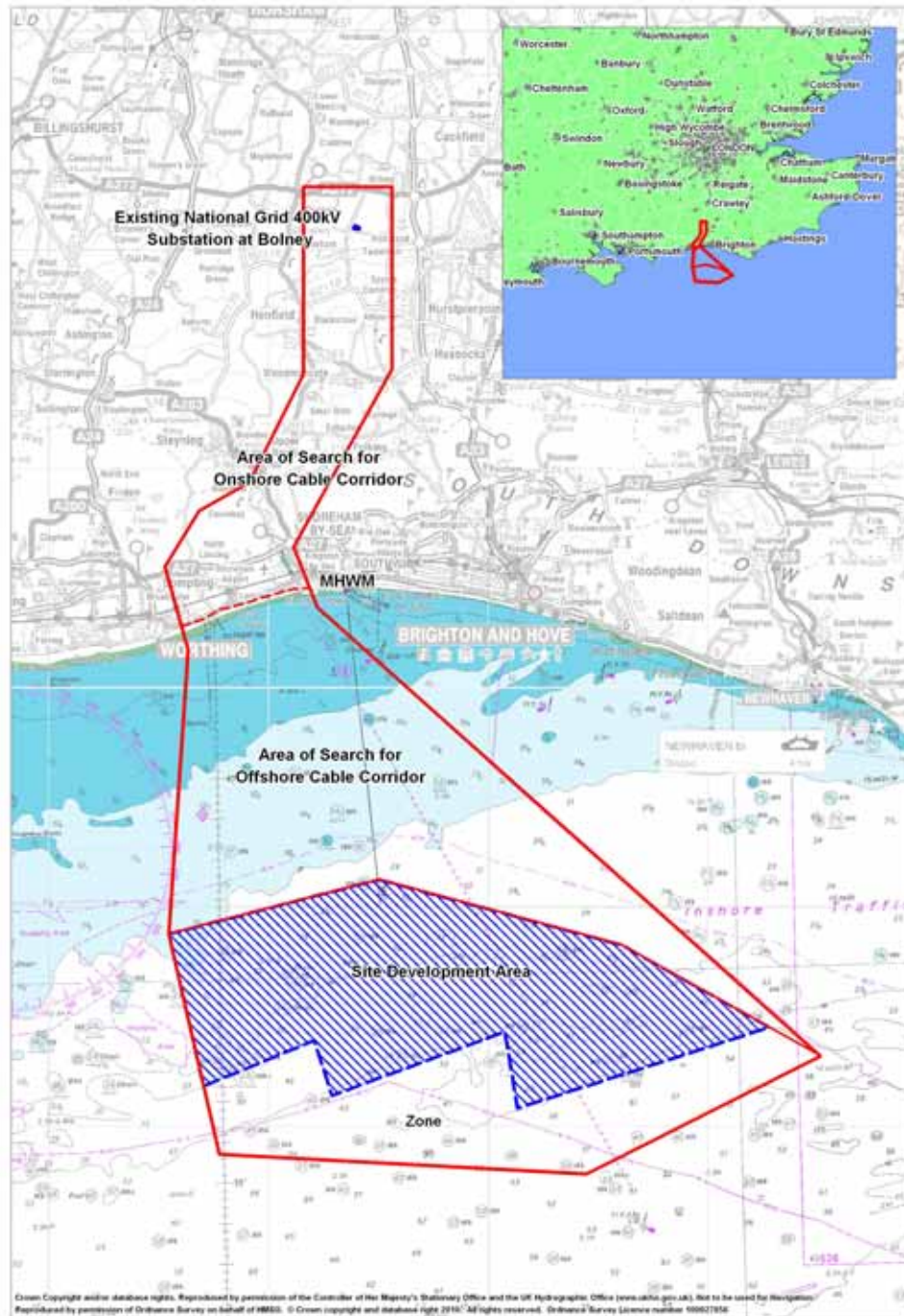


Figure 1.1: Zone location and indicative area of search for the onshore and offshore cable routes

1.4 Consenting Process

The Rampion Offshore Wind Farm is classified as a NSIP under the Planning Act 2008. The Infrastructure Planning Commission (the Commission) deals with applications for NSIPs. The Infrastructure Planning (Environmental Impact Assessment) Regulations (2009) implement the requirements of the European Directive on EIA into UK law. The Rampion Offshore Wind Farm development falls within paragraph 3(a) of schedule 2 of these regulations as an installation for the

harnessing of wind power for energy production, where the need for an EIA should be determined by the relevant competent authority.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 set out the requirements and provisions for screening (deciding if an EIA is required), scoping (setting out the scope for the EIA) and the submission of an ES. Schedule 4 of the Regulations sets out a list of information that should be provided in an ES.

The development of the Rampion Offshore Wind Farm will require a DCO from the Commission under section 37 of the Planning Act 2008. The onshore works for the Rampion Offshore Wind Farm (works comprising landfall works, onshore cabling and substation) will be classed as 'associated works'. In support of the application for a single DCO for both the offshore and onshore elements of the Rampion Offshore Wind Farm to the Commission, an ES will be produced with separate offshore and onshore volumes.

It should be noted that EC&R will submit the DCO application for the entire project, including both onshore and offshore elements, in order to ensure that the project is consented as a whole. There is a current requirement of the industry regulator Office of Gas and Electricity Markets (OFGEM) that the cable connection will be transferred to an independent third-party offshore transmission operator (OFTO).

1.5 Requirement for Environmental Impact Assessment

The legislative framework for an EIA is set by European Directive 85/337/EEC for the assessment of the effects of certain public and private projects on the environment, as amended by Directive 97/11/EC and Directive 2003/35/EC. The directives include two annexes, which specify the types of proposal that should be subject to mandatory EIA (Annex I) and those for which the need for EIA should be determined by the relevant national competent authority (Annex II). Wind turbines are listed in Annex II of the directive as 'installations for the harnessing of wind power for energy production (wind farms)'.

1.6 The Scoping Process

Regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 allows a prospective applicant to ask the Commission for a scoping opinion, which would set out the information that should be provided in an ES. Scoping is undertaken in order to refine the scope of the assessment of environmental impacts and ensure that it is robust in its approach.

The purpose of this document is to support the request for a scoping opinion. The scoping report will be issued to the Commission that will then identify the consultation bodies as set out in regulation 8 (6) of the EIA regulations. The Commission will issue the scoping report to these bodies, which will be formally requested to comment on:

- the proposed approach to the EIA;
- the various topics proposed to be addressed in the EIA;
- the proposed elements to be scoped out (i.e. elements deemed unnecessary for inclusion in the ES; and
- assessment methodologies where appropriate or recommend methodologies.

The scoping report will be placed on the Infrastructure Planning Commission's website <http://infrastructure.independent.gov.uk/>. Consultation bodies will be given 28 days in which to respond to the Commission.

Responses will be collated by the Commission, which is required to issue a formal scoping opinion to the developer within 42 days.

Once the scoping opinion has been received, the response will be reviewed and the relevant points that have been raised will be taken forward and used to inform the environmental assessment process.

1.7 Stakeholder Consultation

In parallel with the scoping process, EC&R is also commencing stakeholder engagement with stakeholders that have been identified in the wider area. This engagement is part of the overall consultation strategy, and provides a mechanism for stakeholders and EC&R to share information regarding the proposals and to inform the design of the proposal with issues raised by stakeholders through this engagement. The Planning Act 2008 (s42) provides 'statutory requirements' for the applicant to engage in and report on pre-application consultation with local authorities, landowners and those who would be affected by the proposals.

In addition, the Planning Act sets out provisions in s47 for the promoter to develop a statement of community consultation (SoCC) with the local authorities; this will be done in due course. The SoCC will set out the opportunities for a wide range of stakeholders to have their say on specific issues, which in turn will influence the design of the Rampion Offshore Wind Farm and/or its associated developments.

1.8 Document Structure

In accordance with regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations, when making a scoping request, the prospective applicant is required to include:

- 'a plan sufficient to identify the land' (section 2);
- 'a brief description of the nature and purpose of the development and of its possible effects on the environment' (sections 5 and 6); and
- 'such other information or representations as the person making the request may wish to provide or make' (sections 2, 3, 4, 5 and 6).

These requirements are addressed in this scoping report as indicated above.

2 THE PROJECT

2.1 Need for Renewable Energy

The European Directive 2001/77/E issued by the European Council in 2001 committed member states to setting national targets for consumption of energy from renewable sources. In accordance with this, the UK Government set a target to generate 10% of UK electricity from renewable energy sources by 2010 with an aspiration to double this figure to 20% by 2020 (Energy White Paper, February 2003). The Energy Act (2004) specifies a range of commitments set out in the Energy White Paper (2003).

In the subsequent Energy Review¹, the Government identified a target of 60% reduction in carbon dioxide emissions by 2050. It is also acknowledged in Annex D of the Energy Review that renewable energy projects provide crucial national benefits. Subsequently, through its Climate Change Act 2008, the Government set a legally binding target to reduce UK carbon dioxide emissions by at least 34%² by 2020, and at least 80% by 2050 compared to 1990 levels.

The Energy Policy for Europe, published by the European Commission on 10th January 2007, established a mandatory target of renewable energy consumption of 20% by 2020. In response, central government issued the Energy White Paper: Meeting the Energy Challenge (May 2007). This set out the government's international and domestic energy strategy to set long-term energy goals and implement the measures described in the Energy Review.

Most recently, under the EU Renewable Energy Directive (2009/28/EC), there is a requirement for the UK to produce 15% of all its energy from renewable sources by 2020 (approx. 30–35% of electricity from renewables). In July 2009, the UK Government published the UK Renewable Energy Strategy (RES), which sets out the means by which it intended to meet this target. Given the difficulties of increasing the proportion of heating and transportation fuel that is made up from renewable sources, the 'lead scenario' identified in this strategy is for over 30% of the UK's electricity to come from renewable sources by 2020, over two-thirds of which is expected to come from wind power.

The 2009 White Paper 'UK Low Carbon Transition Plan – National Strategy for Climate and Energy' sets out the UK's first ever, comprehensive, low carbon transition plan to 2020. The plan sets out the UK's approach to becoming a low carbon country: cutting emissions, maintaining secure energy supplies, maximising economic opportunities and protecting the most vulnerable. The plan is expected to deliver carbon dioxide emission cuts of 18% on 2008 levels by 2020 (and over a one-third reduction on 1990 levels).

The draft overarching National Policy Statement (NPS) for Energy (EN-1) sets out national policy for the delivery of major energy infrastructure, and reflects the UK Low Carbon Transition Plan. The NPS sets out how the energy sector can help deliver the government's climate change plan by clearly setting out the need for new, low carbon

¹ Department of Trade and Industry (2006) The Energy Challenge: Energy Review Report 2006

² Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009

energy infrastructure to contribute to climate-change mitigation. EN-1 notes that large-scale deployment of renewables will help the UK tackle climate change, reducing the UK's emissions of carbon dioxide by over 750 million tonnes by 2030; such deployment of renewables will also bring business opportunities and provide around £100 billion of new investment with the potential to bring up to 500,000 new jobs into the UK renewable energy sector.

The regional, renewable energy targets for the South East are set out in Policy NRM13 of the adopted Regional Spatial Strategy (RSS) for the South East, published in May 2009. This states that the minimum regional targets for electricity generation from renewable resources of 620 MW by 2010, 895 MW by 2016, 1130 MW by 2020 and 1750 MW by 2025 should be achieved by the development and use of all appropriate resources and technologies. Those energy resources with the greatest potential for electricity generation are listed as onshore and offshore wind, biomass and solar.

The proposed Rampion Offshore Wind Farm Project will have an installed generating capacity of 665 MW and will make a significant contribution towards meeting the above targets.

2.2 Project Description – Offshore Elements

The offshore elements of the Rampion Offshore Wind Farm Project will comprise of the following key components:

- Wind turbines;
- Foundations for the wind turbines and substations
- Substations
- Inter-array cables; and
- Export cables

Each of the above elements is considered in more detail in the sections below.

2.2.1 *Wind Turbines*

The exact turbine model and number of turbines will not be known until the final project design is determined. This is owing to the fact that the wind turbine industry is developing rapidly and wind turbine technology is constantly evolving. Therefore, it is difficult to predict the profile of the turbines that will be commercially available at the time of construction.

For the purposes of this project, EC&R intends to consider a range of turbines. In order to maximise the viable alternatives that may be considered, preliminary discussions have indicated that wind turbines ranging from 3.6 MW to 7 MW output are expected to be the realistic options available at the time of tendering for the turbine supply contracts, and after obtaining the necessary consents. This range would lead to an indicative number of turbines between 185 (3.6 MW turbines) and 95 turbines (7 MW turbines).

The wind turbines will have a tower that may be assembled in sections. The main part of the turbine at the top of the tower is known as the 'nacelle'. The nacelle houses the gearbox, generator and in some cases the transformer. The transformer placed in the

nacelle or in the tower steps up the generated electricity to a higher voltage to reduce losses during transmission over the longer distances to the substation.

2.2.2 Foundations

Preliminary engineering work indicates that the following foundation design options will be considered:

- Monopiles
- Multi-pile/jacket
- Gravity base and
- Suction caisson.

It is possible that more than one type of foundation may be used across the project site. A brief description of the expected installation methods for each of the foundation options is outlined below.

Monopiles

Monopiles are welded tubular steel sections, which are installed vertically into the seabed either by driving, using a pile-driving hammer, or by combining driving and drilling, where harder ground conditions are encountered. The dimensions of the monopiles that may be used will depend on the size of the turbines, the hydrodynamic forces and the ground conditions encountered at the Rampion site. Figure 2.1 (below) shows a design drawing of a typical monopile foundation.

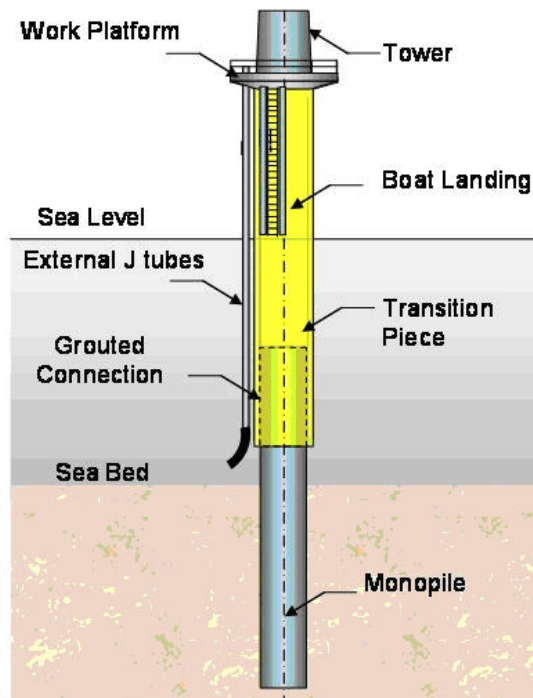


Figure 2.1: Typical offshore wind farm monopile foundation type

Multi-pile/jacket

Multi-pile foundations typically consist of a lattice-work of tubular steel supporting the turbine tower. Piles of small diameter are driven through a pile sleeve at each leg of the structure or pre-piled and then the foundation installed. Connection of each pile and leg could be by grouted or deformed technique. Jacket foundations are commonly of a design similar to that used for oil and gas platforms. Other multi-pile solutions also exist, for example a braced monopile or raked, multi-pile solutions. Figure 2.2 shows a design drawing of a steel tripod foundation, a subset of the multi-piled foundation types, which can be used for an offshore wind turbine.

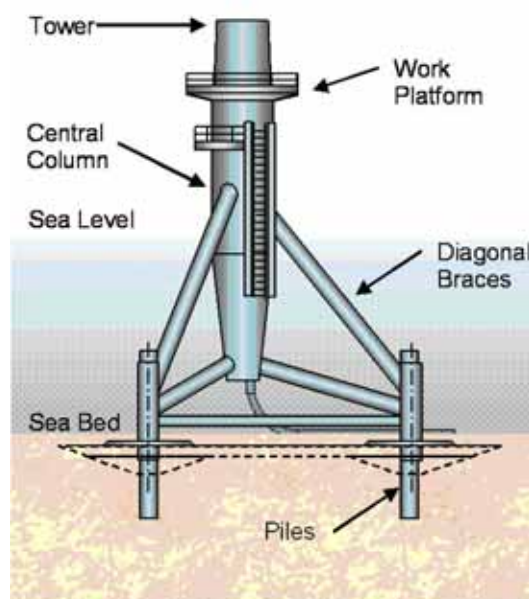


Figure 2.2: A steel tripod foundation, a subset of the multi-piled foundation types, which can be used for an offshore wind turbine

Gravity base

Gravity base foundations have a large-diameter usually concrete base, which sits on the seabed to support the turbine tower. The gravity base solution relies on the weight of the base to stabilise the structure. The base can be constructed from steel if concrete is not suitable to the conditions. The gravity base structure would be filled with sand, rock or iron-ore ballast to increase the weight without adding structural costs. If constructed from concrete, the structures would be heavier, reducing or negating the need for additional ballast.

Before the installation of a gravity base foundation, some preparation of the seabed would be required. This preparation can involve dredging (to remove soft material) and/or rock dumping (to provide a flat surface). Gravity bases may also be designed with steel skirts around the perimeter, which penetrate into the soil below the base, allowing small uneven features in the seabed surface to be accounted for, however, this is viable only in certain ground conditions. Figure 2.3 below is a design drawing of a typical offshore wind farm, gravity base-type foundation.

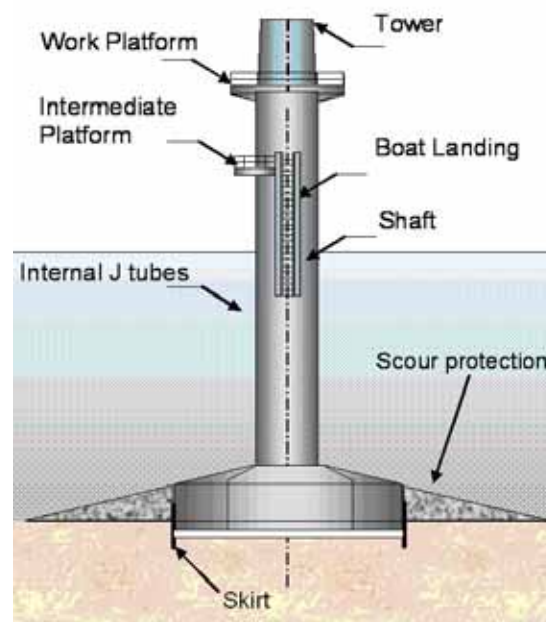


Figure 2.3: Typical offshore wind farm, gravity base foundation structure

Suction-Caisson

The suction caisson is similar to the gravity base, but is smaller in diameter with perimeter skirts that penetrate further into the seabed. This type is only viable in very particular ground conditions. The caisson relies on the sediment within it to increase the overall weight, enabling a lighter, more efficient structure. No preparation of the seabed is necessary and no spoil is generated. Depending on the sediment conditions encountered, it may be necessary to pump grout under the base to ensure good contact between the base and the seabed.

Scour protection material may be required around the bases of all the foundation types to ensure structural integrity. Turbine support structures will also include access facilities and appropriate lighting and marking for surface navigation.

2.2.3 Offshore Substations

There are likely to be two offshore substations that will transform the electricity to a higher voltage before it is transmitted to shore via export cables. Each substation may consist of platforms installed on a foundation; the type of foundation is yet to be defined but is likely to be a monopile or multipile jacket type. Components that are likely to be installed on the platform are transformers, batteries, generators, switchgear, fire systems and modular facilities for operational and maintenance activities. Figure 2.4 shows a typical offshore substation.



Figure 2.4: Photograph of an offshore substation at Robin Rigg Offshore Wind Farm

2.2.4 Inter-array Cables

Subsea array cables will be installed between the wind turbines and offshore substations. Array cables are likely to be installed using ploughing, jetting or trenching techniques. In deeper, more difficult terrain areas 'directly laid' techniques may be considered.

2.2.5 Export Cables

Export cables will transport the electricity from the offshore substations to the onshore connection point. Export cables of rated voltage up to 220 kV capacity will be installed for each substation. The export cables will be installed using ploughing, jetting or trenching techniques as for the array cables.

The exact route of the export cables will be determined during the detailed design of the project, taking into account any environmental sensitivities and seabed conditions.

2.2.6 Landfall

A range of potential landfall locations west of Brighton and Hove have been identified at which the export cables would run ashore.

Construction will involve either surface trenching the cable or using a trenchless technique such as horizontal directional drilling. Cable vaults will be constructed at the landing points for jointing of the submarine export cable and onshore cables. Typically each is a large underground concrete structure housing the cables, fibre optics and

earthing equipment. It is anticipated four separate vaults will be required with two surface manholes for each.

2.3 Onshore Elements

It is intended that the wind farm will be connected to the National Grid Bolney substation in Mid Sussex.

The landfall locations and associated cable routes will be refined as assessments are carried out and constraints analysed through the EIA process. The DCO submitted to the Commission will identify a single cable route corridor, however, for the purposes of the scoping and the EIA, a wider swathe has been defined, which will be refined in the light of constraints and consultation. Figure 1.1 shows the current area of search for the onshore elements of the project.

The main elements of the onshore works are:

- landfall (see section 2.2.6 above)
- transmission cables defined in a cable corridor; and
- a substation.

2.3.1 Onshore Cables

Grid connection infrastructure associated with large offshore wind farm can take the form of underground cabling or overhead tower lines, but it is anticipated in this case that the preference would be to underground the cables. This would involve digging trenches, except where constraints require that other methods must be utilised to avoid or minimise effects above ground. Alongside the electricity cables, fibre optic cables are required to be installed.

For the construction phase of the cable route, a cable-construction corridor will need to be defined; this corridor is wider than that in which the cables will be installed. The corridor will cover the working areas to be secured on a temporary basis, allowing for safe construction and access. The cable construction corridor for surface trenching is expected to be no wider than 40m. The corridor may be narrowed at sensitive points; however, this will be avoided wherever possible because of limitations in the cable design. The corridor will support vehicle traffic, provide adequate space for cable assembly, sufficient space for excavation of the cable trenches, as well as sufficient storage space for the removed topsoil and subsoil.

At predetermined locations, the corridor may also have to be widened beyond the standard width to allow: sufficient space for access at crossings, avoidance of obstacles, directional drilling and/or the application of trenchless techniques. In addition to the construction cable corridor, it will also be necessary to establish larger, temporary, construction laydown areas to accommodate the construction equipment, site offices and materials.

There will be a permanent easement agreed with landowners where the cables are installed underground to allow for access to inspect and undertake maintenance on the pipeline. The visible effects on the land use and environment will generally be temporary as the cable construction corridor is planned to be reinstated to its former condition on completion of construction.

If the construction of the offshore wind farm is undertaken over an extended period, it may not be viable to install all cables in a single operation. In this case some of the cables might be installed initially, along with empty ducts for the remaining cables. Cables would be pulled into the remaining ducts as the later phases of the wind farm project came on line. This activity would remove the need to repeat excavations along the cable route.

2.3.2 Onshore Substation

The National Grid connection offer is to connect at Bolney. In order to connect the cables from the offshore wind farm to the electricity network, a substation will be required. The proposed substation will be located on land near to the existing National Grid 400 kV substation at Bolney (see Figure 2.5). The overall site footprint is expected to be within two hectares. Elements of the substation are likely to include: transmission equipment and buildings containing switchgear and controls and amenities for visiting service engineers. Transmission equipment within the substation usually consists of transformers, air-core reactors, capacitor banks and open busbars.



Figure 2.5: Photograph showing the existing Bolney substation site

2.4 Construction Programme

The construction of the Rampion Offshore Wind Farm is likely to take place over a duration of three to four years. The construction programme will be phased, with onshore works such as the substation and cable installation likely to commence in advance of the offshore construction programme.

2.5 Operational Phase

Once commissioned, the wind farm will operate automatically with each wind turbine operating independently of the others. The operation and control of the wind farm will be assessed by a supervisory control and data acquisition (SCADA) system, installed at each turbine and at the offshore substations and onshore control base. The SCADA system will enable the remote control of individual turbines or the wind farm in general, and remote control of information transfer, storage and the shutdown of any wind turbine in emergency circumstances.

A number of maintenance options are under consideration for the project. It is expected that access to the offshore wind farm will be via personnel transfer vessels, which can transport personnel to the wind turbines and offshore substations to carry out inspections and maintenance.

The maintenance strategy for the Rampion Offshore Wind Farm will consist of two phases and will cover scheduled maintenance (i.e. regular, intended and planned maintenance) and unscheduled maintenance (e.g. unexpected, unplanned maintenance, and equipment repair and/or replacement).

The proposed substation near the existing Bolney National Grid substation will be unmanned, however, regular visits will be made to the substation by service engineers. Apart from routine testing undertaken during a circuit outage, the cable circuits should remain generally maintenance free.

2.6 Decommissioning

The Crown Estate lease for the Rampion Offshore Wind Farm Project will run for 50 years. As the design life of the turbines is likely to be 20 to 25 years, there is the expectancy of refurbishment or replanting (replacement of worn/outdated turbines on existing foundations) to occur during the lifetime of the lease. In the event of a future decision being made to refurbish or replant the turbines then the relevant consents and licences required would be applied for at that time.

At the end of the Crown Estate lease period, there is a condition in the lease and a statutory requirement (through the provisions of the Energy Act 2004) for the wind farm to be decommissioned. Under the statutory process, EC&R is required to prepare a decommissioning plan at the request of the Secretary of State. Before construction of the wind farm, the Secretary of State will expect to see that effective and transparent arrangements are in place to ensure the meeting of decommissioning obligations at the appropriate time.

For the purposes of the EIA, the decommissioning process of the wind farm would likely comprise the reverse of the construction process with some exceptions. Any piled foundations would be removed to just below seabed, with due consideration given to likely changes in seabed level, whilst gravity-based, suction-caisson foundations would be removed completely.

Currently, there is no statutory requirement for decommissioned cables to be removed, however, the necessity to remove cables for decommissioning will be reviewed at the time in terms of their effect on the environment and safety of cables left in situ versus conditions incurred by their removal. On decommissioning, the equipment above seabed level will be removed and the site reinstated.

It is expected that offshore decommissioning will require similar vessels to construction; offshore decommissioning will require a similar period of time i.e. three to four years.

The onshore substation may continue to be used as a substation site even after the wind farm has been decommissioned. In the event the substation is decommissioned, all equipment and buildings above ground level will be removed. Underground cables are likely to be left in situ, unless they are removed and replaced by new cables running along the same route, as part of other future developments. If a future decision is made to refurbish or replace the substation and cables then the relevant consents and licences required would be applied for at that time.

3 PLANNING POLICY CONTEXT

3.1 Planning Context

Under current regulations (the provisions of the Planning Act 2008), the Rampion Offshore Wind Farm as a NSIP will require a DCO from the Infrastructure Planning Commission. However, the new coalition government has recently announced the abolition of the Commission and has proposed replacing it with the Major Infrastructure Planning Unit within the Planning Inspectorate, with appropriate transitional provisions. Despite any potential changes to the governance of the Planning Act, it is assumed that the requirements of the application process will remain unchanged, and that in support of the application for a DCO, an ES will be produced that will present the findings of an independent EIA undertaken within the framework of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.

The development falls within paragraph 3(a) of schedule 2 of these regulations as an installation for the harnessing of wind power for energy production, where the need for an EIA should be determined by the relevant competent authority.

Under section 104 of the Planning Act 2008, when considering an application for a DCO, the Commission must have regard to:

- Any NPS that may effect development relating to or described in the application;
- Any local impact report (prepared by the local authority); and
- Any other matters that may be prescribed or which the Commission members think are both important and relevant to their decision.

The Commission must normally consider the application in accordance with any relevant NPS except to the extent that certain specified criteria apply. The NPSs will set out the relevant national need and planning criteria to be taken into account in assessing applications. The following NPSs will be of particular relevance in the determination of whether or not to grant consent for the Rampion Offshore Wind Farm:

- Overarching energy reference no. EN-1, which sets out the context for the five specific energy NPSs including:
- Renewables reference no. EN-3 which refers to renewable energies, and includes information relating to offshore wind farms including the relevant offshore consenting process, factors influencing site selection and design, and offshore wind farm impacts to the natural, physical and human environment.

National planning policy guidance (PPG) and planning policy statements (PPS) provide a tool that local planning authorities (LPAs) use to control development within the framework and sustainable development aims. Relevant PPGs and PPSs include the following:

PPS1 – Delivering Sustainable Development

This document sets out national policies on land and planning, and overarching policies on the delivery of sustainable development incorporating the aims of social progress, which recognises: the needs of everyone, effective protection of the

environment, prudent use of natural resources and maintenance of high and stable levels of employment.

PPS1 – Planning and Climate Change Supplement to PPS1

This document encourages development that makes a full contribution to delivering the government's UK Climate Change Programme.

PPS7 – Sustainable Development in Rural Areas

The PPS7 sets out the government's planning policies for rural areas, including country towns, villages and the wider undeveloped countryside to the fringes of larger urban areas. PPS7 includes guidance on policies for development in the countryside and landscape designations such as areas of outstanding natural beauty (AONBs) and national parks.

PPS9 – Biodiversity and Geological Conservation

PPS9 promotes developments that maintain, enhance, restore or add to the biodiversity and geological conservation interest.

PPS11 – Regional Spatial Strategies

PPS11 sets out policies to be taken into account in revisions of RSSs including priorities for the environment, energy strategy, infrastructure and economic development.

PPS12 – Local Spatial Planning

This document sets out policies to be taken into account in the preparation of local development documents (LDDs), including resources, utilities and infrastructure provision comprising the local development framework (LDF) and minerals and waste development frameworks.

PPG15 – Planning and the Historic Environment

PPG15 seeks to: preserve and enhance the character and appearance of conservation areas, protect the interests of listed buildings, and protect World Heritage sites for future generations.

PPG16 – Archaeology and Planning

This document advises on the handling of archaeological remains and discoveries.

PPG20 – Coastal Planning

This acknowledges that energy generating proposals can require a coastal location.

PPS22 – Renewable Energy

PPS22 encourages renewable energy schemes subject to their impact on interests such as the landscape and nature conservation.

PPG24 – Planning and Noise

This gives guidance on the use of planning powers to minimise the adverse effects of noise on the environment and quality of life.

PPS25 – Planning and Flood Risk

PPS25 seeks to ensure flood risks are taken into account and inappropriate development is avoided in areas at risk from flooding. It directs development away from areas at highest risk of flooding.

3.1.1 Regional Spatial Strategy

The South East RSS is part of the Development Plan for Sussex, and was published in May 2009. The RSS covers the period between 2009 and 2026. Policy NRM13 of the RSS sets out minimum regional targets for electricity generation from renewable resources and states that those energy resources with the greatest potential for electricity generation are onshore and offshore wind, biomass and solar power. Land-based renewable energy targets for East and West Sussex sub-region are set out in Policy NRM14.

The coalition government has abolished RSSs with effect from 6th July 2010 and stated that new ways for local authorities to address strategic planning and infrastructure issues based on co-operation will be introduced through the Decentralisation and Localism Bill to be introduced in the current parliamentary session.

3.1.2 Local Planning Policies

The local planning context for the onshore components of the project are summarised below. The indicative cable corridor passes through land within the jurisdiction of Worthing Borough Council (East Worthing), Adur District Council (Shoreham-by-Sea), the District of Horsham, and Mid Sussex District Council (See Figure 3.1).



Figure 3.1: Planning authorities in the vicinity of the cable corridor (inner zone)

3.1.2.1 *The Development Plan for Worthing Borough Council*

The Development Plan within Worthing Borough consists of saved policies from the Worthing Borough local plan adopted in 2003.

The council's core strategy, which sets out the overall vision and planning strategy for Worthing over the next 10–20 years, was formally submitted to the Secretary of State on Friday 9th July 2010.

Relevant saved policies in the Worthing Borough local plan include:

- Policy RES7, relating to development that generates or has the potential to generate pollution; such development will only be permitted where by virtue of its location and/or the application of appropriate mitigation measures, its effect on the natural and built environment, including wildlife and the amenities of local residents, does not cause unacceptable harm.
- Policy RES9 relates to the development of sites with known or suspected contamination; it requires investigations and the application of remedial measures sufficient to ensure that any unacceptable risk to health is removed before development proceeds.
- Policy C1 permits development only outside the built-up boundaries of the town should a rural location be needed for the development.
- Policy C5 will not permit development in the strategic gaps unless it meets demonstrable local, social and/or economic needs or is of proven national interest; there are no alternative sites available elsewhere, and it would not compromise – individually or cumulatively – the objectives and fundamental integrity of the strategic gap.
- Policy CT3 permits development that respects and where possible enhances the appearance and character of the sea-front environment; has regard to protecting existing views and is appropriate in terms of design and appearance.

3.1.2.2 *The Development Plan for Adur District Council*

The development plan for Adur district consists of saved policies from the Adur District local plan adopted in April 1996.

Relevant saved policies include the following two policies. Policy AC2 seeks to prevent development that would be harmful to the visual quality and distinctive characteristics of the Sussex Downs AONB; Policy AC3 seeks to protect and enhance the landscape character of the Sussex Downs AONB.

Adur District Council produced a core strategy as part of its LDF but this was subsequently withdrawn and work on its revision started in January 2008. A number of technical studies prepared for the original Core Strategy will be used to inform this review. These include:

- Adur Local Development Framework Strategic Transport Study, which includes information about the East Worthing access road (EWAR), a proposed scheme to improve access to the east of the town. The East Worthing access road study (2005) included route options through the strategic gap between Worthing and Sompting, but no definitive alignment has yet been approved.

3.1.2.3 *The Development Plan for Horsham District Council*

Horsham District Council has a series of adopted local development documents (LDDs) that have superseded its local plan. The key LDD is its general development control policies LDD adopted in December 2007. Within this district, the indicative cable corridor passes through the South Downs National Park and potentially under flood-risk areas being the River Adur and the floodplains of its tributaries. Relevant policies in the Horsham General Development Control LDD include:

- Policy DC1, which generally seeks to protect and enhance the character of the open countryside.
- Policy DC2, which will permit development if it protects the landscape.
- Policy DC4, which seeks to protect and enhance the landscape character of the AONB (now a national park).
- Policy DC5, which seeks to protect, conserve and enhance areas of biodiversity and geology interest.
- Policy DC7, which seeks to prevent development in flood-risk areas unless mitigation measures are provided to prevent flood risk elsewhere.
- Policy DC8, which encourages renewable energy schemes provided there is no adverse impact.

3.1.2.4 *The Development Plan for Mid Sussex District Council*

The development plan within Mid Sussex district consists of:

- Saved policies from the Mid Sussex local plan (2004) and
- Small-scale, housing-allocation development plan document.

In the Mid Sussex local plan there is no allocation for the land adjacent to the existing Bolney substation. It is part of the wider areas of open countryside for which the relevant policies include:

- Policy C1, which seeks to restrain development in the open countryside.
- Policy C5, which seeks to permit development only within sites of nature conservation where the design and layout minimises the effect on features of nature conservation importance.

3.1.2.5 *South Downs National Park Authority*

The South Downs National Park Authority (SDNPA) will be the sole planning authority for the South Downs National Park from 1st April 2011. Until then, the 15 local authorities in the South Downs National Park have agreed to consult it on significant planning applications and policy matters. Key consultation responses to planning applications and on policy will be made at meetings of the SDNPA Planning Committee.

3.2 **Habitats Regulations**

The Rampion Offshore Wind Farm lies outwith any European designated sites and is a significant distance from the nearest marine Natura 2000 site. However, the significant movement of for example bird species between designated sites, both within the UK

and cross-Channel from the UK to continental Europe, highlights the potential for an offshore wind farm along the migration route to have an effect on such populations.

The Conservation (Natural Habitats, &c.) Regulations 1994 and the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 require that, where the possibility of a likely significant effect on a European offshore marine site and/or a European site cannot be excluded, a competent authority must undertake an appropriate assessment.

Appropriate assessment has been undertaken for the Round 3 wind farm sites at plan level. The plan-level appropriate assessment concludes that there will be no adverse effect on the integrity of a European/Ramsar site arising from the Round 3 wind farm sites. This assumes that general measures typically employed on offshore wind farms to avoid or mitigate adverse environmental effects will be implemented where necessary at project level, and that Round 3 development will be required to undergo project-level appropriate assessment wherever the possibility of a likely significant effect on a European/Ramsar site cannot be excluded.

The plan-level appropriate assessment identified specific considerations (advisory only) for Zone 6 as follows:

- Bat interest features (*Barbastella barbastellus* and *Myotis bechsteini*);
- Marine mammal interest features (*Tursiops truncatus*);
- Birds – effects of turbines; and
- Birds – effects of cabling.

The need for project-level appropriate assessment will be discussed with Natural England and, if required, the requisite information will be provided alongside the DCO/ES to inform the appropriate assessment process.

3.3 Other Key Consents

3.3.1 Marine Licence

Part 4 of the Marine and Coastal Access Act 2009 provides a framework for a new marine licensing system. Marine licences will replace the requirement for Coastal Protection Act (CPA) consents and Food and Environment Protection Act (FEPA) licences. The new licensing system is expected to be implemented in spring 2011.

Any consent granted by the Commission will be able to include provision deeming the grant of a marine licence for operations carried out wholly in England, and in waters adjacent to England up to the seaward limits of the territorial sea or the UK Renewable Energy Zone (REZ) (except any part of a REZ in relation to which the Scottish ministers have functions).

The Marine Management Organisation (MMO) will be a statutory consultee for the DCO and will be responsible for enforcing agreed consent conditions.

3.3.2 Planning Permission

As defined under section 33 of the Planning Act 2008, any consent granted by the Commission will be able to include provision deeming the grant of planning permission (under the Town and Country Planning Act (TCPA) 1990).

4 EIA PROCESS

4.1 Introduction

The purpose of the EIA is to provide a systematic analysis of the impacts of a proposed development in relation to the existing (baseline) environment. This is summarised in an ES, which provides information to those from whom consents and authorisations are sought, to enable them to assess the environmental impact of the project. Information in the ES is also used by stakeholders to evaluate the acceptability of the development and its potential impact.

The EIA process typically comprises a series of phases, which are shown in Table 4.1. The EIA for the Rampion Offshore Wind Farm will comprise baseline surveys, assessment of impacts, development of mitigation measures, and identification of residual impacts. The EIA will satisfy the requirements of schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations (which sets out details of information for inclusion in ESs) and will include a description of the development comprising information on the site, design and size of the development, a description of the aspects of the environment likely to be significantly affected by the development, the likely significant effects of the development on the environment, and mitigation measures required to minimise potentially significant effects.

The topic areas identified for assessment as part of the EIA for the proposed offshore and onshore elements are listed in sections 5 and 6, respectively.

4.2 Approach to EIA

Developing an offshore wind farm is a complex process. The design of the wind farm, including the offshore array (e.g. turbine layout, foundation design, turbine type and size and inter-array cables) and the associated infrastructure will be refined on a continuous basis throughout the development process.

It is vital that the developer retains as much flexibility in the design of the wind farm as possible, and must consider many factors, ranging from ground conditions through environmental constraints and sensitivities, to meteorological and metocean conditions. The developer needs to retain flexibility in order to be able to accommodate technological advances in the evolving market of turbine manufacture and supply, and to ensure that economic viability is retained. All of the above means that it is not always possible to define a specific scope for the project at the time of submission.

This approach has worked successfully in the submission of applications for consents for a significant number of Round 1 and Round 2 offshore wind farms under previous consenting regimes. By employing the ‘Rochdale Envelope’¹ approach to EIA, impacts associated with the project are assessed using a ‘worst-case scenario’ approach, in which all options are considered. Using this approach, and if a number of alternative

¹ Case law (i.e. R.V Rochdale MBC Ex. Part C Tew 1999) – The “Rochdale Case”, established that indicative sketches and layouts etc. cannot provide a sufficient basis for outline planning permission for EIA Development. Therefore, with respect to the DCO application, the final scheme constructed must have been covered by the scope of the EIA.

solutions are assessed, the impact assessment is based on the solution that is known to have the biggest impact. Following this reasoning, and if there are no significant impacts as a result of this solution, lesser options will have no significant impacts either. Therefore all likely environmental impacts and their significance will be have been assessed fully in line with the EIA Regulations.

Table 4.1: The EIA process

Data Gathering	<p>Project Data Gathering Basic description of the construction and operation of the proposed wind farm development, including identification of the project components, proposed activities and expected programme</p> <p>↓</p>	S T A K E H O L D E R E N G A G E M E N T
	<p>Environmental Data Gathering Collection of information within the zone, cable corridor and substation site</p> <p>↓</p>	
Scoping	<p>Identification of Environmental Sensitivities Identification of receptors and the key environmental sensitivities, which could potentially be affected by the proposed wind farm development; consultation with regulatory authorities to discuss aspects associated with the proposed project activities</p> <p>↓</p>	
	<p>Site Survey Work Surveys of the baseline environmental conditions to fill gaps in data, identify and confirm potential constraints identified as part of the desk-based assessment, and assist in the determination of impacts</p> <p>↓</p>	
	<p>EIA A detailed assessment of the identified potential effects associated with project activities</p> <p>↓</p> <p>Evaluation of Significance Evaluation of significance, including qualitative estimation of magnitude and severity of impacts</p> <p>↓</p>	
Assessment		

Mitigation Measures	
Management	Identification and definition of mitigation measures to be applied to eliminate, minimise or manage the identified potential significant environmental effects ↓
Compilation of Environmental Statement	Presentation of the findings of the baseline studies and mitigation measures in a systematic way to determine the significance of the residual effect on the environment; schedule of environmental commitments and monitoring requirements

It is proposed to adopt the Rochdale Envelope approach in the EIA for the Rampion Offshore Wind Farm; where design and/or methodology options remain at the time of the DCO submission, these will be clearly identified within the ES, and the reasons why the retention of flexibility is required will be clearly defined.

4.3 Data Gathering

Data gathering for the proposed Rampion Offshore Wind Farm has already commenced. A basic description of the construction and operation of the proposed wind farm is provided in Section 2 of this report. Environmental information has been collected from publicly available data sources and will be supplemented with information requested from relevant consultees during the scoping phase and EIA. Baseline surveys will be undertaken to fill gaps in data; to identify and confirm potential constraints and assist in the determination of impacts.

4.4 Scoping

This scoping report has been prepared to set out the proposed approach to EIA for the proposed Rampion Offshore Wind Farm. The report includes the identification of assessment methodologies for each of the environmental aspects to be assessed. Work to date includes:

- The undertaking of a number of ongoing ecological baseline surveys, including offshore ornithological and marine mammal surveys comprising both aerial surveys and boat-based surveys, and geophysical surveys completed for the entire zone; and
- Identification of proposed assessment methodology for each of the environmental aspects to be considered.

All representations received during the scoping process will be considered and used to inform the EIA process.

4.5 Assessment

4.5.1 Overview

The objectives of the impact assessment will be:

- To gather data regarding the baseline environment (socio-economic, biological, and physical)
- To ensure through engagement and consultation with statutory and non-statutory organisations that concerns about effects on the environment from the proposed offshore wind farm are identified and fully considered
- To work together with the engineering and design teams to develop an environmentally sensitive project design and
- To assess the potential environmental impacts during the construction, operational, and decommissioning phases of the proposed offshore wind farm and suggest mitigation measures to be implemented where required.

The assessment of impacts will be achieved by establishing a robust understanding of the environmental baseline and then predicting the potential impact of key development activities on that baseline. Predictions of impact will be based on a combination of professional judgement, expert knowledge and modelling where appropriate. The definition of what constitutes a significant impact for each environmental aspect will be determined by clear and sensible, pre-defined assessment criteria, as discussed below.

4.5.2 Assessment Criteria

The evaluation of the significance of an impact is important as it determines the actual value of a positive or negative impact and may in turn dictate the resources that should be applied in avoiding or mitigating an adverse impact, or the actual value of a positive impact. Furthermore, it is the combined significance of the various mitigated impacts that determines the overall environmental acceptability of a proposed development.

A number of criteria will be used to determine whether the potential effects of the proposed wind farm are 'significant' and will be assessed quantitatively, where possible. The significance of potential effects will be assessed using one or more of the following criteria:

- International, national and local designations
- Relationship with relevant NPS statements
- Sensitivity of receiving environment
- Reversibility and duration of effect
- Inter-relationship/s between effects and
- Results of consultations.

Those effects considered to be significant before mitigation is applied will be identified in the ES. The significance of effects will reflect judgments as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. For example, a large adverse impact on a feature or site of low importance will be of lesser significance than the same impact on a feature or site of high importance.

In general, the following (or similar) terms will be used to describe the significance of effects, where they are predicted to occur:

- Major: beneficial or adverse – where the development would cause a significant improvement in or deterioration of the existing environment
- Moderate: beneficial or adverse – where the development would cause a noticeable improvement in or deterioration of the existing environment
- Minor: beneficial or adverse – where the development would cause a barely perceptible improvement in or deterioration of the existing environment and
- Negligible: beneficial or adverse – where the development would cause no discernible improvement in or deterioration of the existing environment.

The exact definition of these terms will be made clear for each environmental aspect within the ES. The EIA will address the three stages of the proposed offshore wind farm development:

- Construction – all those works, activities and processes that will be required to build the proposed development
- Operation – the developed scheme completed and in operation and
- Decommissioning – all works and processes required to undertake the closure, dismantling and removal of the development.

4.6 Mitigation Measures and Enhancement

Appropriate mitigation measures will be explored to eliminate, minimise or manage identified potential significant effects on the environment. A widely accepted strategy for mitigation exists and will be followed when considering the methods of dealing with the environmental impacts of the project. The strategy comprises the components listed in Table 4.2. The assessment of the significance of the impacts will subsequently be carried out on the residual impacts. In addition to reducing any adverse impacts, consideration will be given to providing opportunities for environmental enhancement.

Table 4.2: Mitigation strategy

Avoidance	Where viable, the project will be redesigned to avoid impacts. Avoidance will also be considered during the assessment of alternative sites/routes.
Reduction	Reduction will be considered when all options for the avoidance of impacts have been exhausted or deemed to be impractical. For example, alternative alignments will be considered to reduce visual impact.
Compensation	Where the potential for avoiding and reducing impacts has been exhausted, consideration will be given to providing compensation for residual impacts to make the proposal more environmentally acceptable.
Remediation	Where adverse effects are unavoidable, consideration will be given to limiting the level of impact by undertaking remedial works.

Where possible, measures to avoid or mitigate environmental effects will be designed and included in the proposals to form part of the project as 'built-in mitigation measures'. Mitigation measures will be identified in the ES as part of the scheme being assessed.

4.7 Cumulative, Secondary and Indirect Impacts

Cumulative impacts are those that may result from the combined or incremental effects of past, present or future activities. While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative impact that is significant.

Consequential, or secondary, impacts are those resulting from additional developments that are not part of the proposal, but which may reasonably be expected to result from the proposed development.

The cumulative effects of the offshore elements of the proposed Rampion Offshore Wind Farm, in conjunction with other major activities/schemes, will be considered within each topic of the ES. This will include consideration of the following activities:

- Marine-aggregate extraction licensed and proposed sites
- Commercial fisheries activity
- Subsea cables and pipelines
- Port/harbour dredging operations
- Commercial and recreational navigation, and
- Port/harbour development.

The cumulative effects of the onshore electrical grid connection for the proposed Rampion Offshore Wind Farm, in conjunction with other major schemes, will be considered within each topic of the ES. A check for other planning applications in conjunction with the relevant local authorities will be made as part of the consultation process, in order that any planned developments that are the subject of lodged planning applications are included within the assessment of cumulative impacts.

The cumulative assessment will be undertaken using the IEMA EIA guidance and the 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions', prepared for the European Commission (DG X1) and the Environment Protection Agency (EPA) Advice Notes on Current Practice.

4.8 Alternatives

The Infrastructure Planning (Environmental Impact Assessment) Regulations require for inclusion in an ES:

An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account environmental effects.

Zone 6 was defined through the strategic environmental assessment (SEA) process undertaken by the Department of Energy and Climate Change (DECC) to determine

the location of the most appropriate sites for offshore wind farm development. Figure 4.1 shows the location of the Round 3 offshore wind zones.

Alternatives will be considered as part of the EIA, and a section will be included in the ES outlining the alternatives considered. For the offshore elements, alternatives are likely to include alternative locations and layouts for the turbines and offshore export cable routes, and alternative technology and design. For the onshore elements these are likely to include alternative locations and layouts for the landfall, onshore cable routes and substation.



Figure 4.1: Location of Round 3 zones identified by Crown Estates following the SEA process

5 OFFSHORE EIA TOPIC AREAS TO BE ASSESSED

5.1 Overview

The proposed topic areas to be addressed as part of the EIA for the offshore elements of the proposed Rampion Offshore Wind Farm are listed as follows:

Physical environment

- Bathymetry, geology and hydrodynamics.

Biological environment

- Benthos and sediment quality
- Fish and shellfish ecology
- Nature conservation
- Marine mammals
- Marine ornithology.

Human environment

- Landscape, seascape and visual
- Marine archaeology
- Navigation and shipping
- Civil and military aviation
- Socio-economics
- Commercial fisheries
- Other marine users.

For each of the topic areas, this scoping report provides a brief summary of the environmental baseline, details of potential impacts and proposed EIA methodology.

Following preliminary investigation of the potential environmental effects of the offshore elements, it is proposed that the following topics will be scoped out of the EIA:

- Marine disposal areas – the disposal of material at sea is licensed under the Food and Environment Protection Act 1985. Since the end of 1998, most forms of disposal at sea have been prohibited. The main exception applies to material originating from that dredged from ports and harbours. There are nine marine disposal sites in the vicinity of Zone 6 and the proposed cable route corridor. The Newhaven spoil disposal site is the closest known marine disposal area in the vicinity of Zone 6. No activities having the potential to significantly impact upon marine disposal areas are anticipated to take place during the construction or operation of the project owing to the distance of the activities from the proposed development.
- Marine archaeology during operation – no activities having the potential to significantly disturb or damage archaeological resources are anticipated to take place during operation of the project. This conclusion is based on the assumption that all vessels including maintenance vessels and jack-up barges

employed during operation will observe any archaeological exclusion zones that may be designated as part of the archaeological protocol for the project.

5.2 Bathymetry, Geology and Hydrodynamics

5.2.1 Preliminary Environmental Baseline

5.2.1.1 Bathymetry

Zone 6 is located in the Eastern English Channel, between 13km and 25km offshore from the Sussex coast. The zone is located in the shallower depths of the Channel waters, ranging from 11m to 50m below Chart Datum (CD), where there are relatively gentle seabed slopes (see Figure 5.1).

The seabed is predominantly formed of sands and gravels, overlying normally consolidated sands and clays with some peat layers and basal gravels. The fine-grained sediments are relatively mobile, with static surface sediments comprising coarse-grained lag deposits. The tidal regime controls the sediment mobility in the zone, resulting in both well-sorted sediment distributions and bedform features. Of note, is the infrequency of wave events resulting in the wave regime enforcing a control only upon sediment transport in the coastal fringes (Grochowski *et al.*, 1993)

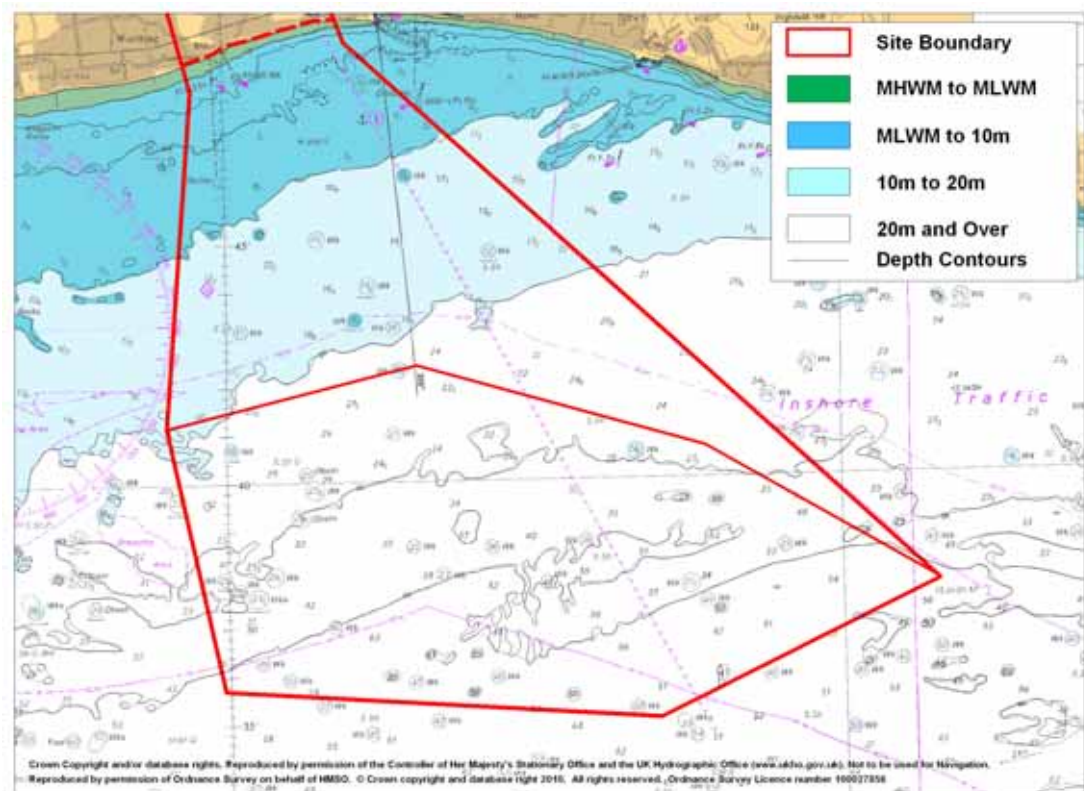


Figure 5.1: Bathymetry in the vicinity of the zone

5.2.1.2 Seabed Geology

Zone 6 contains a variable sequence of Quaternary sediments of the Pleistocene and younger Holocene epochs, comprising a sequence of variable fine to coarse soils generally between less than a metre and up to 30m thick.

The solid geology of the zone, derived from British Geological Survey (BGS) Dungeness and Wight seabed sediment charts (Crosby *et al.*, 1988; Curry *et al.*, 1977) indicates that the zone is characterised by Tertiary Clays and Upper Cretaceous Chalk with flint, the latter outcropping and subcropping from Beachy Head to Bognor Regis to the east. Tertiary rocks subcrop beneath seabed sediments off Worthing, Brighton and Beachy Head and extend out into the Channel.

The Northern Palaeovalley is present within the zone to 20m in depth, and whilst the majority is sediment filled, unfilled sections are present. Where infill cover is limited or absent, the underlying bedrock is at, or very close to, the seabed. The project-specific geophysical surveys should determine the exact location of these channels. Submerged river cliffs also feature.

5.2.1.3 Seabed Features

The zone is located within an embayment of open aspect, bound by two prominent headlands, Selsey Bill and Beachy Head. These features form the boundaries of a distinct coastal cell, as identified within the shoreline management plans (SMPs) as sub-cell 4d.

Coastal sub-cell 4d is characterised by a heavily managed shoreline consisting of:

- Cliff, beach and estuary features
- Accretion at the harbour mouths and
- Erosion along the shingle beaches.

5.2.1.4 Offshore Character

It is suggested that both relict (Northern Paleovalley) and active seabed features are located within the zone (ABPmer, 2008). Whilst the exact location of the mobile seabed features is not confirmed, available survey data suggest the presence of sand streaks, patches, megaripples and sand waves in the zone's vicinity (James *et al.*, 2007; Evans *et al.*, 1998). The presence of these features indicates an active sediment regime under the control of tidal conditions. It is considered that sand waves represent the most common mobile seabed feature within the zone, with typical heights of approximately 2m. They have a thinly stratified structure inclined from east to west.

5.2.1.5 Water Column Features

Tidal climate

The English Channel is characterised by a tidal wave, which propagates from west to east, governed by a degenerate tidal amphidrome situated inland of Weymouth. Consequently, the tidal range increases in an easterly direction. The tidal range within the zone is of the order of 2.5m (neap) to 5m (spring). This corresponds to a macro-tidal regime.

Tidal currents are relatively energetic. The closest tidal diamond to the site indicates a surface peak speed in the order of 0.8m/s (United Kingdom Hydrographic Office (UKHO) chart 1652). These current speeds are strong enough to support the maintenance of the seabed features reported in Section 5.2.1.3 (Belderson *et al.*, 1982).

Both tidal range and therefore tidal current speeds vary predictably within a variety of timescales, from hours (tidal cycle) to weeks (spring–neap) to months (solstice–equinox) to years (the 18.6-year nodal cycle). Mean water levels may also vary over the development’s lifetime as a consequence of the combination of climate change affecting mean sea level globally and regional post-glacial rebound of the underlying geology.

Climate change

Climate change may potentially affect the normal baseline environmental conditions within the site over the lifetime of the proposed development. Of most relevance is climate change, which is predicted to cause an increase in mean sea level and average storm intensity with time. The exact magnitude and rate of these changes are not widely agreed owing to the uncertainty involved in predicting climate change. However, the UK Government issues guidelines for appropriate consideration of these factors.

It is along the coastline that the effects of climate change are likely to be most evident. Here, most of the wave energy is ultimately dissipated, potentially leading to modified rates of littoral sediment transport. The advancing position of mean high water may also lead to wave energy dissipation higher up the foreshore with anticipated beach loss and scour. Increased wave energy offshore may have consequences for the frequency and magnitude of sediment transportation events resulting in elevated suspended sediment concentration (SSC) levels.

Wave climate

The position of the proposed wind farm within the eastern English Channel means that exposure to extreme waves originating from the North Atlantic is limited. The annual mean significant wave height within the zone is shown to be in the range: 0.9m to 1.26m (Business Enterprise and Regulatory Reform (BERR), 2008), with wave buoy data shoreward of the site indicating a maximum wave height of 4.8m (ABPmer, 2009). The prevailing wave direction is from the south-west.

Table 5.1 summarises the typical range of wave and tidal conditions expected across the proposed development area.

Table 5.1: Hydrodynamic conditions expected across the proposed development area

Hydrodynamic feature	Expected measurements
Maximum tidal range	5m
Maximum total water depth	Approx. 61m (based on Admiralty chart 1652)
Peak spring tide current (mid-water)	1.12m/second

Hydrodynamic feature	Expected measurements
Annual mean significant wave height	0.9–1.26m

Sedimentary environment

A description of the bathymetry, geology and metocean conditions lends itself to a characterisation of the sedimentary environment within coastal sub-cell 4d. The presence of the promontories Selsey Bill and Beachy Head can be viewed as longshore boundaries to littoral transport. Within this cell, shoreline transport is eastward from Selsey Bill to Beachy Head.

The mobile seabed features described in Section 5.2.1.3 are indicative of a hydrodynamic regime controlled by tidal, rather than wave, conditions.

For the English Channel between the Isle of Wight and Shoreham, sand is likely to be mobile during part of each tide whilst gravel is only likely to be mobile in shallower water depths where storm energy significantly enhances the tidal current effects (HR Wallingford, 1993). Net bedload sediment transport is to the east, from a bedload parting zone (located from south of the Isle of Wight to the Cotentin Peninsula) to a bedload convergence zone (located from Hythe/Dungeness to Boulogne).

Suspended sediments

Suspended sediments originating from the English coast are transported offshore, and travel in an eastwardly direction. Analysis of sediment plumes resulting from marine aggregate activities in the vicinity of the proposed wind farm *showed that* suspended sediment concentrations (SSCs) were short term, and that dispersion was not significantly increased by wind action (EMU, 1999).

5.2.2 Key Potential Environmental Impacts

The potential effects of the proposed Rampion Offshore Wind Farm – during the constructing, operating and decommissioning phases – on the physical environment may include changes to the (i) wave; (ii) tidal; and (iii) sedimentological regimes. The effects may occur over the:

- Near field (the area within the immediate vicinity of the turbine grid); and
- Far field (the coastline and sites of scientific and conservation interest).

5.2.3 Proposed Assessment Methodology

5.2.3.1 Geophysical Survey

Project-specific geophysical surveys are underway for the proposed offshore wind farm site. The key objectives of the geophysical surveys are to:

- Provide an accurate bathymetric chart of the Rampion Offshore Wind Farm site
- Chart natural seabed features and any obstructions, man-made objects, debris or wrecks
- Locate any structural complexities or geohazards and
- Locate and identify sites of near-surface soft material.

5.2.3.2 *Metocean Survey*

Project-specific metocean surveys are planned for the proposed offshore wind farm site. The key objectives are to survey the typical and extreme metocean conditions at the site including the measuring of:

- The surface-water profile (velocity, tidal currents and waves)
- Water column profile (currents, velocities and direction)
- Wind characteristics (direction, velocity and gusting) and
- Sea state (wind, wave, swell and tide).

5.2.3.3 *Impact Assessment*

The proposed scope of the assessment will include a consideration of the following currently available guidance:

- Marine Guidance Note MGN 371 (compliance with the International Hydrographic Organisation (IHO) order 1 standards)
- Centre for Environment, Fisheries and Aquaculture Science (CEFAS) 2004. Offshore Wind Farms: guidance note for environmental impact in respect of the Food and Environment Protection Act (FEPA) and the CPA requirements
- Collaborative Offshore Wind Research into the Environment (COWRIE) (2009). 'Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide'. Eds: Lambkin, D.O., Harris, J.M., Cooper, W.S. and Coates, T.
- UK Society for Underwater Technology (SUT) (2005). Guidance Notes on Site Investigation for Offshore Renewable Energy Projects, and
- Joint Nautical Archaeology Policy Committee (JNAPC) (2006). JNAPC Code of Practice for Seabed Development. Joint Nautical Archaeology Policy Committee.

Note: It is expected that the above guidance list will be revised during 2010 to account for the potential impacts of the Round 3 offshore wind farm programme.

Historical data from other operational wind farm sites and project-specific survey data will be used to inform conceptual and numerical modelling. These will be used in turn to determine the magnitude, extent and significance of hydrodynamic changes resulting from the construction, operation, and decommissioning of the development within sub-cell 4d. This will include changes in the sedimentary environment affecting sensitive receptors, and changes in the typical levels of suspended sediment concentrations and their potential for re-deposition. Where practicable, appropriate mitigation measures will be proposed.

5.2.3.4 *Potential Cumulative and In-combination Impacts*

In terms of hydrodynamic impacts, CEFAS has stated that only those projects located within one tidal ellipse/excursion of the proposed site require consideration. There are no other offshore wind farms relevant to the Rampion Offshore Wind Farm site, and it is therefore proposed to scope out hydrodynamic cumulative impact assessment from other offshore wind farms.

Twelve marine aggregate sites are located in close proximity to the zone, and a number of submarine cables cross the proposed wind farm site. The main potential combined effect produced by an offshore wind farm and dredging activities is that of overlapping sediment plumes (for example the combination of plumes arising as a result of wind farm construction activities and aggregate dredging overspill). A foreseeable potential interaction between these activities exists owing to their proximity to each other. The extent to which the interactions may occur is dependent upon the anticipated construction schedules and the likelihood of such activities occurring at the same time.

5.3 Benthos and Sediment Quality

5.3.1 Preliminary Environmental Baseline

5.3.1.1 Intertidal Zone

Tittley *et al.* (1986) describes the intertidal area present along the coast as having a shoreline of high vertical cliffs fronted by an extensive wave-abrasion platform. The EIA will provide descriptions of the different shoreline zonation patterns present, particularly in the areas where cables are proposed to come ashore. Where areas of higher conservation value are present, there may be the potential to reroute cables in order to avoid such areas, however, this activity will have to be co-ordinated taking into account the onshore cable routeing requirements.

5.3.1.2 Subtidal Zone

In the subtidal area chalk reefs are present, which have created a series of ridges and gullies running perpendicular to the coast as a result of wave action. This is most notable close to the coast where wave action is most prominent; smaller ridges and gullies are present further offshore. Various floral and faunal communities are present on the chalk bedrock. Some of the faunal species present are borers and may contribute to the erosion of the chalk structures through their activities.

Intertidal and subtidal chalk is a UK Biodiversity Action Plan (BAP) priority habitat. Sussex is the only location in the British Isles where linear offshore chalk cliffs occur (i.e. as vertical faces between 1m and 4m in height), although less well-developed features are known off the Kent, Isle of Wight and Dorset coasts. The offshore Sussex chalk cliffs are regarded as regionally important on the basis of their geomorphological interest (Irving, 1999). Particularly good examples of chalk cliffs on the seabed have been identified 1km beyond Black Rock and further offshore; these cliffs have been proposed as potential marine sites of nature conservation importance (mSNClS) (Irving, 1996).

The chalk reef system close inshore gives way to expansive areas of unstable deposited material ranging from small boulders, cobbles and gravel to finer sediments such as sand and mud further offshore. Several Seasearch studies undertaken on the sand-dominated seabed beyond the chalk reef system and extending some 3–4km offshore noted sandy seabed of varying types including rippled sand, flat sand, silty sand, sandy silt, sand waves, coarse sands, clean rippled sand and muddy sand.

The majority of the area further offshore does not benefit from the level of survey and data that is available for the inshore, shallow areas along this coastline, although the sea remains relatively shallow in some areas for a significant distance from shore. For

example the 10m-depth contour is more than 5km offshore of Pagham. However, there are areas where the seabed shelves more steeply, such as at Beachy Head where the 20m-depth contour lies barely 500m from the base of the cliffs.

With increasing distance offshore, the sediment-dominated seabed is generally characterised by the boreal offshore sand community and the muddy sand and gravel associations (Holme, 1966).

Figure 5.2 shows the predicted habitats in the vicinity of the zone. This data has been interpreted from the EUNIS (European Nature Information System) seabed habitat classification database, which is available as a data layer from the MESH (Mapping European Seabed Habitats) Project.

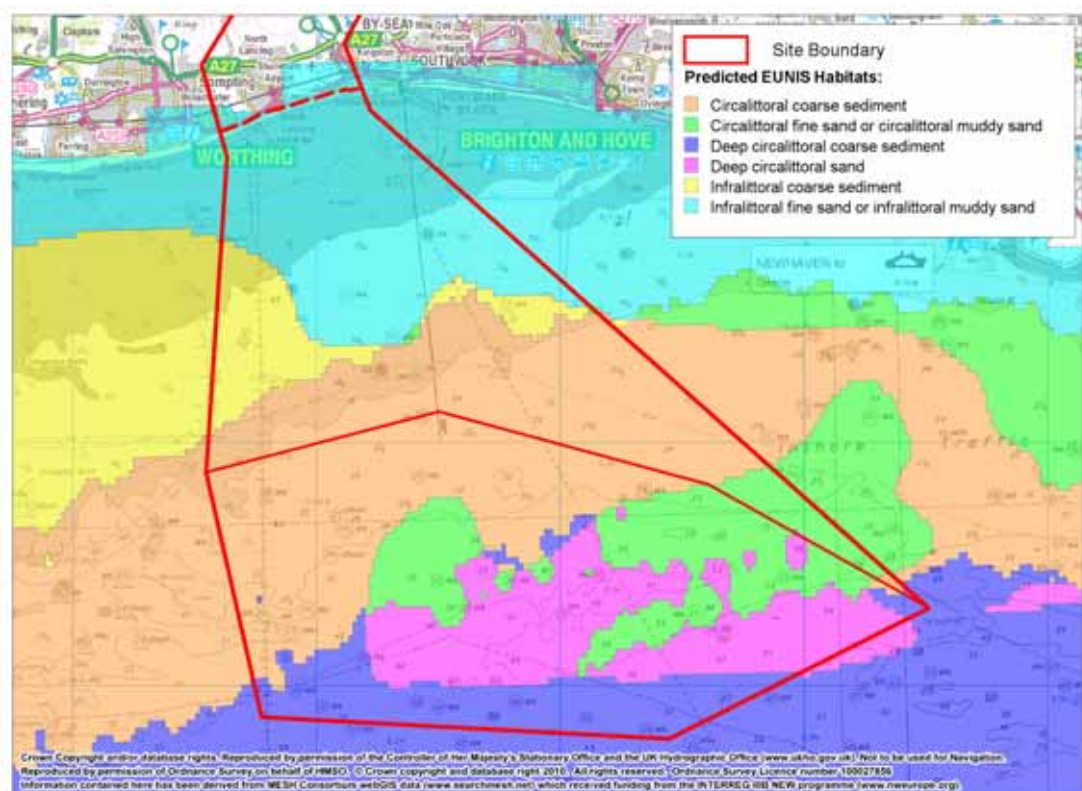


Figure 5.2: Predicted seabed habitats in the vicinity of the zone (interpreted from the EUNIS seabed classification database, publicly available from the MESH project).

The EUNIS predicted habitats over the offshore development zone are seen to be dominated by coarse seabed sediments including sand. The exception to this is a large area of the development zone where finer grained sediments including muddy sands are present. Inshore from the development zone in the near shore areas a distinct band of finer grained sediments are seen to be present (dominated by infralittoral fine sands or muddy sands).

Marine aggregate dredging in the Owers Bank licensed extraction areas to the west of the zone takes place in areas dominated by coarse circalittoral and infralittoral sediments.

5.3.2 Key Potential Environmental Impacts

The potential impacts on the benthos from construction and operation of the proposed wind farm are presented below:

- Increased sediment loads leading to smothering (construction phase)
- Remobilisation of contaminated sediments leading to toxic effects (construction phase)
- Direct physical impacts to the seabed from the placement of jack-up rig feet or equivalent (construction phase)
- Loss of seabed habitat through presence of turbines and foundations (operational phase)
- Scour leading to change of seabed habitats (operational phase)
- Changes in seabed habitats as a result of changes in sediment transport regimes (operational phase) and
- Colonisation of turbines leading to increased biodiversity (operational phase).

5.3.3 Proposed Assessment Methodology

5.3.3.1 Desk-based Review

A desk-based review of existing benthic marine ecology information will be undertaken, focussing on sourcing data that have been collected within or in close proximity to the zone, and supplementing this with information on the benthic ecology of the wider region where available. A range of data from a variety of sources will be reviewed to inform the environmental assessment, comprising both broad-scale studies, site-specific assessments and characterisation work in the general area. Information on the seabed sediment present will also be collected, in terms of the type of sediment (such as rock, sand and mud) and its distribution, together with the levels of any contaminants already present in the area. Data sources will include:

- DECC strategic environmental assessments for Round 3 of the offshore wind farm
- The DECC strategic environmental assessment for SEA area 8
- Natural England natural area report for the eastern English Channel region
- Environmental statements from offshore/coastal developments in the vicinity of the development
- Joint Nature Conservation Committee (JNCC) Coastal Directory for Region 8 (Barnes *et al.*, 1998)
- The Booth Museum, Brighton, holds data drawn from historic surveys and observations within the area
- Littoral fauna and flora at Brighton (Ventham, 1990 and 1992, and Tittley *et al.*, 1986).

- Sussex Seasearch project, providing information on subtidal habitats (Irving, 1996 and 1999), incorporating the preceding information reviews by Wood (1992) and the Marine Conservation Society (1984).

The description of the benthic habitats and species present will be divided into subtidal and intertidal areas.

5.3.3.2 *Intertidal and Subtidal Surveys*

In addition to the review of existing information, intertidal and subtidal surveys will be specified and agreed with the regulatory bodies to ensure that the species and habitats in the areas which are likely to be affected by the proposed wind farm and cable installations are fully considered in the impact assessment. The surveys will focus on any species or habitats of nature conservation interest; offshore surveys will be informed by the interpretation of geophysical data from across the site. Geophysical data can indicate the location of sediment forms, which may be of conservation interest, such as Sabellaria or mussel reefs.

It is anticipated that seabed and sediment grab sampling will take place during the offshore survey, with the macrofaunal invertebrates in the sediment being subject to taxonomical analysis. Sediment from the sampling locations will also be analysed for various physical (sediment grain size) and chemical (such as trace metal) parameters; data from such analyses can provide the reasons why species are present in one area and not another. Grab sampling will not be undertaken at sites, which have the potential to support biogenic reefs.

The scope of the surveys may also include the collection of epifaunal samples – the grab sampling collects species that live in the sediment, whilst the epifaunal sampling, carried out using a small beam trawl, is the collection of seabed species that live on the surface of the sediment, rather than in it.

5.3.3.3 *Impact Assessment*

To enable the potential impact of the proposed wind farm development to be assessed, a description of the existing benthic communities, focusing particularly on any areas of conservation interest, will be produced. Potential impacts that may occur on the subtidal and intertidal physical, chemical and biological environment as a result of the planned construction, operation and decommissioning will then be identified. The sensitivities of the communities present to the types of impact expected from wind farm construction, operation and decommissioning will be assessed. Where necessary, measures will be proposed to mitigate the impacts.

In the event that the proposed development has a direct impact on any sites that are designated for conservation at the European (SAC or SPA) or international level (Ramsar), as a result of qualifying habitats or species that they support, then the requisite information will be provided alongside the DCO/ES to assist the competent authority to carry out an appropriate assessment (see also Section 5.5). Cumulative impacts will be assessed by taking into consideration any similar developments, proposed or existing, that are in the vicinity of the development zone.

5.4 Fish and Shellfish Ecology

5.4.1 Preliminary Environmental Baseline

5.4.1.1 Species composition

The subject zone supports populations of a wide range of fish and shellfish species. These can be broadly split into the following categories:

- **Commercially important marine fish** include flatfish (e.g. Dover sole, lemon sole and plaice), roundfish (e.g. cod, whiting, bass, red mullet and black bream) and elasmobranchs (e.g. thornback ray)
- **Commercially important shellfish** include cuttlefish, squid, lobster, edible crab, whelks, and king scallop
- **Diadromous fish species of conservation and/or commercial importance** include European eel, sea trout, sea lamprey, river lamprey, allis shad and twaite shad
- **Other fish species** of little or no commercial importance include for example dab, gobies, dragonets, pipefish, pogge, rockling and bib. The legally protected basking shark occasionally occurs in the eastern English Channel in the summer months and has been sighted by marine mammal observers during the ornithological surveys undertaken to date for the Rampion Offshore Wind Farm project. However, this area is believed to be relatively unimportant in comparison to other UK waters (e.g. the Irish Sea). Seahorse (*Hippocampus* sp.), protected under the Wildlife and Countryside Act, is known to be present in shallow inshore areas around the zone, particularly in seagrass areas.

5.4.1.2 Spawning and Nursery Grounds

The zone is known to overlap with spawning and nursery areas of several commercially important fish species, as presented in Table 5.2.

Table 5.2: Location and timing of spawning and nursery grounds for major commercially important fish species within the vicinity of the zone (Coull *et al.*, 1998)

Species	Local spawning areas	Local nursery areas
Whiting	Offshore of Beachy Head (Feb–June)	-
Plaice	Much of eastern English Channel (Dec–March)	Nursery areas within shallow areas east of Beachy Head
Lemon sole	Much of eastern English Channel (Apr–Sept)	Much of eastern English Channel
Dover sole	Much of English Channel (March–May)	Inshore, Beachy Head westwards
Sandeel	Offshore of Beachy Head (Nov–Feb)	Offshore of Beachy Head westwards
Sprat	All of English Channel (May–Aug)	-
Whiting	Offshore, Worthing eastwards	Inshore, Worthing eastwards

Black bream are locally important to commercial and recreational fisheries, and they excavate nests for spawning. Spawning occurs in inshore areas where suitable substratum occurs; the nearest known spawning ground to Zone 6 lies along the 10m-depth contour between Bognor and Worthing.

The inshore area around the zone may also be important for bass, which is a highly important species for both recreational and commercial fisheries. The area in and around the zone may be an important spawning and nursery area for lobster, edible crab and whelk, and a number of other species; these will be addressed in the ES. Migratory diadromous species (e.g. sea trout, eel and shad) are likely to pass through the area of the zone, although it is not currently thought that this is a critical habitat for these species.

5.4.2 Key Potential Environmental Impacts

Key potential effects on the fish and shellfish populations of the area as a result of the wind farm development may include:

- Direct loss (negative) or addition (positive) of suitable habitat for feeding, refuge, spawning and nursery areas caused by construction. For example, in the case of placement of turbines with associated rock armour this could include loss of suitable areas for flatfish feeding/black bream spawning/seahorse refuge, or the creation of new habitat for spawning crab and lobster. Those species that are known to spawn directly onto the substrate (e.g. black bream) may be particularly effected, rather than pelagic spawning species. Changes in the habitat/substrate of the area may lead to a change in fish/shellfish community composition.
- Effects on fish and shellfish (particularly spawning aggregations of commercially important species) from construction activities (e.g. noise, vibration and resuspended sediment from piling).
- Indirect impacts to fish and shellfish through a change (e.g. a decline) in the distribution and abundance of their prey species (e.g. benthos). This could be caused by potential association of fish and prey species with turbine bases (artificial reef effect).
- Effects of electro-magnetic fields (EMFs) on electro-sensitive fish species, particularly elasmobranchs, from buried inter-array and export cables during the operational phase).

5.4.3 Proposed Assessment Methodology

A large amount of monitoring and survey information on fish and shellfish ecology in the area of Zone 6 is already available; unnecessary duplication of field surveys to collect the same information will be avoided where possible. However, it may be necessary to conduct some surveys to inform any gaps in knowledge, and this will be discussed with the regulatory authorities (CEFAS and Natural England).

If surveys are required, these may include otter trawl (for adult fish), 2m scientific beam trawl (for juvenile fish) and dredge (for scallops). In addition, a more specialist survey for black bream nests may also be required if deemed necessary by the regulators, based on geophysical and photographic survey techniques.

All this information will be used to provide a robust baseline, against which to predict impacts, including cumulative impacts in the vicinity.

5.5 Nature Conservation

5.5.1 Preliminary Environmental Baseline

5.5.1.1 Designated Sites

A review of designated sites occurring within or in proximity to Zone 6 was undertaken by RPS Group in 2009. A summary of the areas of importance and the reasons for designation are presented below. The types of designation included are as follows:

- SACs
- SPAs
- Ramsar sites
- SSSIs
- LNRs and/or NNRs
- SNCI and mSNCI (or marine equivalent)
- Voluntary marine reserves (VMRs), and
- Proposed marine conservation zones (where known).

The majority of these sites are coastal and shallow subtidal in nature and hence would be primarily of interest for issues associated with the offshore cable route corridor and potentially wider-ranging coastal processes. However, some (notably the mSNCIs) include areas further offshore, which potentially would be of greater interest for the offshore aspects of the wind farm.

However, even where coastal sites are limited in their extent offshore, the potential development area lies in relative proximity to the coastline; therefore, it is considered possible that the offshore components associated with the construction, operation and decommissioning of an offshore wind farm located at the identified sites could impact upon current coastal designated sites.

Although the zone is not directly within any designated conservation areas, there are designated sites inshore of the area, both statutory and voluntary. In addition to these, there are national and local level sites, European designations (SPAs and SACs) and Ramsar sites in the region, however, these sites are a significant distance from the zone and are thus not considered in detail in the following section. Where these areas support protected species, particularly if these species are mobile, for example the bird populations, such species are covered under the appropriate sections of this report.

Designated conservation areas in the vicinity of the proposed offshore wind farm site are listed in Table 5.3 and are presented in Figure 5.3.

Table 5.3: Designated conservation areas in the vicinity of the proposed Rampion Offshore Wind Farm

Type of Designation	Site Name
SAC	Solent maritime SAC Solent and Isle of Wight lagoons SAC South Wight maritime SAC Dungeness SAC Hastings Cliffs SAC
SPA	Chichester and Langstone harbours Solent and Southampton Water Pagham Harbour Portsmouth Harbour Dungeness to Pett Levels
Ramsar	Arun Valley Chichester and Langston harbours Thursley and Ockley bog Solent and Southampton Water Pevensey Levels Portsmouth Harbour Pagham Harbour Dungeness
SSSI	Lee-on-the-Solent to Itchen Estuary Browdown Sinah Common Bracklesham Bay Bognor Reef Felpham Climping Beach Brighton to Newhaven Cliffs Seaford to Beachy heads Pevensey Levels Hastings Cliff to Pett Beach Dungeness, Romney Marsh and Rye Bay Pagham Harbour Rye Harbour Newtown (IoW) Harbour Titchfield Haven

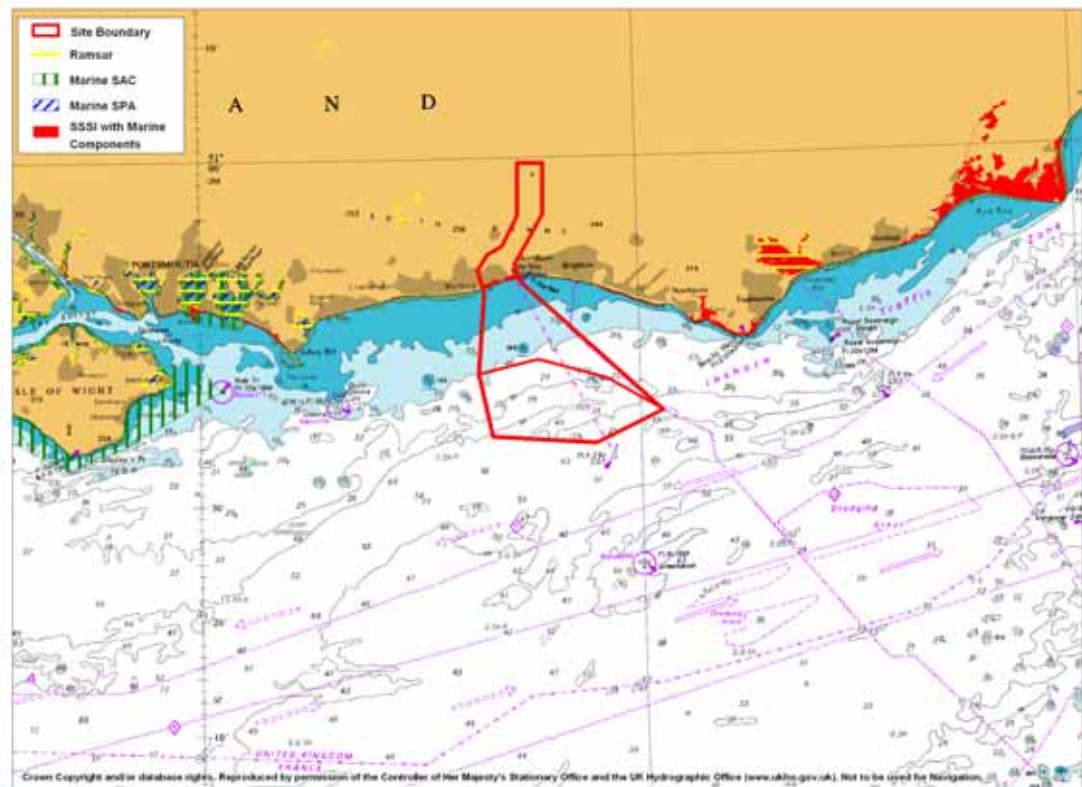


Figure 5.3: Coastal and marine conservation-designated sites

There are a number of coastal SNCIs and mSNCIs within the vicinity of the proposed offshore wind farm. Although SNCIs and mSNCIs are of conservation importance, they are not yet afforded protection under statute. The sites are designated by local authorities because of their local importance for nature conservation. Although non-statutory, the designations can be incorporated into statutory planning legislation.

5.5.1.2 *Voluntary Marine Reserves*

VMRs may be set up by representatives of the users of a subtidal area or an area of shore in order to initiate management of that area. Management may have a variety of purposes, from the conservation of an area important for marine biology to its educational uses. There is one VMR on the Sussex coast located off Beachy Head.

5.5.1.3 *Marine Conservation Zones*

The marine conservation zone (MCZ) project is being led by Natural England and the JNCC to identify and recommend MCZs to government. The MCZ project will be delivered through four regional MCZ projects covering south-west seas (Finding Sanctuary), the Irish Sea (Irish Sea Conservation Zones), the North Sea (Net Gain) and south-east seas (Balanced Seas) (see Figure 5.4).

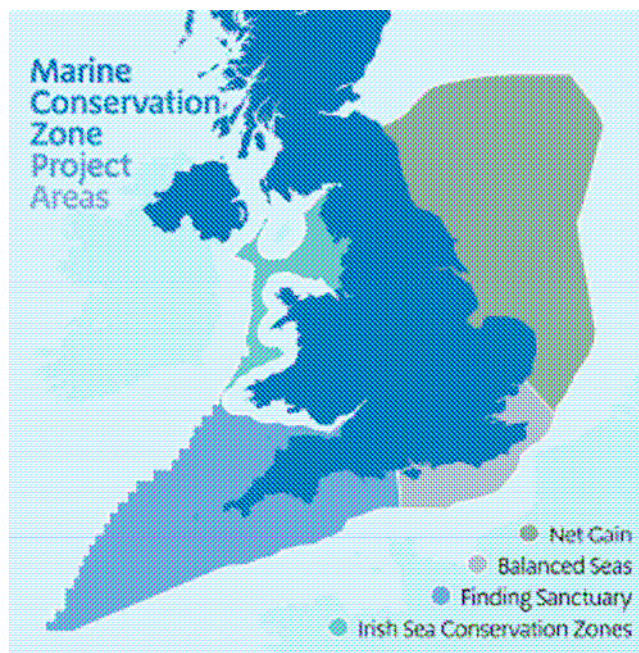


Figure 5.4: Marine conservation zone project areas

Natural England and JNCC are providing statutory advice on how MCZs should be selected within the MCZ project area. The regional stakeholder groups will use this guidance to develop their recommendations. Government will use these recommendations as a basis for selecting MCZs for designation in 2012. The Rampion Offshore Wind Farm is located within the Balanced Seas.

5.5.1.4 UK BAP

The Convention of Biological Diversity was signed in Rio de Janeiro in 1992 (and hence is also referred to as the Rio Convention), and entered into force in 1993. It was the first treaty to provide a legal framework for biodiversity conservation, and included calls for national strategies and action plans to 'conserve, protect and enhance biological diversity'.

The UK response was the UK BAP, launched in 1994. The UK plan includes the identification of a number of habitats and species, together with a series of local action plans. The following priority maritime species and habitats have been identified by the Sussex Biodiversity Partnership (East and West Sussex and Brighton and Hove councils) and the UK BAP:

- Coastal saltmarsh
- Littoral and sublittoral chalk
- Biogenic reef
- Maritime cliffs and slopes
- Saline lagoons
- Brackish hydroid (*Clavopsella navis*)
- Ivell's sea anemone (*Edwardsia ivelli*)
- Lagoon sand shrimp (*Gammarus insensibilis*)

- Basking shark (*Cetorhinus maximus*)
- Dolphin
- Toothed whale

5.5.2 Key Potential Environmental Impacts

The potential impacts of the proposed offshore wind farm may include:

- Adverse effects on the integrity of designated sites of nature conservation importance
- Adverse effects on Annex I habitats and Annex II species, and
- Adverse effects on UK BAP habitats and species.

5.5.3 Proposed Assessment Methodology

To assess the potential impact of the proposed offshore wind farm development, a description of any areas of conservation interest will be compiled. A determination of the impacts that the development may have on these areas will be completed, and proposed mitigation of any significant impacts will be recommended.

The overall environmental description will be based on data gathered from sources available in the public domain and from consultation. Data gathering will focus particularly on records of designated species and habitats offshore, within and in close proximity to the zone.

Species and habitats considered will include those designated at regional, national, European, and international levels, in both offshore and intertidal areas (SSSIs, SPAs, SACs, Ramsar and UK BAP species or habitats). Any voluntary marine-protected areas will also be included in the review.

Designated areas within the development zone boundary will be presented visually using Admiralty charts as base mapping.

The assessment will include the identification of any potential impacts on designated sites, and species of conservation importance. In particular it will be noted if any European designated sites (on account of the presence of populations of Annex I habitats or Annex II species) are impacted.

In the event of the proposed development having an impact directly on any sites that are designated for conservation at the European level (SAC) as a result of qualifying seabed habitats or species, current indications are that the need for project-level appropriate assessment will not be required. However, this will be discussed with Natural England during the EIA process and, if required, the information will be provided alongside the DCO/ES to inform the appropriate assessment process.

5.5.3.1 Potential Cumulative and In-combination Impacts

Potential cumulative and in-combination impacts of the proposed project on sites of nature conservation importance will most likely be assessed via a formal appropriate assessment undertaken by the competent authority.

In order to ensure that any appropriate assessment process undertaken for this development is robust, EC&R proposes that early discussion be undertaken with key

consultees, notably Natural England and JNCC. The Royal Society for the Protection of Birds (RSPB) will be consulted at an early stage.

5.6 Marine Mammals

5.6.1 Preliminary Environmental Baseline

The following section contains a summary of current information on cetaceans (whales, dolphins and porpoises) and pinnipeds (seals) in the vicinity of Zone 6. The section covers the abundance, occurrence and the conservation status of marine mammal species in the area, together with an appreciation of any seasonality in their distribution.

The principal source of cetacean data for this assessment is the Joint Cetacean Database (JCD), now prospectively named the Joint Cetacean Protocol (JCP). The JCP collaboration brings together marine mammal records and their associated meta-data from a diverse range of surveys and monitoring programmes.

A most useful first output of the JCD was an atlas of cetacean distribution in north-west European waters (Reid *et al.*, 2003). The atlas provides species distribution maps and standardised sighting rates for cetaceans recorded during dedicated surveys. The underlying data were obtained from three sources:

- European Seabirds at Sea (ESAS) database: the JNCC seabirds at sea team (SAST) have recorded marine mammals during systematic ship-borne surveys since 1979. These data are now managed within a collaborative European database that currently holds 13,000 marine mammal records from year-round survey coverage.
- Sea Watch Foundation (SWF) database: the SWF database holds additional, casual reports of cetaceans as well as data from effort-recorded surveys. These data were summarised and discussed in the status review of UK Cetaceans (Evans *et al.*, 2003). The SWF data compliment the JCD with records of less frequently observed species, and by providing information on seasonal occurrence and longer-term trends in abundance. SWF has a network of active regional groups and ongoing survey and monitoring programmes. The foundation publishes regular newsletters and produces occasional publications on aspects of UK cetacean ecology and distribution.
- Survey of Cetaceans of the North Sea and Adjacent Waters (SCANS): SCANS was the first pan-European cetacean survey. It was carried out in July 1994 using ship and aerial survey teams and provided coverage of most continental shelf waters. SCANS provided baseline population estimates of harbour porpoise (*Phocoena phocoena*), minke whale (*Balaenoptera acutorostrata*), white-beaked dolphin (*Lagenorhynchus albirostris*) and combined white-beaked (*Lagenorhynchus albirostris*) and white-sided dolphin (*Lagenorhynchus obliquidens*) (Hammond *et al.*, 1995). SCANS II was a similar survey carried out in 2005 again using shipboard and aerial survey techniques.

The principal source of information on pinnipeds is that reported by the Sea Mammal Research Unit (SMRU) to the National Environmental Research Council's Special

Committee on Seals (e.g. SCOS 2007). SMRU carries out regular surveys of the UK's major breeding colonies of grey seal and harbour seal.

SMRU and others publish the results of behavioural studies including for example, tracks of seal movements using satellite telemetry or photo-identification, which aid the interpretation of seal counts on land. Occasional records of vagrant pinniped species are also available (e.g. at the Seaquest Southwest and British Marine Life Study Society websites).

The following discussion focuses on the species that are most likely to be encountered in the vicinity of the Zone 6 site. The most frequently recorded species are bottlenose dolphin (*Tursiops truncatus*) with harbour porpoise (*Phocoena phocoena*), short-beaked common dolphin (*Delphinus delphis*), long-finned pilot whale (*Globicephala melaena*), Risso's dolphin (*Grampus griseus*), grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*) also recorded, though at lower frequency. No sites in the wider region are specially designated to protect marine mammals.

Bottlenose dolphin

Bottlenose dolphins are the most frequently recorded cetacean off the coast of South East England. Sighting rates of bottlenose dolphin are higher in the vicinity of the zone than of harbour porpoise and long-finned pilot whale, the only other two species recorded in dedicated surveys of the region (Evans *et al.*, 2003; Reid *et al.*, 2003; Mackey *et al.*, 2004). However, numbers are fewer than in other regions such as the Irish Sea and North East Scotland regions.

Williams *et al.* (1997) suggest that bottlenose dolphins move eastwards along the English Channel coast in summer, when they are seen in the coastal waters off Sussex. Sighting rates in the eastern Channel are highest in May (Evans *et al.*, 2003). These animals appear to return to the central and western English Channel in autumn (Williams *et al.*, 1997; Owens *et al.*, 2001). Jones *et al.* (undated) suggest that sighting reports of bottlenose dolphins on the eastern Channel coast may reflect the movements of only a few groups or individual animals.

In addition to desk-based studies, observations have been made by trained marine mammal observers participating in the boat-based monthly surveys that have already started in the zone.

Harbour porpoise

Harbour porpoise is the most common UK cetacean, but their density during the SCANS and SCANS II surveys was lower in the eastern English Channel than in other regions of the UK (Burt *et al.*, in press); no harbour porpoise was recorded in the eastern Channel in either survey. Porpoises have been recorded during dedicated surveys in the vicinity of the zone, but sighting rates are low compared to those in other regions of the UK (Reid *et al.*, 2003). Opportunistic sightings of harbour porpoise, however, have been reported throughout the year (Evans *et al.*, 2003), with the highest numbers recorded in April. Porpoise sightings off south-eastern UK are reported mostly from the eastern Solent and Selsey Bill, and from Dungeness, Kent.

Harbour porpoise behaviour makes them difficult to observe and recent observations of an increased presence in the western English Channel (MacLeod *et al.*, 2008) during summer months, combined with observations during baseline surveys

conducted in the proposed site, suggests their numbers throughout the channel may be under-estimated.

Other cetaceans

Long-finned pilot whale has been recorded during dedicated surveys of the English Channel but far more frequently west of the Isle of Wight than near the zone (Reid *et al.*, 2003; Mackey *et al.*, 2004). There have also been opportunistic sightings and stranding records of short-beaked common dolphin, Risso's dolphin, killer whale and white-beaked dolphin (Evans *et al.*, 2003).

Long-finned pilot whale and short-beaked common dolphin have been recorded most frequently in May and October respectively. These species inhabit the western approaches to the UK and are relatively common in the western English Channel; both occasionally make inroads further east. Vagrant Risso's dolphin and killer whale are also more likely to enter the region from the west where they are more common than in the southern North Sea. Although the white-beaked dolphin is a common North Sea species, it is infrequently encountered in South West UK.

Seals

Grey seals and common seals are occasionally recorded on the coast of South East England but neither species breed locally, nor are there any important haul-out sites in the region (Duck, 1998). The common seal is the more common species in the Thames Estuary and along the coast of Kent. Grey seals breed in small colonies at sites in Devon, Cornwall and the Scilly Isles (Cornish Seal Group: <http://www.cornwallsealgroup.co.uk/>) where they are listed as a qualifying feature but are not a primary reason for site selection. There are reports of a small population of common seals inhabiting Chichester Harbour, where they are more frequently seen than elsewhere on the Sussex coast.

5.6.2 Key Potential Environmental Impacts

Key potential issues, which may result in effects on the marine mammal population of the area include:

- Physiological/behavioural effects on marine mammals resulting from pile-driving noise (during the construction phase). The effects may not be detectable (Nedwell *et al.*, 2003), or they could range from mortality in cases of close proximity (Vagle, 2003) to hearing loss (temporary or permanent) to lack of feeding activity, or avoidance (Feist, 1996; Tougaard *et al.*, 2003).
- Secondary impacts on habitat/prey species caused by construction activities could include: increased levels of suspended sediment, which may impair echolocation in cetaceans; avoidance of the area by fish and other prey species and therefore marine mammals, or even attraction of marine mammal species into the area in response to the presence of large numbers of disoriented fish.
- Displacement of marine mammals (during the operational phase), which could be linked to a number of factors, the effects of which are difficult to separate, e.g. physical intrusion/barrier effects, operational noise and increased vessel traffic.

- Changes in the use (positive or negative) of the wind farm area by marine mammals, which may be caused by the potential association of fish and other prey species with turbine bases (known as the artificial reef effect).

5.6.3 Proposed Assessment Methodology

5.6.3.1 Marine Mammal Observations

During the ongoing boat-based ornithological surveys, marine mammal observers are undertaking marine mammal counts in accordance with relevant JNCC guidance. The objectives of the marine mammal surveys are to identify:

- Species in the area
- Number and distribution and/or locations of sightings
- Known routes and movements in/at/around and through the zone
- Relative importance of the zone to each species, and
- Specific uses of the zone including temporal and spatial use.

5.6.3.2 Baseline Assessment

Baseline data will be collected from a number of publicly available sources, and will include consultation with statutory and non-statutory consultees (including the JNCC, Natural England, CEFAS and the Seawatch Foundation). Data from relevant related industries may also be collated, which will include information on the impacts associated with noise and vibration in the marine environment. Observation data is also being collected by marine mammal observers during the offshore bird surveys centred on the zone, which are taking place on a monthly basis. Information will be reviewed and a baseline description developed to form the basis of the assessment.

5.6.3.3 Impact Assessment

The impact assessment will be performed using baseline data on distribution and abundance, from both desk-based collation and from that collected during project-specific, boat-based surveys. The baseline will be reviewed alongside published literature on the behavioural responses of marine mammals to the construction and operation of offshore wind farms (including findings of previous Round 1 projects) in order to predict potential impacts.

Using species-specific information on hearing abilities and sensitivities, an assessment will be made of the potential impact of typical construction and operational noise sources to determine the zones in which there may be impacts on marine mammals. Possible secondary impacts on marine mammals (e.g. alteration of distribution/abundance of prey species) will also be considered.

5.7 Marine Ornithology

5.7.1 Preliminary Environmental Baseline

As part of this scoping phase, ornithological data for the area have been obtained from a range of sources, including:

- Seabird Populations of Britain and Ireland (Dunn *et al.*, 2004).

- Aerial Surveys of Waterbirds in UK Inshore Areas (Dean *et al.*, 2003; DTI, 2006; Söhle *et al.*, 2006; Lewis *et al.*, 2008).
- The Migration Atlas Movements of the Birds of Britain and Ireland (Wernham, C.V. *et al.*, (eds), 2002).
- Wetland Bird Survey (WeBS) Data (BTO, WWT, RSPB and JNCC), published in annual reports, most recently Austin, G.E., Collier, M.P., Calbrade, N.A., Hall, C. and Musgrove, A.J., 2008. Waterbirds in the UK 2006/7: the Wetland Bird Survey. BTO/WWT/RSPB/JNCC, Thetford.
- ESAS JNCC (under licence to the RPS Group for R3 metadata).
- County bird reports (Hampshire (2005), Sussex (2005), Kent (2005) and Isle of Wight (2006)).
- Various offshore wind farm ESs (including Thames Array, Thanet, Kentish Flats and Greater Gabbard).
- High definition aerial surveys undertaken as part of the Crown Estate's enabling actions.

Some breeding seabirds (e.g. terns and gulls) or those species that occupy inshore coastal waters in particular seasons (e.g. divers and common scoter) or waterbirds such as waders and waterfowl that may migrate across the open sea, are represented within a number of coastal sites of known ornithological importance. Those of potential relevance for Zone 6 include:

- Chichester and Langstone harbours (West Sussex) designated as a Ramsar site, SPA, SSSI and SAC (as part of the Solent maritime SAC)
- Solent and Southampton Water (Hampshire) an SPA incorporating several SSSIs. North Solent is an NNR
- The South Wight SAC
- Pagham Harbour (West Sussex) Ramsar site, SPA and SSSI
- Hastings Cliffs (East Sussex) SAC
- Dungeness to Pett Levels (Kent to East Sussex), which incorporates a proposed Ramsar site, SPA, SAC and SSSI (Dungeness, Romney Marsh and Rye Bay). Dungeness is also an NNR
- Rye Harbour (East Sussex) SSSI
- Bracklesham Bay (West Sussex) SSSI
- Hastings Cliffs to Pett Beach (East Sussex) SSSI
- Selsey, East Beach (West Sussex) SSSI
- Climping Beach (West Sussex) SSSI
- Bognor Reef (West Sussex) SSSI
- Seaford to Beachy Head (East Sussex) SSSI
- Brighton to Newhaven Cliffs SSSI
- Pevensey Levels (East Sussex) SSSI and NNR (this site is mostly inland but extends to the coast)

- Newtown Harbour (Isle of Wight) NNR and
- Titchfield Haven (Hampshire) NNR.

The same key species groups mentioned above occur on the French coast, indicating that there is a high probability of cross-channel movements by these species.

The designations of the sites (available at jncc.gov.uk and naturalengland.org.uk) provide details of the importance of the population of the qualifying or cited species and species within qualifying bird assemblages (see Appendix III).

Breeding seabirds

The eastern English channel coastline supports a range of seabird colonies. Table 5.4 provides details of legal protection, conservation status, an estimated wind farm vulnerability index and population estimate for the key bird species breeding along the eastern English channel coastline.

Table 5.4: Key species breeding along the eastern English Channel coastline

Species	Annex I	Schedule 1	Red List	Amber List	UK Priority BAP species	Vulnerability index ^a	Occurring at sea	Population estimate for coast ^{**}
Northern fulmar				✓		5.8	✓	126 pairs
Great cormorant				✓		23.3	Coastal	318 pairs
European shag				✓		23.3*	Coastal	4 pairs
Mediterranean gull	✓	✓		✓		12.0*	Coastal	78 pairs
Black-headed gull				✓		7.5	Coastal	21,245 pairs
Common gull				✓		12.0	Coastal	11 pairs
Lesser black-backed gull				✓		13.8	✓	152 pairs
Herring gull				✓	✓	11.0	✓	3,216 pairs
Black-legged kittiwake				✓		7.5	✓	2,231 pairs
Sandwich tern	✓			✓		25.0	✓	688 pairs
Roseate tern	✓	✓	✓		✓	n/a	✓	1 pair
Common tern	✓					15.0	✓	711 pairs
Little tern		✓		✓		n/a	✓	201 pairs
Common guillemot				✓		12.0	✓	337 individuals

Species	Annex I	Schedule 1	Red List	Amber List	UK Priority BAP species	Vulnerability index ^a	Occurring at sea	Population estimate for coast ^{**}
Total (14 species)	4	3	1	12	2			

^a Garthe and Hüppop, 2004 (estimated wind farm vulnerability index)

* indicates that vulnerability index has been estimated based on that of similar species

** Isle of Wight to Kent

Of these breeding species, terns, fulmar and gulls (notably including the Mediterranean and little gulls) are likely to be the main species groups, which may require specific studies during the EIA process. Common tern, sandwich tern and little tern are qualifying species for the Solent and Southampton, Chichester and Langstone harbours, Pagham Harbour and Dungeness SPAs.

Wintering and passage seabirds

Table 5.5 provides details of key bird species wintering offshore in the eastern English Channel including details of legal protection, conservation status, and an estimated wind farm vulnerability index, for each of these species.

Table 5.5: Key species wintering or passing through eastern English Channel coastal counties

Species	Annex I	Schedule 1	Red List	Amber List	UK BAP species	Vulnerability index ^a	Occurring at sea ^{**}
Dark-bellied brent goose				✓	✓	n/a	Only on passage
Common eider				✓		20.4	✓
Common scoter		✓	✓		✓	16.9	✓
Great northern diver	✓	✓		✓		44.0*	✓
Red-throated diver	✓	✓		✓		43.3	✓
Manx shearwater	✓			✓		n/a	✓
Storm-petrel	✓			✓		n/a	✓
Northern gannet				✓		16.5	✓
Bar-tailed godwit	✓			✓		n/a	Only on passage
Whimbrel		✓		✓		n/a	Only on passage
Pomarine						n/a	✓

Species	Annex I	Schedule 1	Red List	Amber List	UK BAP species	Vulnerability index ^a	Occurring at sea**
skua							
Arctic skua					✓	10.0	✓
Great skua				✓		12.4	✓
Little gull	✓	✓				12.8	Coastal
Razorbill				✓		15.8	✓
Total (15 species)	6	5	1	11	3		

^a Garthe & Hüppop, 2004 (estimated wind farm vulnerability index)

*indicates that the vulnerability index has been estimated based on that of similar species

**'on passage' means birds are usually only recorded when they are passing through; 'coastal' means the birds usually linger along the coastlines, usually feeding or roosting

Of these species, red-throated diver, great northern diver, common scoter, tern species, Manx shearwater, storm petrel, skua species and little gull are likely to require further investigation as part of the EIA process.

Bewick's swan, brent goose, white-fronted goose and bean goose also winter along parts of the south coast. Bewick's swan, brent goose and several other species of waterbirds are qualifying species for the Solent and Southampton, Chichester and Langstone harbours, Pagham Harbour and Dungeness SPAs.

In addition, there is a pronounced spring passage of some species of seabirds, namely auks, tern species, fulmar, gannet, skuas and shearwaters, through the English Channel, which is recorded annually from such headlands as Dungeness.

Aerial and boat-based surveys of waterbirds have been undertaken around the UK coastline between 2000 and 2006, by the JNCC and the WWT (Dean *et al.*, 2003; Department of Trade and Industry, 2006; Söhle *et al.*, 2006; Lewis *et al.* 2008) Further surveys have been undertaken by TCE between 2009 and 2010 that provide a crude baseline from which site-specific work is being undertaken.

Ad hoc boat-based seabird surveys have also been undertaken in the English Channel from cross-channel ferries, and much of the other information that exists has been gathered by amateur birdwatchers from land-based watch points. Information has also been gathered for many years at two bird observatories in Kent, at Dungeness and Sandwich Bay. Key species occurring in winter or on passage in Hampshire, Kent, Sussex and the Isle of Wight are given above.

There are a range of other species occurring in winter or on passage in Hampshire, Kent, Sussex and the Isle of Wight. Although they less likely to be affected by an offshore wind farm, they occur in negligible numbers or have a lower conservation status; such species will still be considered within the EIA, if only to be removed from primary species of concern list.

Overall, the general area and designated sites identified in the region support significant bird populations. Drawing from the range of data reviewed and the experiences recorded for other offshore wind farm sites in the UK, the following species are considered to be of principal potential concern in relation to the proposed Rampion Offshore Wind Farm development:

- Terns (common, little, sandwich and roseate)
- Fulmar
- Gannet
- Auk
- Divers (red-throated and black-throated diver)
- Swan (Bewick's swan)
- Geese (dark-bellied brent goose)
- Ducks (red-breasted merganser)
- Gulls (Mediterranean, common, black-headed, lesser black-backed, herring, greater black-backed and kittiwake), and
- Waders (bar-tailed godwit, golden plover, grey plover and lapwing).

For the Rampion Offshore Wind Farm, it will be important to understand the influence of two potential ornithological migration patterns acting in differing ways as well as breeding species:

- Seabird migration (between the North Sea, English Channel and the Atlantic), and
- Wildfowl, wader and passerine migration (between the UK and continental Europe).

The English Channel has the potential to act as a bottleneck for seabirds during their spring and autumn passage owing to the proximity of the English and French coastlines. There is also likely to be the potential for significant movements of birds between designated sites on the two coasts (England and France). The English Channel is approximately 100 kilometres wide between Eastbourne and Dieppe in France.

5.7.2 Key Potential Environmental Impacts

At this stage, potential ecological effects may only be broadly identified before the completion of the baseline ornithological surveys. Therefore, these impacts are largely based on experiences of other offshore wind farms within European waters. Potential effects include:

- Disturbance leading to displacement of birds (during construction and decommissioning). Disturbance may be initiated both by vessels (especially disturbance of swimming and diving species such as divers and auks) and by noisy construction activity such as pile-driving that may affect all species.
- Indirect disturbance of prey resources (e.g. fish) thereby changing bird distribution (during the construction phase).
- Displacement and barrier effects (during the operational phase) and
- Positive and/or and negative changes to habitat conditions (the presence of turbine bases and changes to the seabed) that may induce changes in the distribution of bird prey resources and thus the birds themselves (during the operational phase).

5.7.3 Proposed Assessment Methodology

5.7.3.1 Ornithological Surveys

Project-specific ornithological surveys are underway for the proposed offshore wind farm. The surveys comprise both aerial surveys and boat-based surveys, with the boat-based surveys providing data for species that are less readily identified than during aerial surveys, and to provide data on flight movements and heights. The key objectives of the ornithological surveys are:

- To establish the importance of the zone for birds, including breeding, migratory and wintering populations
- To provide data to enable the baseline environment for birds in and around the zone to be established
- To facilitate the prediction of potential impacts and significance of any effects from the construction, operation and de-commissioning of the proposed development of the zone on ornithology, and
- To enable the development of mitigation measures to be applied to reduce any potential impacts on ornithology in the zone.

The detailed boat-based surveys (to be completed over two years) are being undertaken across the zone (including a 5km buffer around the zone), plus an adjacent control area (see Figure 5.5).

The surveys comprise one boat-based survey per month over three days. The aerial survey area extends at least 5km from all the possible turbines locations. The specifications for these surveys have been agreed through consultation and with Natural England and discussed with the RSPB.

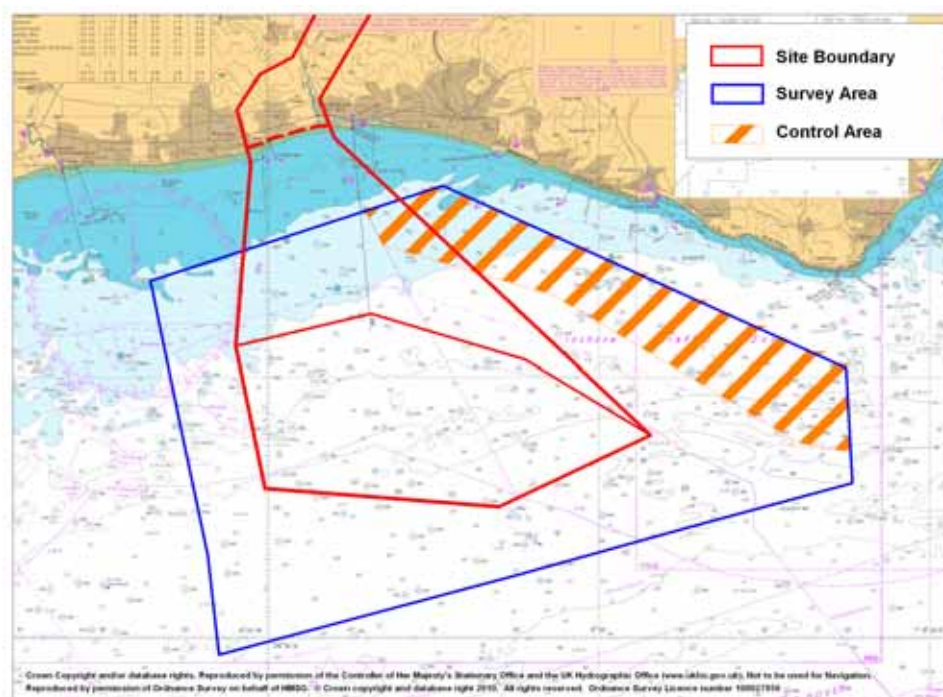


Figure 5.5: Extent of offshore ornithological surveys

5.7.3.2 *Impact Assessment*

The work will include a full evaluation of the conservation importance of the zone's bird populations and identification of any particularly sensitive areas. Collision risk will be estimated for bird species of conservation importance regularly over-flying the proposed wind farm site and for species occurring in large numbers (based on the results of the flight observations). This risk will be calculated using a standard modelling process (Percival *et al.* 1999, Band 2001, SNH/BritishWind Energy Association (BWEA) 2002). Standard assessment methodologies will be used, following current guidance.

Possible disturbance effects during operation, construction and decommissioning will be assessed by determining the bird populations of importance within the wind farm site and its surrounds (based on the field surveys and any additional information available), and by reference to the current literature on bird/wind farm interactions.

Indirect disturbance of prey resources (e.g. fish) creating changing bird distribution, and causing displacement and barrier effects, will also be assessed. Positive and/or negative changes to habitat conditions (caused by the presence of turbine bases and changes to the seabed) that induce changes in the distribution of bird prey resources and thus of the birds themselves (during the operational phase) will also be considered.

5.7.3.3 *Potential Cumulative and In-combination Impacts*

The closest known offshore renewable energy project is 'West Isle of Wight' (located 74km west of the zone). As agreed during initial discussions with Natural England, there are unlikely to be cumulative impacts due to the distance between the two projects. In-combination effects are more likely to occur with other sea users. Potential in-combination impacts of the proposed project will be considered as part of the ornithological assessment.

5.8 **Landscape, Seascape and Visual**

5.8.1 ***Preliminary Environmental Baseline***

As part of the bid submission presented to the Crown Estate, a preliminary appraisal was initially undertaken by the RPS Group in 2009 to establish the extent to which existing landscape, seascape and visual environment may potentially be affected by an offshore wind farm within this zone. The appraisal provided a high-level overview of the potential effects that may arise as a result of a development of this type; the appraisal enabled a scope of work to be defined for the subsequent seascape and visual impact assessment (SVIA).

The site context

The method for the preliminary exercise followed guidelines and principles set out in the 'Guidance on the assessment of the impact of offshore wind farms seascape and visual impact report' BERR (formerly DTI). The guidance provides key considerations in siting, layout and design, and assessing the sensitivity of the seascape. The assessment was initially conducted assuming a capacity target of approx. 600 MW, and turbines with a hub height of 80m and overall tip height of 133m.

Fifteen locations were identified to provide an even coverage throughout the zone of theoretical visibility (ZTV). This total was subsequently reduced to the following five key viewpoints:

- Worthing – where there is a large concentration of receptors in close proximity
- Devil's Dyke – a frequently visited downland location in the AONB (now a national park)
- Brighton – where there is a large concentration of receptors in close proximity
- Firle Beacon – a popular downland location in the AONB (now national park) and
- Beachy Head – a popular heritage coast location in the AONB on the eastern edge of the seascape zone.

As part of the EIA, the number of viewpoints will be reconsidered to take account of the sensitivity of the newly designated South Downs National Park and the heavily populated nature of the stretch of coastline within the study area, together with the proximity to the coast of the popular long-distance footpath of the South Downs Way. At least one of the viewpoints will be from the marine environment (from a cross-Channel ferry).

5.8.2 Key Potential Environmental Impacts

Potential environmental impacts would include:

- Effects on visual amenity, landscape and seascape arising from the proposed offshore wind farm (during construction and de-commissioning phases) including:
 - Temporary, short-term visual effects during construction works, which would last approximately four years
 - Additional shipping activity would create some minor temporary effect visible to receptors on boats and onshore, and
 - Potential temporary effects experienced at night (during the construction period) from lighting on cranes and boats.
- Effects on visual amenity, landscape and seascape arising from the proposed offshore wind farm during the operational phase; these will be reduced because of its location at sea (+12km from shore); through careful array design, it is possible to reduce effects of the wind farm on the visual amenity of the area from the outset.

5.8.3 Proposed Assessment Methodology

The assessment will seek to identify the key features of the landscape and seascape within the study area during the landscape a seascape assessment; changes that the proposed development may have on this character will be considered. The assessment will be based on receptor sensitivity and the capacity of the seascape to accommodate change.

The approach is based on guidance in the 'Guidelines for landscape and visual impact assessment' (GLVIA), 2002 and the 'Guide to best practice in seascape assessment'

(GSA) and subsequent updates being prepared by Natural England and Scottish Natural Heritage.

As the zone mainly encompasses a large expanse of open sea, character assessment for consideration has been based on the GSA and includes both landscape and seascape. One purpose of the GSA is to help evaluate change and help assess proposed offshore structures such as wind farms. The GSA states that value should include factors such as rarity, diversity, and sense of place, historic or cultural value and popularity.

The quality of the resource should also be considered in terms of its condition, intactness, rarity, distinctiveness and the presence of visual detractors. Capacity of the seascape to accommodate change is based on the ability or degree to which the character area can accommodate change without experiencing an unacceptable reduction in quality or value.

The GSA states that such capacity depends on form, function and scale of possible changes and the distance of the development from receptors. In the coastal and hinterland areas, capacity is also judged in relation to the complexity of the coastal edge and the local topography. The methodology included in the GSA makes this assessment process as objective as possible.

The visual assessment includes a consideration of the change that would result in existing views and visual amenity to receptors. Taken into account would be the sensitivity and importance of receptor groups and the nature, scale or magnitude and duration of the change. Visual effects will be assessed using ZTV studies (nacelle height and blade tip), turbine layouts depicted as wireframes and a viewpoint analysis. The visual assessment will be based on:

- The analysis of a ZTV maps
- The analysis of wireframes from preliminary viewpoints, and
- Analysis of views from agreed viewpoints representing sensitive receptors within the study area at a range of distances and directions from the proposed development.

The assessment will involve a desk study, field observations, review of ZTVs, wireframes and photomontages, as well as analysis of this data. The existing and predicted view of the proposed wind farm and associated infrastructure will be described and illustrated using photographs and with reference to the photomontage/wireframe visualisations.

The initial assessment will include reference to a number of agreed viewpoints using a combination of the ZTV, preliminary wireframes and site survey. Following an initial review, a reduced number of viewpoints will be taken forward for further assessment allowing for further layout design iterations. These design iterations are likely to form the basis, at least in part, of the consultation process.

5.8.3.1 *General Approach to LVIA and Key Tasks*

The proposed methodology will comprise the following tasks:

- Site survey undertaken by two experienced landscape architects
- Confirmation of scope and methodology with representatives of relevant local authorities (by means of the consultation during the assessment process)

- Baseline visual assessment
- Baseline landscape and seascape assessment
- Mitigation and discussion with client regarding layout options considered
- Assessment of significance of effects on landscape and seascape, and
- Production of the detailed stand-alone Technical Report as an appendix and Summary Chapter for inclusion in the ES.

The proposed methodology will include:

- A review of existing landscape character assessments in the area. Numerous assessments have been undertaken by a range of public bodies, in relation to both the former AONB, and in relation to the newly designated South Downs National Park area, and their relationship with adjacent landscapes.
- A review and identification of sensitive landscape and visual receptors (for example, residential properties, tourism centres, settlements, designated landscapes, historic parks and gardens, footpaths/walks, cycle routes and ferry routes) and viewpoint locations.
- A review of planning policies and published landscape character assessments.
- Consultations with statutory consultees including local authorities, and other consultees including Natural England, and other stakeholders.
- It is anticipated that the proposed study area of 35km radius from the centre of the proposed wind farm, will be accepted by the statutory consultees.
- Meeting with local authorities and consultees (as necessary) to discuss the extent of the study area and agree preliminary viewpoint locations.
- It is currently anticipated that a cumulative impact assessment will not be required, owing to the distance of other wind farms. It is also anticipated that an LVIA assessment of in-combination effects such as marine extraction and disposal would not be required.

5.9 Marine Archaeology

5.9.1 Preliminary Environmental Baseline

A baseline data collection exercise has been conducted for the zone. The baseline data discussed below is taken from a study completed in 2009 by Wessex Archaeology on behalf of EC&R as part of the zone bidding process. The principal sources consulted were as follows:

- Records of wrecks and obstructions collated by Seazone (provided by ECR)
- Records from the National Monuments Record (NMR), held by English Heritage (EH), of known wrecks, documented losses, and archaeological finds
- Records of protected and controlled sites under the Protection of Military Remains Act (PMRA) held by the Ministry of Defence (MoD)
- Various secondary sources regarding historic shipping patterns alongside sources relating to potential wreck sites and casualties with specific reference

to the Aggregate Levy Sustainability Fund (ALSF) Navigational Hazards project (Bournemouth University 2007)

- Various secondary sources relating to historic aviation patterns and the potential for aircraft crash sites with specific reference to documented World War II Air/Sea Rescue operations and the ALSF Aircraft Crash Sites at Sea project (WA, 2008), and
- Various secondary sources relating to the palaeo-environment with specific reference made to submerged palaeolandscapes and coastal change.

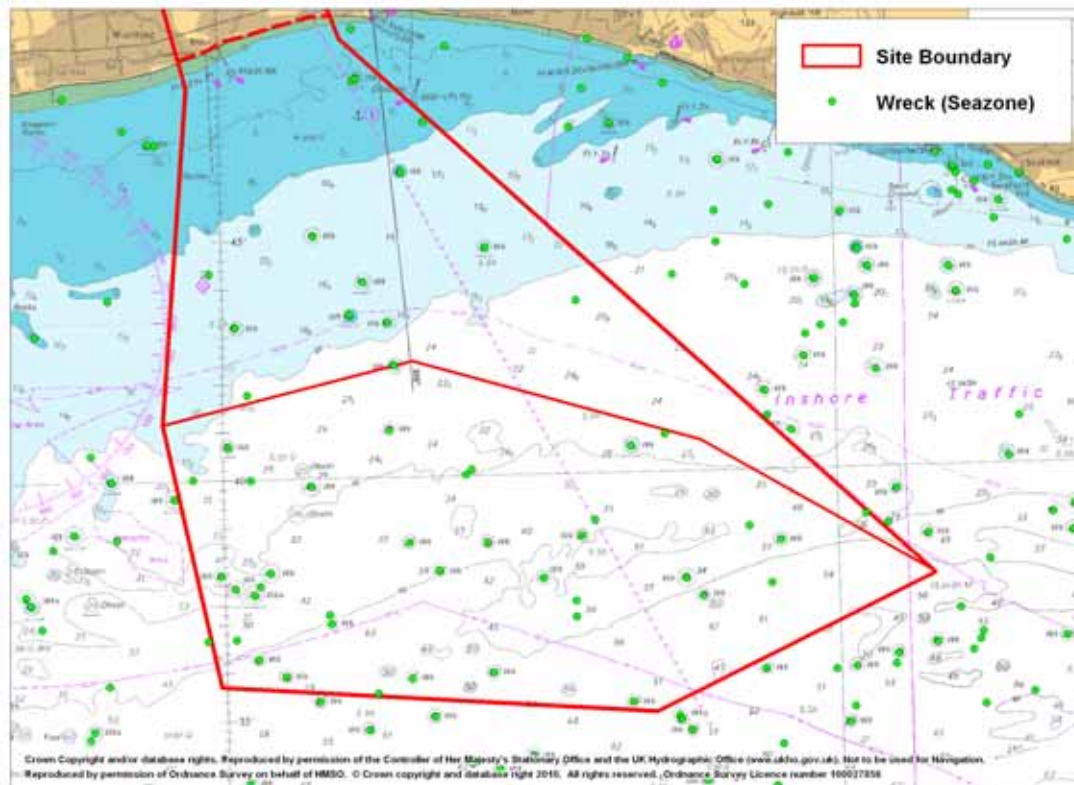


Figure 5.6: Wrecks identified in the vicinity of the zone

5.9.1.1 Results

The key findings of the baseline data collection exercise within the zone are:

Protection of Wrecks Act (PWA) 1973

- There are no protected wrecks within the zone.

Protection of Military Remains Act (PMRA) 1986

- There are no protected military sites within the zone.

Other (non-statutory) wreck sites

As illustrated in Figure 5.6, there are 60 charted wrecks within the zone, many of which are listed as 'unspecified'. None of the sites have been investigated in sufficient detail to establish their importance, or to confirm the location on those not previously surveyed.

There are also a number of *Recorded Losses* within the zone for which there relate to currently unnamed chartered wrecks. Some may be located outside of the zone as the descriptions regarding the location of a wrecking incident are often vague.

There are also a number of *Recorded aircraft losses* within the zone. Although the location of these aircraft crash sites is not precise, as military aircraft, should any remains of these sites be discovered during seabed development operations, they would be automatically protected under the PMRA (1986). The only known constraint in relation to PMRA designated sites relates to the unknown (presumed WWII) aircraft south of Shoreham.

Areas of archaeological potential

Wrecks

There is the potential for the remains of vessels within the zone dating from the Mesolithic period (8,500 - 4,000 BC) to the modern day. The Solent was one of the busiest traffic routes in England before the 15th century, and maritime activity continued to expand, with a dramatic increase from the Post-medieval period. In addition, the area was a focus for military activity during the two World Wars. The high number of chartered obstructions and recorded losses indicate the potential for future discoveries in the vicinity of the zone.

Prehistoric archaeology

As a result of glaciation and sea-level change, this coastline region could have been occupied by early humans at various periods during the Palaeolithic. The zone was not covered by glacial ice during the Anglian, Wolstonian or Devensian glacial maximums, and therefore the area has the potential to have preserved prehistoric remains from the earliest periods of human occupation. From the Late Upper Palaeolithic to the Mesolithic, sea levels rose, but for much of the period the zone would have been habitable dry land. There is potential to discover archaeological material along palaeovalleys and below/within the palaeovalley infill sediments, all currently below the present sea level. Artefact assemblages from this period have been found 'in situ' off the coast of the Isle of Wight and could be present in offshore, near-shore or intertidal areas within zone.

By the end of the Mesolithic, the zone would have been submerged, thus any artefacts and evidence from the Neolithic onwards will be of a maritime nature only.

5.9.2 Key Potential Environmental Impacts

Potential damage could occur during pre-construction seabed preparation, wind farm construction, post-wind farm construction and intrusive geotechnical survey to:

- Wrecks of known and unknown vessels that could potentially date from the Mesolithic through to the present day
- Shipborne artefacts
- Unknown military aircraft lost during WWI and WWII conflicts
- Unknown prehistoric archaeological remains, including artefacts, evidence of land surfaces, or vessels, and
- Evidence of known and unknown palaeo-channels.

Potentially visual impacts could occur on land based heritage receptors, this will be assessed as part of the landscape and visual Impact assessment.

5.9.3 Proposed Assessment Methodology

The assessment will be divided into the following key phases:

- A desk-based assessment including consultation of relevant record data sources
- Consultation of relevant geophysical survey data sources, including the recently undertaken geophysical survey of the zone
- Assessment of potential impacts, and
- Reporting.

The principal sources to be consulted in the baseline assessment will include:

- UK Hydrographic Office records
- NMR maintained by EH; data obtained for protected and non-protected wreck sites, documented losses, obstructions and fastenings, scheduled monuments, registered battlefields and archaeological events (www.pastscape.org.uk)
- Historic Environment Records maintained by local authorities, in this case Sussex County Council
- Archaeological Data Services website for protected and non-protected wreck sites and other maritime sites (www.ads.ahds.ac.uk)
- Maritime and Coastguard Agency (MCA) website for a list of protected wrecks and designated military remains (www.mca.gov.uk), and
- MAGIC website for protected wrecks, scheduled monuments and registered battlefields (www.magic.gov.uk).

These data sources will form the basis for a desk-based assessment of the recorded wrecks, submerged landscapes, coastal sites and other relevant features. This information will also be used to produce a munitions risk assessment, based on sites that come under the PMR (1986).

In addition, any geophysical data obtained for the area to be used for the proposed array and connecting cables, will be reviewed by appropriately qualified archaeologists, specialising in marine archaeological assessments. The data will be reviewed for any anomalies potentially relating to sea bed marine heritage features.

Based on the findings of the desk-based assessment and the impact assessment, a series of recommendations will be proposed to mitigate any significant impacts of the proposed development upon the archaeological and cultural heritage resource.

Those recommendations will be discussed with English Heritage and West Sussex County Council archaeologists, where appropriate.

5.10 Navigation and Shipping

5.10.1 Preliminary Environmental Baseline

This section contains an overview of the navigational features within and adjacent to the proposed development zone. Figure 5.7 is a map illustrating the main navigational features in the vicinity of Zone 6.

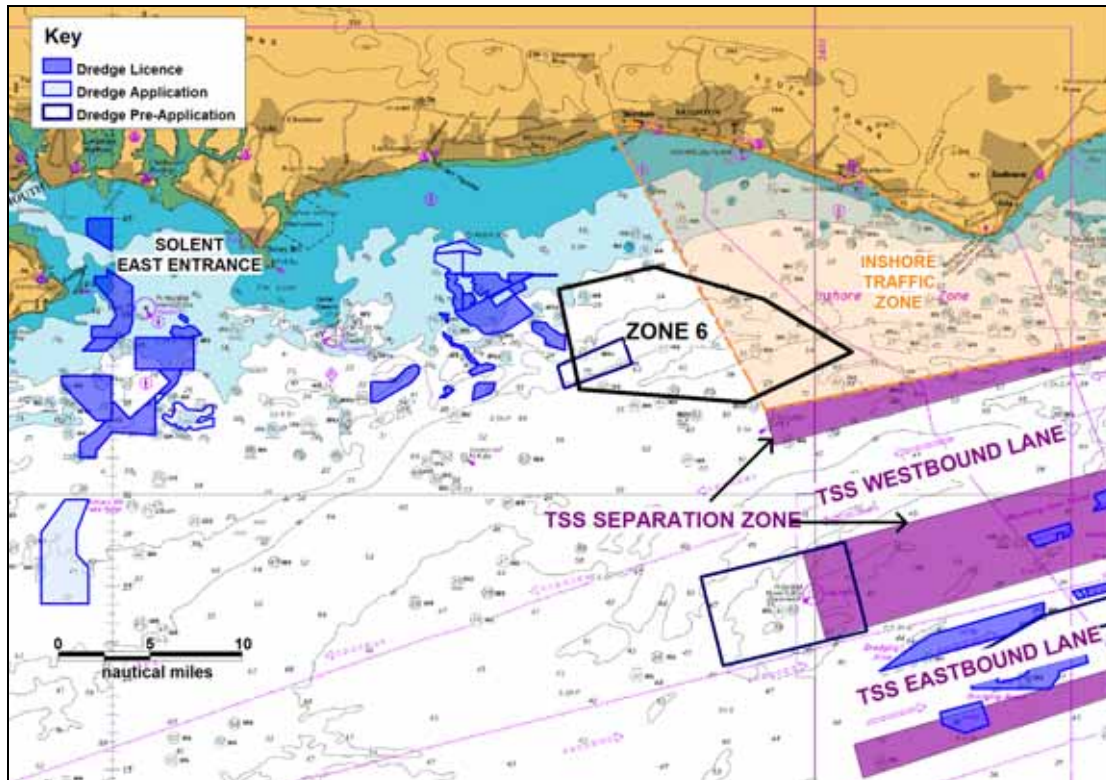


Figure 5.7: Navigational features in the vicinity of Zone 6

The main navigational feature of the area is the traffic separation scheme (TSS) in the eastern English Channel adjacent to the Dover Strait, which is used by a large range of shipping heading east–west through the English Channel.

The nearest lane used by westbound traffic is 3nm from the edge of the zone. There is an inshore traffic zone north of the TSS, which is used by coastal shipping. In addition, there are dredging licence areas in the vicinity and a pre-application area within the zone; dredging operations in these areas will result in local vessel movements.

Merchant shipping

Figure 5.8 below illustrates 28 days of AIS data for the zone from September 2008.

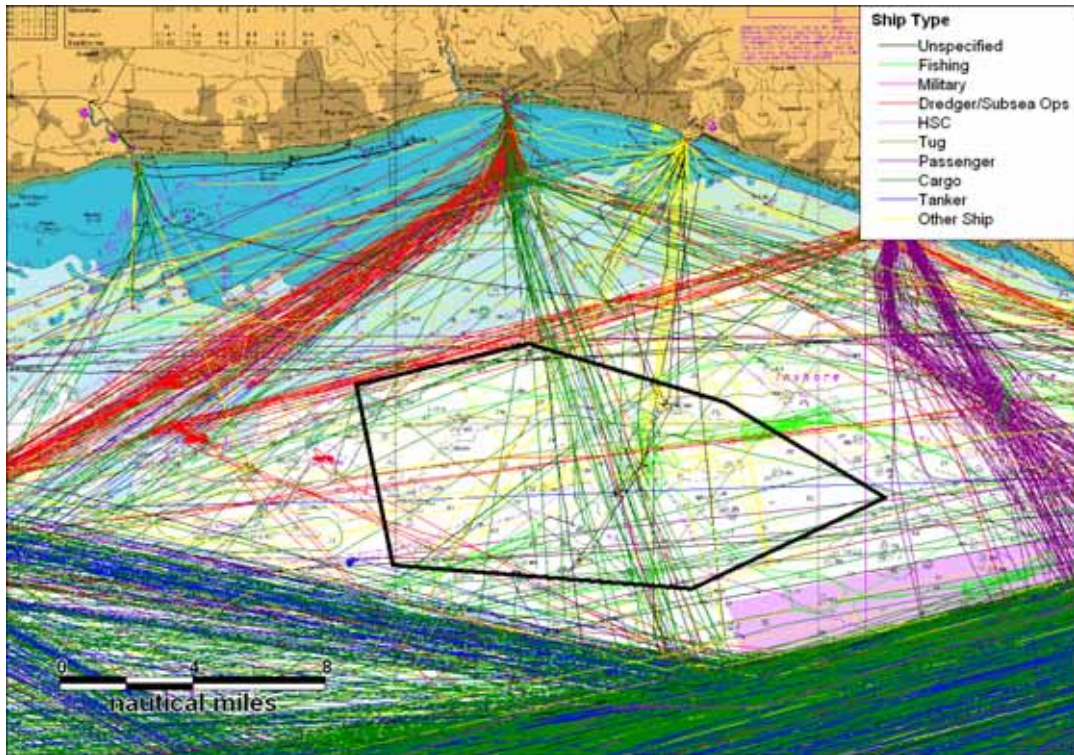


Figure 5.8: Vessels by type passing through the area

The destinations of vessels tracked within the zone are presented in Figure 5.9 below.

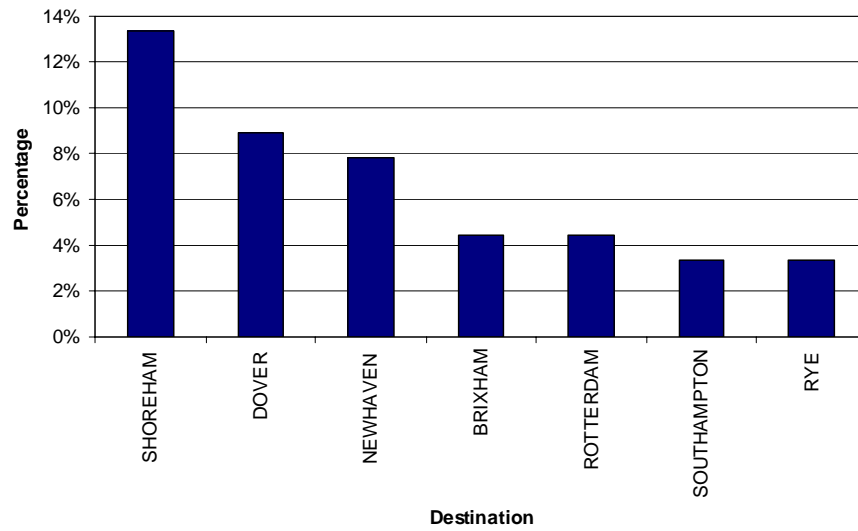


Figure 5.9: Main destination ports of vessels passing through the zone

The relative density of traffic in the area ranked in five bands from very high down to very low is presented in Figure 5.10.

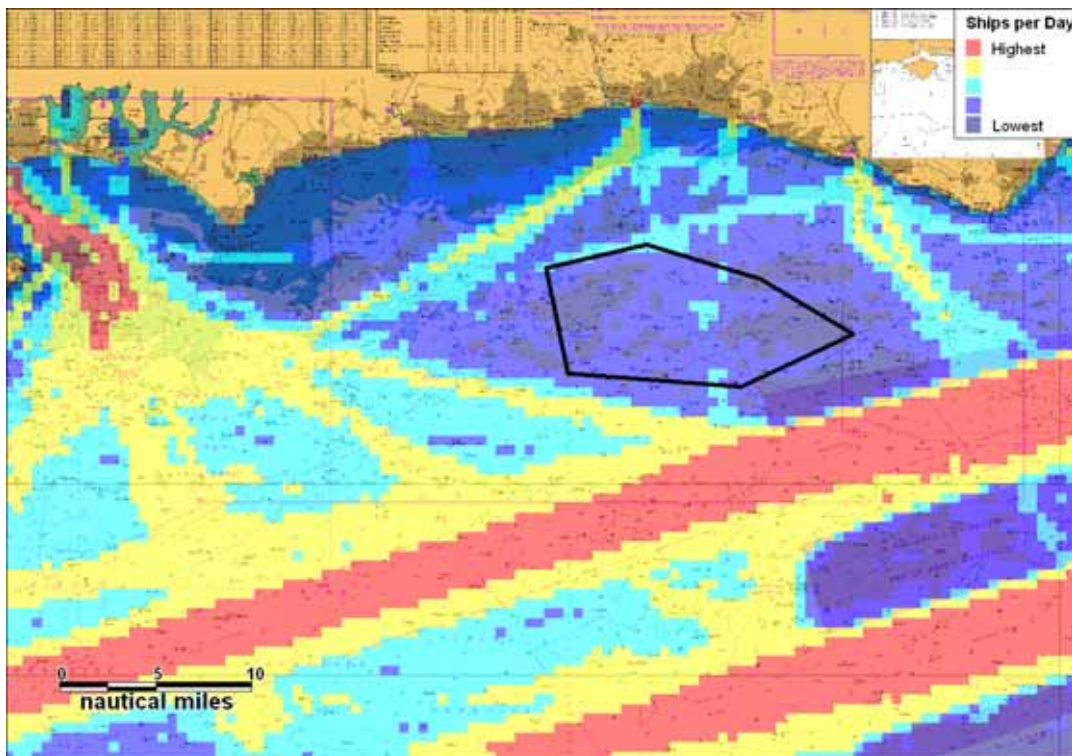


Figure 5.10: Vessel density map

It can be seen that the densities are relatively low within the zone, however, this is partly owing to very high densities in the surrounding area, such as the TSS to the south and the Solent to the west, which tend to dominate the higher rankings. There are moderately used routes to the west and east associated with Shoreham (mainly dredgers) and Newhaven (mainly passenger ferries to/from Dieppe).

Overall, the zone's location is free from the main concentration of traffic in the area, although there is an important shipping lane known as the 'inshore traffic zone' (ITZ) that passes through the proposed zone. This lane is important in that it separates smaller vessels from the larger shipping vessels that are using the TSS. It is likely that navigation stakeholders will require sea room to be maintained for such vessels.

Fishing vessels

It is noted that there is a relatively high level of fishing activity in the area; UK as well as foreign fishing vessels (mainly French and Belgian) are observed. Much of the activity is associated with potting being carried out by vessels in the under-10m fleet, while larger vessels comprise trawlers and scallop dredgers.

Recreational vessels

The zone is outside the general sailing and racing areas identified by the Royal Yachting Association (RYA). These areas tend to be closer to the coast (e.g. in the Solent and around the Isle of Wight).

There are numerous marinas and clubs along this part of the south coast including Brighton Marina 7nm north of the zone.

There are cruising routes passing through the zone along the coast (going in an east–west direction) and across the Channel (in a north–south direction). Several other routes pass near to the boundary of the zone, particularly inshore.

5.10.2 Key Potential Environmental Impacts

The main potential impacts envisaged, based on experience of other wind farm developments and information contained in the MCA and DECC guidelines, are:

- Collision between vessels
- Contact with wind farm structures
- Radar interference
- Inhibited search and rescue operation, and
- Anchor/trawl impact on the cable route.

In addition, impacts such as displacement, re-routeing of vessels (e.g. traffic to/from the ports of Shoreham and Newhaven as well as some traffic around the Brighton area) and interference with aggregate dredging will also need to be assessed. Consideration in this regard will be given to effects caused during the construction and operational phases of the development.

5.10.3 Proposed Assessment Methodology

In assessing the potential impacts of the proposed offshore wind farm development on shipping and navigation, full account will be taken of MCA publication MGN 371 (M+F): Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues.

The baseline for the area from a shipping and navigational perspective will be established by carrying out an up-to-date traffic survey of all vessel types for a total of at least four weeks, taking account of the factors listed in MCA publication, MGN 371.

In addition to this, a review of other data (including historical incidents) will be carried out in the area to establish an understanding of existing hazards and marine activities in the locality.

The marine navigational risk assessment to be conducted as part of the EIA will be carried out based on the recommended methodology described in the DTI (now DECC) publication ‘Guidance on the Assessment of the Impact of Offshore Wind Farms: Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms’ (the ‘DTI Methodology’). It is currently envisaged that the risk assessment will be based on a formal safety assessment process centring on a hazard workshop and resulting hazard register.

Before the navigation risk assessment begins, consultation with key navigational stakeholders will commence; an ongoing dialogue will be maintained as the risk assessment process progresses. Consultees will include the following:

- MCA (including the Channel Navigation Information Service (CNIS) at Dover)
- Trinity House
- Chamber of Shipping
- RYA

- Cruising Association
- Local Port Harbour Master (those at Shoreham and Newhaven)
- Brixham pilots
- Dredging operators, e.g. Hanson Aggregates Marine
- RNLI
- Local yacht clubs, e.g. Royal Ocean Racing Club and Brighton Marina, and
- Fisheries associations and officers.

In accordance with the DTI methodology, after the baseline shipping survey of the zone has been done, the risk assessment will be performed in two distinct phases. First, a preliminary hazard analysis will be conducted in order to determine an appropriate programme of work and to define the tools and techniques to be used for assessing the marine navigational risks in a manner proportionate to the specific case of the Rampion Offshore Wind Farm. Works will include preliminary search and rescue and emergency response assessments.

Once the program and techniques have been agreed with the MCA, the full marine navigation risk assessment will proceed. The process entails completing the following four overarching tasks:

- Estimate the base case level of risk (with present-day traffic levels and no wind farm)
- Predict the future case level of risk (with future traffic levels and no wind farm)
- Predict the base case with the wind farm level of risk (with present day traffic levels and with the wind farm 'in place') and
- Predict the future case with the wind farm level of risk (with future traffic levels and with the wind farm 'in place').

Some displacement effects on shipping and navigation may include but may not be limited to:

- Additional voyage distances
- An increase in vessel encounters and the creation of 'choke points', and
- A reduction in the available depth and width of navigable water.

Navigation and collision-avoidance effects may arise from, for example:

- Structures hindering the view of navigational features and other vessels, and
- Interference with electronic navigation and communications equipment.

Published studies into effects on marine radio navigation and communications systems will be consulted (for example the 2004 QinetiQ/MCA report into investigations undertaken at North Hoyle Wind Farm and the 2007 BWEA report into effects on radar at Kentish Flats).

The level of impact on marine radio navigation and communications systems will be assessed in accordance with the relevant guidelines from the DTI methodology.

5.11 Civil and Military Aviation

5.11.1 Preliminary Environmental Baseline

Civil aviation

The Civil Aviation Authority (CAA) is the public corporation that oversees and regulates all aspects of civil aviation in the United Kingdom.

NATS (En Route) Plc ('NERL') is responsible for the safe and expeditious movement of aircraft operating in the en-route phase of flight in controlled airspace in the UK. To administer this service, NERL operates a comprehensive infrastructure of radars, communication systems and navigational aids throughout the UK, all of which could be compromised by the establishment of a wind farm. NERL is responsible for safeguarding its infrastructure to ensure its integrity to provide the required level of services to Air Traffic Control (ATC).

The zone is located in close proximity to areas delineated by NERL as being vulnerable to interference or having the potential for interference with its operational infrastructure, and within areas where there is potential for interference with this infrastructure (see Figure 5.11).

Military use

There are no military practice and exercise (PEXA) areas within the zone, nor any danger zones noted, which could be affected by or constrained by the proposed wind farm.

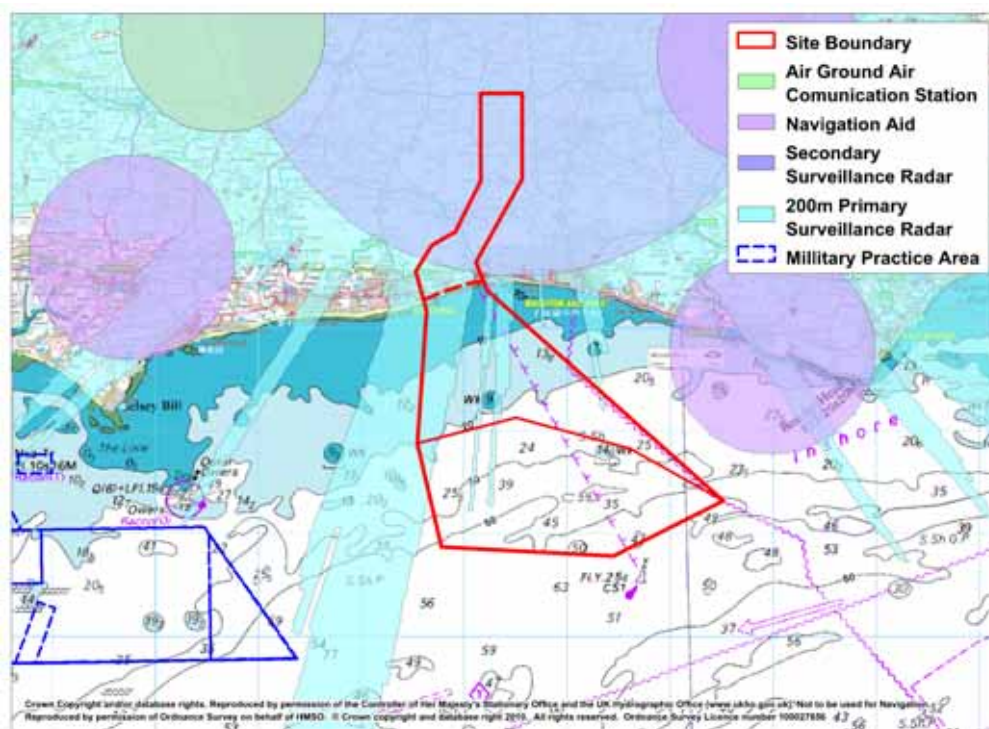


Figure 5.11: Extent of civil and military aviation radar and military practice areas in the vicinity of the zone

5.11.2 Key Potential Environmental Impacts

Civil aviation

The installation and operation of the turbines will result in additional tall structures, which will have to be navigated by aircraft. However, owing to the large difference in relative height between aircraft flight paths and turbines height/s, aviation exclusion zones are not usually required.

Nevertheless, the potential remains for the movement of the turbines to interfere with radars, communications systems and navigational aids. Early consultation with NERL suggests that the wind farm is not likely to affect any of these.

Military use

Military use of the area is not anticipated as there are no military PEXAs within the zone; no danger zones are noted that could be affected or constrained by the proposed wind farm.

5.11.3 Proposed Assessment Methodology

During the EIA a consultation process in line with the recommendations made in the 'Wind Energy and Aviation Interests – Interim Guidelines' (published by the Working Group for Wind Energy, Defence and Civil Aviation Interests) will proceed during which the MoD and CAA will be informed of the proposed development.

Potentially affected aviation stakeholders will be identified in a review of aeronautical charts, NERL safeguarding maps and aerodrome approach plates; the stakeholders will be consulted so that any potential affect of the development on their operations can be ascertained.

A desk study will be undertaken to determine the impact of the proposed offshore wind farm development on civil and military aviation activities.

The assessment of the aviation and radar issues within the proposed offshore wind farm area will include radar propagation projections using appropriate software. An aviation report will be produced encompassing all military ATC and Air Defence radars, NATS radars, and any airport radars. Additional consultation with NATS/CAA and/or MoD/airports will be undertaken should this be required.

The assessment will highlight any deficiencies in the available data. Data gathering will be modified accordingly and continue with the EIA process and the production of the section on civil aviation for the ES.

5.12 Socio-economics

5.12.1 Preliminary Environmental Baseline

5.12.1.1 Tourism and Recreation

Recreational activities in the nearshore coastal area are widespread and varied. Uses of the general coastal areas are varied and widespread. They include bathing near the beach (swimming, surfing and general beach activities), wind- and kite-surfing, water- and jet-skiing, motor-boating, yachting, diving and recreational angling, though there is a focus on utilising the bathing water areas.

Other popular activities related to the shoreline and cliff areas include bird watching, rambling, cycling and horse riding among others. Of particular note, however – regarding the offshore components of the scheme – are boating and yachting together with recreational angling, diving (including potential dive sites).

Recreational sailing/boating routes were initially reviewed by the RPS Group. The findings are summarised below in Figure 5.12.

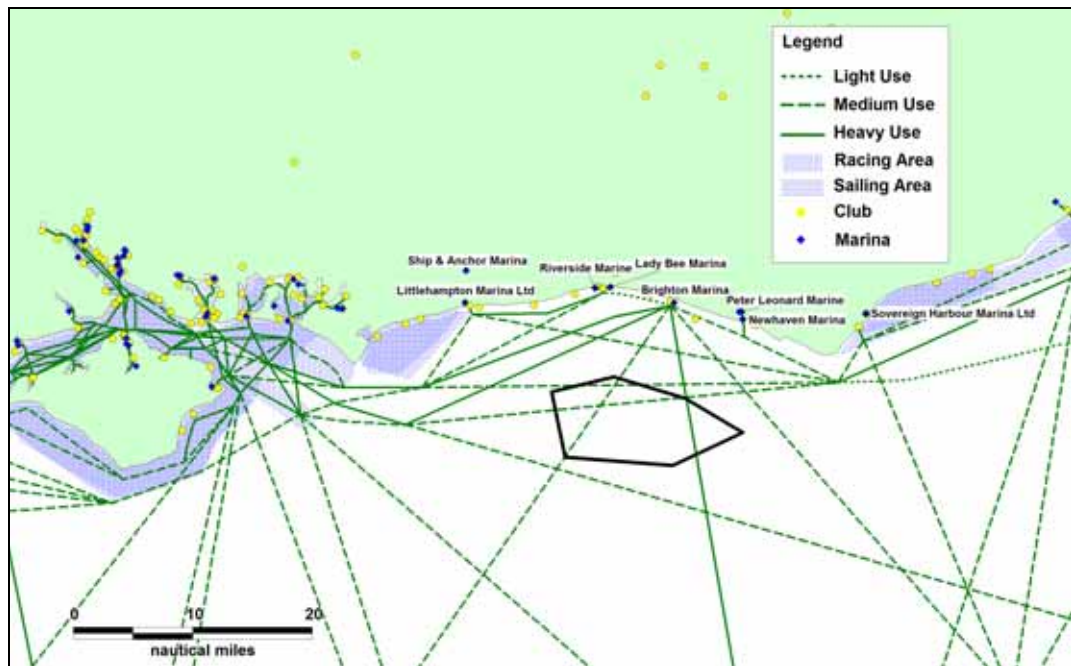


Figure 5.12: Recreational activity and facilities overview

There are numerous marinas and clubs along this part of the south coast. The closest is Brighton Marina, 7nm north of the zone. In addition, the south coast is characterised as having the highest density of recreational sailing in the UK.

5.12.1.2 Employment

According to the 2008 Annual Business Inquiry (ABI) there are approximately 333,000 employee jobs in West Sussex. The service sectors predominate in West Sussex, particularly distribution, hotels, restaurants, banking, finance and insurance. Over the seven years from 1998-2005 employment growth in West Sussex has been much lower than in the South East and Great Britain.

5.12.2 Key Potential Environmental Impacts

5.12.2.1 Tourism and Recreation

During construction, the most likely onshore sources of disturbance or effects will come from noise and traffic associated with construction of the electricity transmission cable from landfall to Bolney substation. However, as the majority of offshore construction will take place 13–25km offshore, the impact from offshore noise on tourism/recreation will be minimal.

Initially, the development of the proposed offshore wind farm may act as a new tourist attraction once construction is completed, which could in turn contribute to the local economy. EC&R's visitor centre for the Scroby Sands Wind Farm, for example, attracts 35,000 visitors a year. In particular, existing or new businesses offering short boat trips to enable tourists to see the wind farm close up may be developed. However, the feasibility of such ventures should be balanced against possible interference with other resource users. Some tourists may feel that the presence of an offshore wind farm spoils the seascape, which may deter them from visiting the area. However, there is no direct evidence available to support or contradict this supposition.

5.12.2.2 Employment

The development of the proposed offshore wind farm has the potential to generate a range of economic and social impacts. The key economic impact will be the creation and support of employment during the construction and operational life of the project. The impacts may occur either directly, indirectly or through induced impacts such as through the use of local services.

5.12.3 Proposed Assessment Methodology

A desk study of available baseline data will be undertaken in association with a comprehensive site visit. The work will be undertaken in coordination with the stakeholder management team, the Crown Estate supply chain initiative and other interested parties. A formal methodology and criteria for ranking impacts will be developed with a focus on employment generation and external benefits, local enterprises and services, tourism and leisure. The study will include an examination of both positive and negative impacts during construction, operations and decommissioning.

Whilst a thorough review of such activities will be undertaken for the EIA, the majority of these activities will be related to the coastal and shallow nearshore areas as noted above (see 5.12.1.1). However, a review of dive sites, recreational angling sites and sites used for other activities, which may extend further offshore, will be undertaken as part of the assessment.

With regard to the assessment of impacts on telecommunications, full consultation with Ofcom and all relevant identified link operators will be undertaken to assess the potential interference on:

- VHF
- GPS
- VTS radar
- Radcomms
- AIS
- Data links
- Mobile telephones
- Television reception, and
- Marine communications.

5.13 Commercial Fisheries

5.13.1 Preliminary Environmental Baseline

There is currently no single data set or model that can be used to accurately quantify the precise levels or values of all categories of commercial fishing within discrete sea areas such as the Round 3 wind farm zones.

Table 5.6 below gives the number and percentage of surveillance sightings of vessels by nationality (2000–9). This illustrates the relative importance of foreign vessel activity in the area, with more than 50% of the sightings being Belgian and French vessels. The majority of these vessels were identified as beam trawlers, scallop dredgers and unspecified trawlers.

Table 5.6: Number and percentage of surveillance sightings recorded within the boundaries, 2000–9 (MMO)

Nationality	No. of Vessel Sightings	Percentage (%)
United Kingdom	292	44.7
Belgium	287	44.0
France	64	9.8
Netherlands	8	1.2
Unknown	2	0.3

International Council for the Exploration of the Sea (ICES) rectangles are the smallest spatial statistical units used for collating fisheries data. Rectangular boundaries are aligned to 1° longitude and 30' latitude, and for the most part apply to sea areas equating to approximately 900 nm². The development is located across two rectangles, while the majority of the proposed development is in rectangle 30E9. In addition, it should be noted that fishing activity may not be evenly distributed over the area of a rectangle.

The areas of ICES rectangles are large in comparison to certain specific fishing grounds, particularly static gear grounds. Another consideration is that operators of vessels under 10m in length are not obliged to complete and submit daily EU log books as are the operators of larger vessels. Also, vessels shorter than 15m in length are not tracked by VMS. A significant proportion of activity within the area is conducted by operators in boats smaller than 10m and/or 15m in length, therefore, it is recognised that consultation with local fishermen using such boats within the area will be an important part of the information and data gathering process.

Figure 5.13 and Figure 5.14 illustrate the landing values by method and species according to the ICES rectangles in the English Channel in Zone 6. The pie charts highlight the importance of potting and gillnetting to operators using boats under 10m in length within Zone 6.

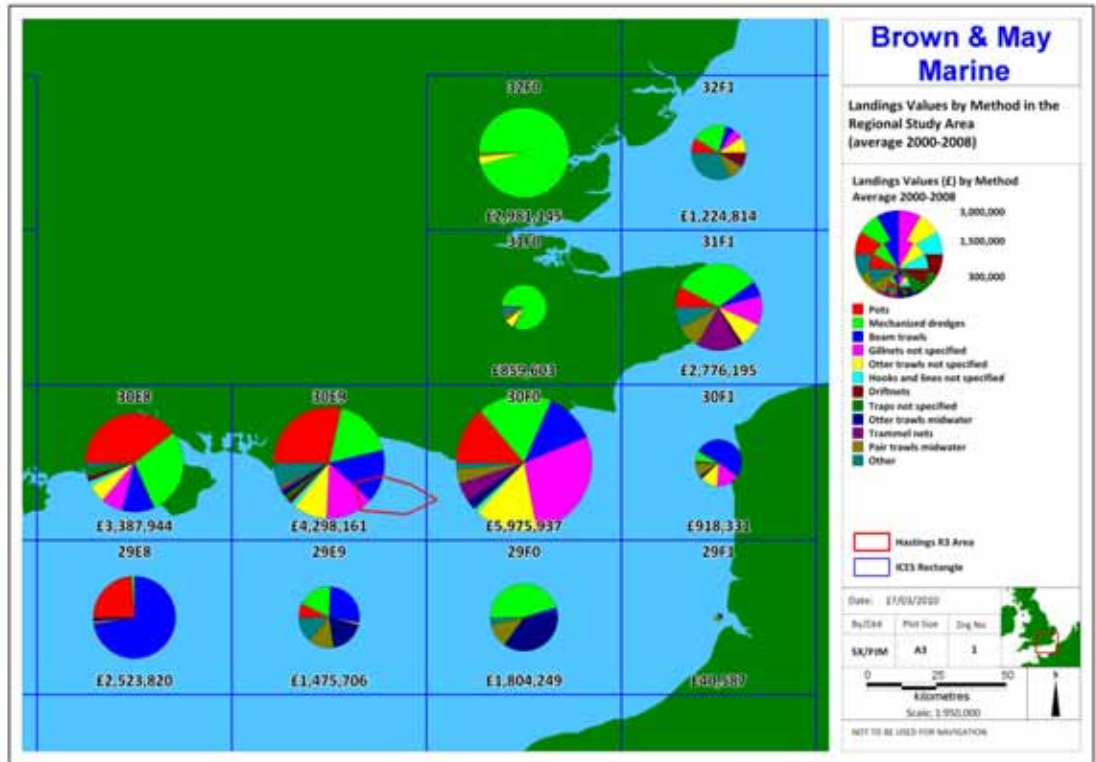


Figure 5.13: Average annual landing values of UK and foreign vessels into UK ports by method (2000–8) (MMO)

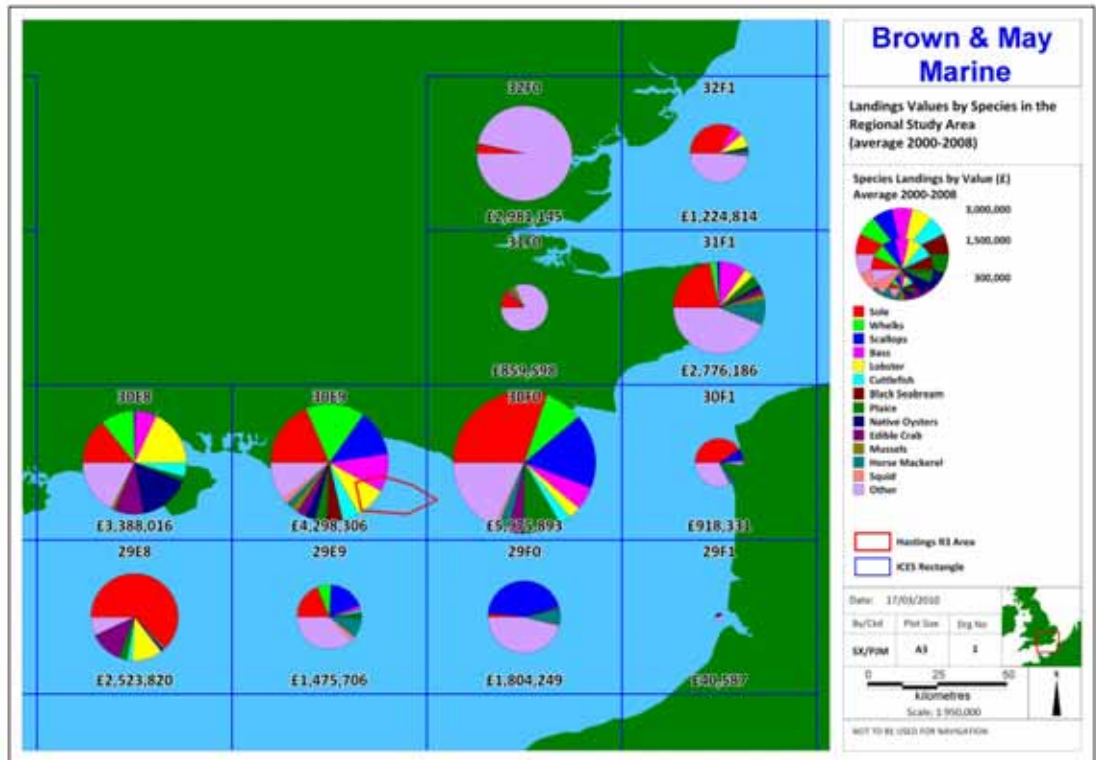


Figure 5.14: Average annual landing values of UK and foreign vessels into UK ports by species (2000–8) (source MMO)

5.13.2 Key Potential Environmental Impacts

The potential effects of the construction and operational phases of offshore wind farms on commercial fishing as given in the 2004 'Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements' are summarised as follows:

- The presence of seabed objects
- Adverse impacts on commercially exploited species
- Increased steaming time to traditional grounds
- Safety issues for fishing vessels
- Loss or restricted access to traditional fishing grounds, and
- Other issues raised.

5.13.3 Proposed Assessment Methodology

5.13.3.1 Baseline Assessment

Data and information will be acquired from a range of sources as follows:

- ICES publications
- EU Fisheries Committee publications and data sets (Europa and Eurolex)
- MMO (formerly Marine and Fisheries Agency (MFA)): fisheries statistics unit and data and communications team. (Information includes catch, effort, and landing statistics, VMS and surveillance sightings, 2005–9)
- Sussex Sea Fisheries District Committee, annual reports, 2005–9
- Dienst voor de Zeevisserij (Fisheries Agency), Ostende, Belgium
- Direction Departementale des Affaires Maritimes, France
- Comite Regional des Peches Maritimes et des Elevages Marins, France
- Algemene Inspectie Dienst (Fisheries Agency), Netherlands
- Netherlands Institute for Fisheries Research (RIVO)
- Relevant published environmental statements of adjacent wind farms and other offshore installations
- National Federation of Fishermen's Organisation (NFFO), UK
- Relevant UK regional and local affiliated and non-affiliated fishermen's associations, producer organisations and a representative sample of individual local fishermen
- MMO District Fisheries Inspectors
- Federatie van Visserijverenigingen, Netherlands
- Nederlandse Visserbond, Netherlands
- Redercentrale, Belgium, and
- Union Nationale des Armateurs à la Peche de France (UAPF)

The MMO currently does not release VMS data on foreign vessel activity in UK waters unless the specific written permission of the relevant Member State agency is received.

Requests will therefore be made to the relevant Member States agencies and fishermen's federations for VMS data to obtain the necessary permissions to allow for the release of the data.

5.13.3.2 *Impact Assessment*

The various potential effects resulting from the construction, operation and decommissioning phases of the proposed offshore wind farm on a local, regional and national scale, will be separately assessed. As discussed above, a significant proportion of the fishing activity in the wind farm area is by vessels from other EU member states, principally the Belgian and French. It therefore recognised that in this context there will be trans-boundary effects and the baseline and assessment processes will take account of this.

5.14 Other Marine Users

5.14.1 *Preliminary Environmental Baseline*

The South East coast, including the areas in and around the zone, is subject to a wide range of human uses offshore. Along the zone's southern boundary lies one of the busiest and most constrained areas for commercial shipping in the world. In addition, there exists extensive dredging for offshore aggregates in the vicinity of the zone, as well as a number of other human uses of the offshore area. There is the potential for the proposed offshore development to affect these existing activities, therefore, the degree of impact (if any) will be assessed and mitigation proposed.

5.14.1.1 *Marine Aggregate Extraction*

Table 5.7 contains details of marine aggregate-extraction sites located in the vicinity of Zone 6. There is one marine aggregate pre-application area (associated with licence 499) within the boundary of the zone (see Figure 5.15).

Table 5.7: Marine aggregate sites located within the vicinity of the zone

Licence Area	Operator	Status
123A–G	CEMEX UK Marine Ltd	Licensed area
124/1 A–G	Hanson Aggregates	Licensed area
122/2	Tarmac Marine Dredging	Licensed area
122/3	Tarmac Marine Dredging	Licensed area
122/1 A–G	Tarmac Marine Dredging	Licensed area
453	CEMEX UK Marine Ltd	Application area
488	Tarmac Marine Dredging	Application area
499	Hanson Aggregates	Pre-Application area

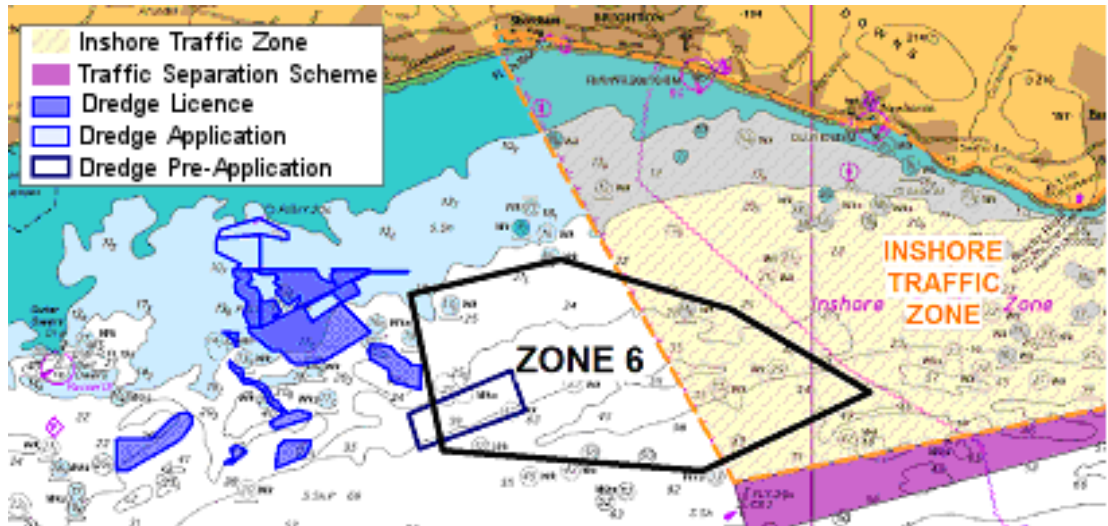


Figure 5.15: Locations of marine aggregate extraction

5.14.1.2 Marine Disposal Areas

The disposal of material at sea is licensed under the Food and Environment Protection Act 1985. Since the end of 1998, most forms of disposal at sea have been prohibited. The main exception is the disposal of material originating from that dredged from ports and harbours. There are nine marine disposal sites in the vicinity of Zone 6 (see Figure 5.1.6).

Table 5.8: Marine disposal sites

OSPAR Code	Disposal Site	Category of waste	Total Quantity in 2002 (metric tonnes)
WI065	Basin 1 naval base Portsmouth	Dredge material	0
WI060	Nab Tower	Dredge material	429,604
WI031	Shoreham	Dredge material	57,137
WI020	Brighton/Rottingdean	Dredge material	67,506
WI045	Chichester Harbour	Dredge material	1,031
WI011	Newhaven	-	-
WI010	Newhaven	Dredge material	38,200
DV040	Eastbourne	Dredge material	20,806
DV045	Wish Tower	-	-

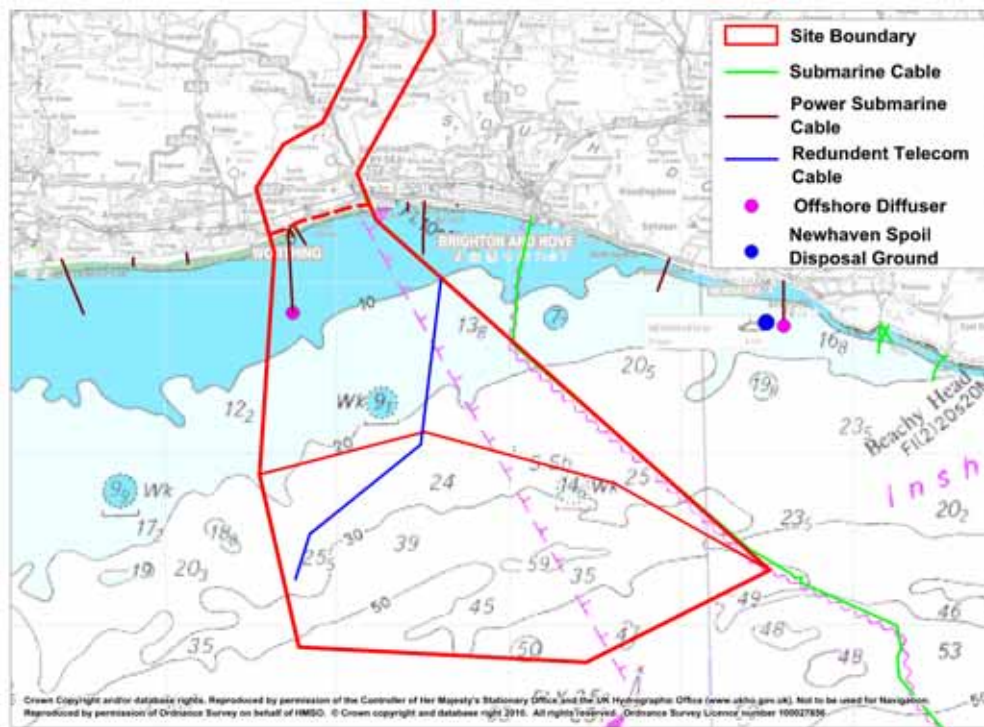


Figure 5.16: Newhaven disposal site and location of seabed obstructions

Of the nine locations, the Newhaven spoil disposal site (12km distance from the zone) is the closest known marine disposal area in the vicinity of Zone 6. No implications for these sites (effects from the wind farm) are anticipated owing to their distance from the proposed development. Therefore, no detailed assessment is proposed as part of the EIA process.

5.14.1.3 Munitions

Research undertaken by RPS found no apparent munitions dumping areas within the zone or in close proximity to it. In addition, no MoD practice or exercise areas overlap the zone.

5.14.1.4 Offshore Oil and Gas

No blocks currently licensed for oil and gas exploration lie within or adjacent to the zone. Therefore, no detailed assessment of these issues is proposed as part of the EIA process.

5.14.1.5 Other Renewable Energy Schemes

There are no other known offshore renewable energy projects in the area. The closest known offshore renewable energy project is 'West Isle of Wight' (located 74km west of the zone). No detailed assessment of current renewable energy schemes is therefore proposed as part of the EIA process.

5.14.1.6 *Subsea Cables and Pipelines*

A number of cables have been identified in the vicinity of the zone. A single cable located towards the eastern boundary of the zone is listed as 'UK-France 3' (see Figure 5.16). In addition, there are two redundant British Telecom cables that cross the site. Assessment of any implications on these arising from the development of proposed offshore wind farm will be included in the EIA to ensure that any active cable/s remain/s unaffected by the development, and that any remediation work required regarding the defunct cables can be carried out where appropriate.

5.14.1.7 *Telecoms/Communications*

There is a range of possible areas where the local communications and television infrastructure could be affected by the presence of offshore wind farms and its associated subsea cabling. These effects include:

- Reflection and shadowing of signals between transmitters and receivers by wind towers or rotating blades can potentially impair some forms of communications systems such as radio, television and mobile phone (microwave) signals
- EMF emitted from the generator gear and electricity export cables, and
- Potential disturbance of submarine telecommunication cables.

5.14.2 **Potential Environmental Impacts**

5.14.2.1 *Marine Aggregate Extraction*

There is one licensed marine aggregate extraction area within the boundary of the zone and a number of aggregate extraction areas within the vicinity of the zone. Potential direct impacts include interaction with dredging operations during construction and operation of the proposed wind farm. Indirect impacts through the enforcement of temporary safety (exclusion) zones during construction may restrict existing vessel movements to and from existing dredging sites. Discussions have commenced with dredging companies operating in the vicinity of the zone.

5.14.2.2 *Marine Disposal Areas*

As in the case of marine aggregates above, and given the distance between the existing aggregate-extraction licence areas and the offshore wind farm, it is unlikely that there will be any significant direct interaction between the wind farm and marine disposal operators during construction and operation of the proposed wind farm. Indirect effects caused by the enforcement of temporary safety (exclusion) zones during construction may restrict existing vessel movements to and from existing sites.

5.14.2.3 *Munitions*

The general area was a focus for military activity during the World Wars and there is potential for munitions to exist here, presumably associated with military wrecks. These may be identified as a result of the geophysical surveys, and suitable plans will be put in place to deal with unidentified UXO during construction.

5.14.2.4 *Subsea Cables and Pipelines*

The primary concerns of the offshore industry relate to protection of subsea pipelines, cables and structures during wind farm installation and cable-laying operations.

5.14.3 Proposed Assessment Methodology

Baseline data will be collected from a number of publicly available sources and verified; data will include extensive consultation with statutory and non-statutory consultees. Information will also be reviewed from that available on the relevant Admiralty charts and other UKHO publications, and Kingfisher Information Service cable awareness charts that cover the study area. A baseline description will be developed to form the basis of the assessment.

The following information will be collated/verified in order to produce a comprehensive baseline description:

- Marine aggregate extraction licences
- Offshore oil and gas infrastructure and exploration and production licensing
- Subsea cables/pipelines and other seabed obstructions
- MoD offshore exercise areas, and
- UXOs (munitions) and marine disposal areas.

Consultation will take place with the MCA, UK Offshore Operators Association (OOA), DECC, local ports and harbours authorities, the UKHO, the MoD, the Crown Estate, the UK Offshore Aggregate Producers Association, as well as any other relevant bodies. As noted, discussions have already commenced with dredging operators associated with the licensed marine aggregate-extraction area within the boundary of the zone.

A formal methodology and criteria for ranking impacts will be developed, with particular focus on the impacts of the project on those other marine users listed above. The various potential effects of the construction, operation and decommissioning phases of the development on a local, regional and national scale, will be separately assessed and where practicable, appropriate mitigation measures will be proposed.

6 ONSHORE EIA TOPIC AREAS TO BE ASSESSED

6.1 Overview

The proposed topic areas to be addressed as part of the EIA for the onshore electrical grid connection for the proposed Rampion Offshore Wind Farm are listed as follows:

Physical environment

- Agriculture and soils
- Air quality and
- Ground conditions and water resources.

Biological environment

- Ecology and nature conservation.

Human environment

- Archaeology and cultural heritage
- Landscape and visual amenity
- Noise and vibration
- Recreation
- Transport and
- Electric and magnetic fields.

For each of the topic areas, this scoping report provides a brief summary of the environmental baseline within the area of search (see Figure 6.1), details of potential impacts and proposed EIA methodology.

Following preliminary investigation into the potential environmental effects of the onshore electrical grid connection, it is proposed that the following topics be scoped out of the EIA:

- Agriculture and soils during operation – no activities with potential to significantly effect agriculture and soils are anticipated to take place during operation of the project.
- Archaeology during operation – no activities with potential to significantly disturb or damage archaeological resources are anticipated to take place during operation of the project.
- Traffic during operation – no activities with potential to significantly effect local traffic movements are anticipated to take place during operation of the project.
- Recreation during operation – no activities with potential to significantly effect recreation are anticipated to take place during the operation of the project.
- Air quality during operation – no activities with the potential to significantly effect air quality are anticipated to take place during the operation of the project.
- Socio-economic impacts – although there may be some small benefit for the local economy, particularly the utilising of local service industries and the

requirement for accommodation for the workforce, the small workforce involved and the temporary nature of the work is not expected to result in significant effects on the socio-economics of the area during the construction or operation of the project.

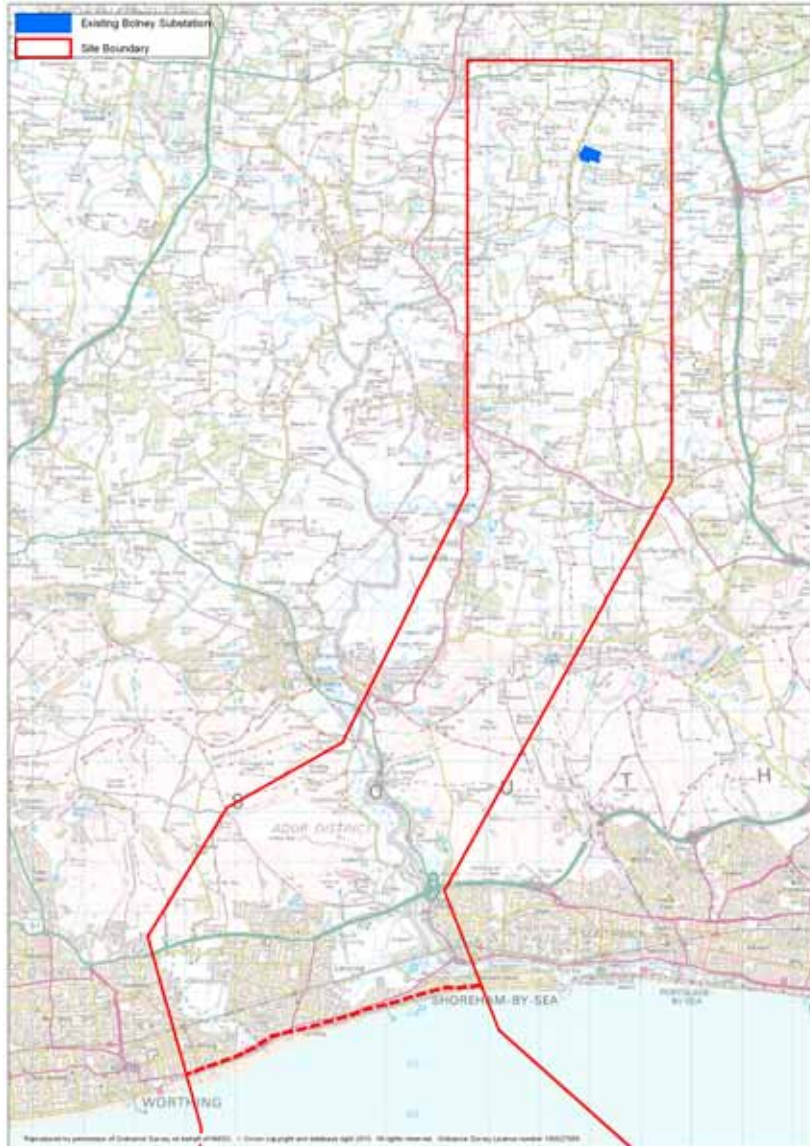


Figure 6.1: Indicative onshore cable corridor

6.2 Agriculture and Soils

6.2.1 Preliminary Environmental Baseline

Agricultural land classification

The agricultural land use within the indicative onshore cable corridor is described from the DEFRA Agricultural Land Classification (ALC) of England and Wales, and is presented in Figure 6.2.

Close to the coast, land use is dominated by the urban areas of Shoreham-By-Sea, Worthing, and Hove (in particular the urban areas within these towns of Kingston-By-Sea, Lancing, and Sompting).

The majority of the indicative corridor is comprised Grade 3 agricultural land (good to moderate quality agricultural land). This land is predominantly improved grassland for grazing pasture or winter feed. The remainder of indicative corridor is comprised predominantly of Grade 4 and Grade 2 agricultural land, with an area of Grade 5 land on the northern slopes of the South Downs.

Grade 4 (poor quality agricultural land) is shown to be present on the upland areas of the South Downs, and in the River Adur valley and catchment.

Grade 2 (very good quality agricultural land) is present to the north and south of the village of Woodmancote, south of the town of Henfield and village of Blackstone, where it is clear that the land use is cultivated arable farming, rather than improved grassland for grazing or winter-feed.

Grade 5 (very poor quality agricultural land) is present in an area on the northern boundary of the South Downs. This area is characterised by north facing slopes of steep gradient where the chalk downland forms an eroded escarpment, punctuated by many winterbournes (ephemeral chalk streams).

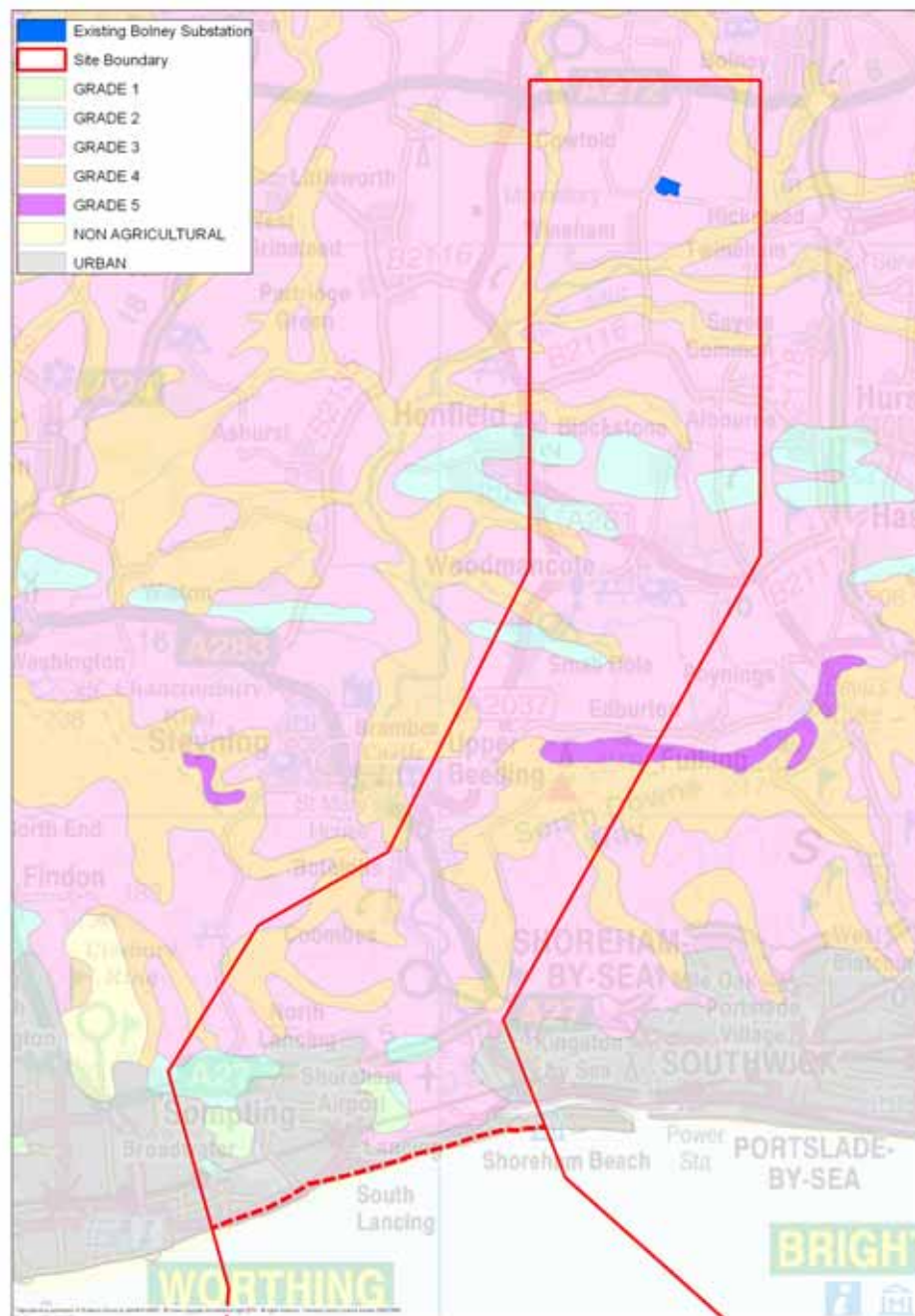


Figure 6.2: Agricultural land use (From DEFRA Agricultural Land Classification)

Agri-environment schemes

Environmental Stewardship is an agri-environment scheme that provides funding to farmers and other land managers in England who deliver effective environmental management on their land. There are a number of parcels of land that are managed under Entry Level Stewardship, Organic Entry Level Stewardship, Higher Level Stewardship and Entry Level Stewardship plus Higher Level Stewardship within the indicative cable corridor (see Figure 6.3). There are no parcels of land that fall under Organic Level Stewardship plus Higher Level Stewardship within this area.

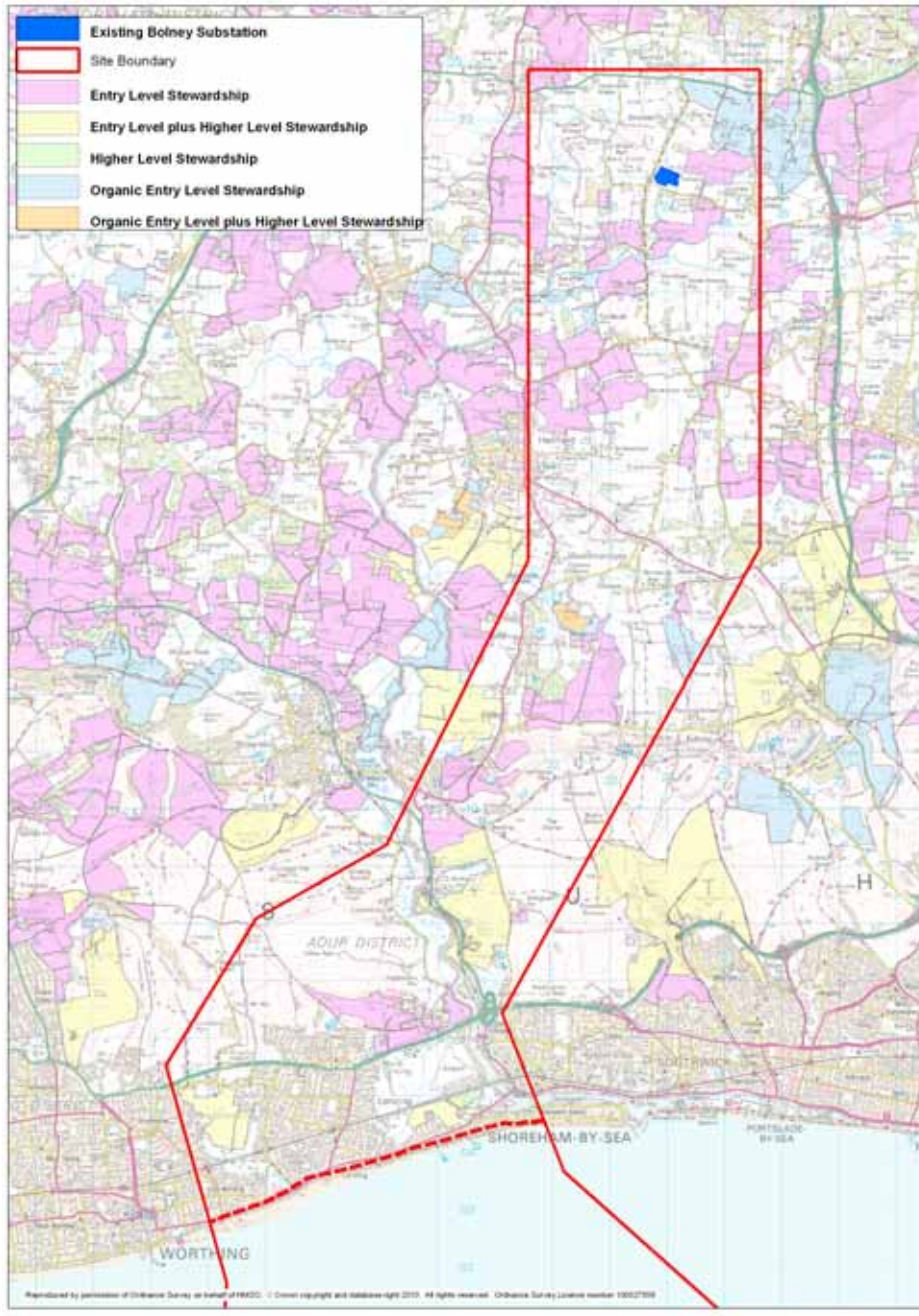


Figure 6.3: Environmental Stewardship Agreements

Soil types and characteristics

Table 6.1 overleaf presents information on soil types and characteristics within the indicative corridor based on information from the Soil Survey map of South East England (1:250,000) and the accompanying Soil Survey Bulletin 15: ‘Soils and their Use in South East England’.

Table 6.1: Summary of soil types and characteristics within the indicative cable corridor

Soil Type	Characteristics	Depth
Newchurch 1 Association (814b) (from the coast to north of the railway and in the Adur valley)	Deep, stoneless, poorly drained, heavy textured soils developed in marine alluvium	>1m but likely to be semi-liquid at depth
Coombe 1 Association (511f) (from north of the railway to North Lancing and part of the corridor between North Lancing and Combes – on the lower slopes and valley bottom locations)	Deep and moderately deep, well-drained chalky soils in a variable thickness of silty and chalky drift over chalk	Variable – mostly 500mm to 1m but deeper in valley bottoms
Andover 1 Association (343h) (on part of the corridor between North Lancing and Combes – on the steeper valley sides)	Shallow chalky soils	Typically around 400mm over chalk, but with both deeper and shallower patches
Upton 1 Association (342a) (on steep slopes of Truleigh Hill)	Shallow chalky soils	<300mm over chalk
Coombe 2 Association (511g) (narrow strip on either side of Upper Beeding to Edburton Road)	Deep and moderately deep, well-drained chalky soils in a variable thickness of silty and chalky drift over chalk	Variable – mostly 500mm to 1m but deeper where slope becomes more gentle
Wickham 2 Association (711f) (north of Truleigh Manor Farm)	Poorly drained, medium to heavy textured soils in drift over Gault Clay	>1m
Fyfield 4 Association (571g) (in vicinity of Truleigh Sands and south-east of Henfield)	Well-drained, light-textured soils over sands and sandstones and less well-drained soils over interbedded sands and clays	Variable; mostly >1m, but there can be some with sandstone within 800mm
Wickham 1 Association (711e) (north-east of Small Dole and north of Furners Farm to Bolney substation)	Poorly drained, medium to heavy textured soils in drift over Weald Clay	>1m
Fladbury 3 Association (813d) (narrow strips near River Adur and southern tributary near Bolney substation)	Poorly drained, clayey soils in river alluvium	>1m but likely to be very wet and semi-fluid at depth

6.2.2 Key Potential Environmental Impacts

Key potential impacts on agriculture and soils resulting from the construction and decommissioning of the proposed onshore electrical grid connection may include:

- Loss of sediment through soil disturbance, compaction through use of heavy machinery, and the overall loss of productive arable land
- Potential for transmission of agricultural pests and diseases

- Temporary disruption to agricultural operations during the construction phase, and
- Temporary disruption and alteration of land-drainage systems during construction.

No significant effects on agriculture and soils are predicted during the operational phase of the onshore works and as such the assessment of impacts on agriculture and soils during the operational phase has been scoped out of the EIA.

6.2.3 Proposed Assessment Methodology

Baseline data collection will include appraisal of agricultural land quality and the soil resources associated with the onshore elements of the project. Works will include:

- A desk-top assessment of agricultural issues using relevant published information
- A review of Agricultural Land Classification (ALC) maps published by Defra
- Cross-reference to the Phase 1 habitat survey where relevant
- A review of agri-environmental schemes affected by the proposal, and
- A review of relevant local/district plans for any agricultural land protected from development by policy.

A desk-top assessment will be undertaken to characterise the soils along the cable route corridor using published soils mapping. The characteristics of each soil association crossed will be determined and interpreted for construction and restoration. Appropriate careful reinstatement will be undertaken to minimise impacts to agricultural land, in particular with regards sensitive chalk grassland in upland areas of the South Downs.

6.3 Air Quality

6.3.1 Preliminary Environmental Baseline

The onshore works may pass through areas administered by the following district councils (see Figure 6.1):

- Adur District Council
- Worthing Borough Council
- Horsham District Council, and
- Mid Sussex District Council.

Results from preliminary enquiries suggest that Worthing Borough Council, Horsham District Council and Mid Sussex District Council have not (to date) declared any air quality management areas (AQMA).

Adur District Council has two extant AQMAs:

- High Street, Shoreham-by-sea AQMA and
- Southwick AQMA.

Outside the AQMA, it is assumed that air quality currently meets the objectives of UK local air quality management (LAQM) set out in the UK air quality strategy and regulations.

6.3.2 Key Potential Environmental Impacts

Potential impacts on air quality resulting from the construction and decommissioning of the proposed onshore electrical grid connection may include:

- Increased emissions into the air from vehicle movements associated with the construction of the proposed onshore electrical grid connection, and
- Increased dust emissions into air during construction.

No activities with the potential to significantly impact on air quality are anticipated to take place during the operation of the proposed onshore electrical grid connection, and as such the assessment of effects on air quality during the operational phase has been scoped out of the EIA.

6.3.3 Proposed Assessment Methodology

The assessment methodology will comprise a number of stages, as follows:

- Consultation with key stakeholders, including the local authorities, through whose areas the route will pass
- Baseline review of local air quality conditions
- Qualitative assessment of potential impacts resulting from dust emissions, including the identification of mitigation measures as required
- Quantitative assessment (DMRB³ screening assessment) of emissions from vehicles associated with the scheme, where the transport assessment indicates these are likely to be significant, and
- Production of the air quality section of the ES.

6.4 Ground Conditions and Water Resources

6.4.1 Preliminary Environmental Baseline

The area within the indicative cable corridor, along the stretch of coast, and the land extending northwards along the River Adur are all designated as comprising a zone at high risk from tidal flooding (Zone 3) according to the latest Environment Agency (EA) flood zone map. The maps also indicate that the area benefits from some flood defences, although the standard of protection afforded is not known.

The rest of the indicative cable corridor is largely located in Flood Zone 1. A number of river crossings are noted, the largest of which is the River Adur. A number of smaller watercourses are located along the proposed route, which will potentially result in the crossing of associated floodplains.

³ DMRB screening assessment: the UK Highways Agency developed a screening assessment tool, referred to as 'Design Manual for Roads and Bridges' (DMRB) tool for assessing effects of road traffic on local air quality

According to the EA source protection zone maps, the indicative corridor passes through a number of source protection zones (SPZ1, SPZ2 and SPZ3); there are no zones of special interest.

The land between the A259 coast road and the railway comprises two areas of historic landfill. The southern area, known as Brooklands Park, was operational as a landfill site between 1950 and 1962; currently used for recreation, it now comprises a nine-hole golf course, pitch and putt and miniature railway, with an adjoining boating lake. The northern area, known as Meadow Road, was operational as a landfill site between 1963 and 1970 and is now fenced off.

Details have been obtained from Worthing Borough Council (WBC) confirming that the fill comprised domestic refuse with varying proportions of cover material and some areas caked in sewage sludge. The following site investigation reports have been prepared; they are held by WBC:

- 'Site Investigation Report for Land North of Brooklands' (1985)
- 'Methane Investigation at Meadow Road/Dale Road' (1986)
- Development of Brooklands Pleasure Park Feasibility Study (1988)
- 'Report on Methane Monitoring at Brooklands and Dominion Way, Worthing' (1990)
- 'Contaminated Land Investigation at Brooklands Par 3 Golf Course' (2003), and
- 'Ground Investigation into Landfill Cover Layer Thickness and Integrity at Brooklands Golf Course' (2005).

To the north of the railway, the cable corridor crosses the open gap between Sompting and Worthing and then moves northwards into open countryside. There is an historic landfill site north of Sompting known as the Halewick Lane Tip.

The existing Bolney substation site is located off Wineham Lane, just over 1km north of the village of Wineham. The land around the substation comprises grassland with mature boundary hedgerows and trees. The existing substation site is not located within flood zones 2 and/or 3.

There are four Regionally Important Geological/Geomorphological Sites (RIGS) within the indicative cable corridor including Shoreham Cement Works, Beeding Quarry, Horton Clay Pit, Small Dole, Golding Barn Quarry, Upper Beeding and Beeding Small Quarry, Upper Beeding (see Figure 6.4).

6.4.2 Potential Environmental Impacts

Ground conditions

The presence of contaminated soils may have an adverse effect during the construction phase as there may be an increased risk to construction workers from contact with contaminants. Any removal of contaminated soils off site may also have an effect during construction owing to increased vehicle movements and use of landfill void. Construction activity invariably involves the use of contaminating substances such as fuels and oils, which can turn into sources of ground contamination at the site if not handled carefully.

The operation of the cable corridor is not likely to have any significant interaction with sources of potential contamination.

Water resources

Potential effects during construction relate to the potential risk of contaminated water run-off from the construction right-of-way and subsequent effects on local water quality. Operational effects are likely to relate to the potential for flooding at, and arising from, the proposed substation.

The potential impacts are summarised below:

- Hydrological change, including possible disturbance of and modification to watercourses, existing drainage patterns, overland flow routes, and groundwater recharge and flows
- Possible increase in surface-water overflow towards watercourses as a result of a larger impermeable surface area
- Sediment or chemical pollution of watercourses and land drains during construction and operation
- Interruption or disturbance of public or private water supplies
- Effects on freshwater ecology from pollution, obstruction of land drains and watercourses or changes in the hydrological regime, and
- Construction of the routes creating preferential pathways (either horizontal or vertical) for contaminants through impermeable soils.

6.4.3 Proposed Assessment Methodology

Flooding and drainage

The relevant policies and legislation will be confirmed prior to data collection. The approach will be shaped to conform to these policies. A flood risk assessment (FRA) for the proposed substation will be prepared in accordance with PPS25 and will include the consideration of the implications of altering the surface-water run-off regime from the substation development. A further FRA will be undertaken to investigate the effect of the cable corridor, and will identify watercourses and the potential impacts of any crossing points (including potential impacts on the functional floodplain).

Desk-study information pertaining to geology and hydrogeology will be obtained from published mapping sources and landfills identified using the EA website for the entire onshore cable route, including all alternative route options.

Ground conditions

The assessment methodology will comprise:

- A review of the legislative and policy context
- A desktop baseline study, to identify:
 - Ground conditions prevailing across all elements of the project including the nature of underlying solid and superficial geological material. Borehole records will be reviewed to confirm the geological setting

- Hydrogeological setting, which will be determined using EA data, including the groundwater vulnerability maps and adopting the new EA aquifer classification scheme. The groundwater vulnerability assessment will include the consideration of the nature of soils as well as superficial geology
 - Licensed groundwater abstractions, which will be identified. The potential for effecting water resources will be assessed, and
 - Licensed landfills (closed or open), which will be examined, and their proximity to the route, noted.
- An assessment of the potential risk posed by ground and groundwater conditions, and
 - Remedial measures, to mitigate any potential effects, to be identified; these measures will be presented to combat each type of risk identified. It is accepted that different mitigation measures may be required to combat the same risk; the measures are selected according to their suitability in different environmental settings.

For the qualitative assessment the following terms will be used:

- The source – potential contaminated sources (landfills)
- The pathway – route or mechanism by which the source may affect an identified receptor, and
- The receptor/s – natural environmental including human receptors that can be detrimentally affected by sources of contamination, and for which protection must be implemented. Of particular concern are human occupants (primarily users of adjacent land), watercourses, groundwater and ecologically important sites. In considering the receptors, account is taken of the nature of the proposed cable-laying operations; these are likely to include open trenching and, in places, horizontal directional drilling.

To identify the source, pathway and receptors, the desk study will include the review of available information to allow an assessment of:

- Historical land uses (assessing the potential for ground contamination)
- Areas of contaminated land (landfill), and
- Environmental setting (assessing the sensitivity of the surrounding environment to contamination and pollution).

Water resources

Effects on water resources will include effects on the prevailing hydrological, surface-water drainage, flooding and water quality environments at the landfall site, along the cable corridor and at the substation site at Bolney. These effects will be assessed.

A hydrological desk study will be undertaken to assess the existing hydrology, and to identify any potential effects caused by the cable route, both during construction and post-construction. The hydrology will be assessed in terms of the natural drainage patterns, baseflows and volumes, run-off rates, hydrology, geomorphology and water quality (including that of private water supplies).

Data will be collated from the following sources: geological maps (both solid and drift geology) as follows:

- Hydrogeological maps
- Groundwater vulnerability maps
- EA flood maps
- Soil survey maps
- Borehole records held by the BGS, the EA and the local authorities (these identify abstractions in the locality and the current groundwater quality)
- Strategic flood risk assessment
- EA water quality and discharge records
- Local authority private water-supply records, and
- Any investigations into utilities being undertaken and details of water supplies.

6.5 Ecology and Nature Conservation

6.5.1 Preliminary Environmental Baseline

Designations

Table 6.2 below is a list of statutory designations within the indicative cable corridor (see Figure 6.4). The main reasons for the designation of these sites are indicated.

Table 6.2: Summary of nature conservation designations within the indicative cable corridor

Site designation	Site Name	Site information
SSSI	Adur estuary	Saltmarsh supporting an unusual estuarine plant community; large area of intertidal mud flats important for a variety of wading birds including ringed plover for which the site is nationally important; the site also supports common lizards
SSSI	Beeding Hill to Newtimber Hill (Units 1–5)	Composed of three nationally important habitats: chalk grassland, juniper scrub and calcareous oak/ash/beech woodland; it has a rich diversity of flora species and supports a rich invertebrate fauna including nationally important, uncommon and scarce invertebrates; a dew pond supports colonies of all three newt species
LNR	Lancing Ring	Chalk grassland, scrub and a dew pond create a variety of habitats and support a variety of butterflies and the adder
LNR	Mill Hill	Unimproved species, rich chalk grassland that has over 160 recorded species of flowering plants and up to 30 species per square metre; also scrub and secondary woodland; this is one of the best butterfly sites in Sussex with over 29 species recorded
LNR	Widewater Lagoon	A brackish lagoon landlocked by a man-made shingle bank; it supports many wildfowl, and the terrestrial habitat

Site designation	Site Name	Site information
		supports a variety of butterflies
LNR	Shoreham Beach	A vegetated shingle beach
LNR	Tottington Wood	An area of ancient woodland managed as coppice and known to support amphibians, reptiles and bats

In addition to the above, there is an RSPB reserve (Adur Estuary), a Sussex Wildlife Trust (SWT) nature reserve (Woods Mill), a number of SNCI's, various notable trees and 'ancient woodland sites' recorded within the indicative corridor. Direct impacts on any of these sites should be avoided.

6.5.2 **Key Potential Environmental Impacts**

Potential impacts in relation to ecology and nature conservation are as follows:

- Damage to or mortality of protected or notable species within their habitats
- Direct or indirect disturbance of protected or notable species within their habitats
- Temporary or permanent loss of habitats important for species
- Temporary or permanent severance of important habitat from species
- Impacts on water quality through pollution, and
- Impacts on overall species composition and diversity as a result of any of the above.

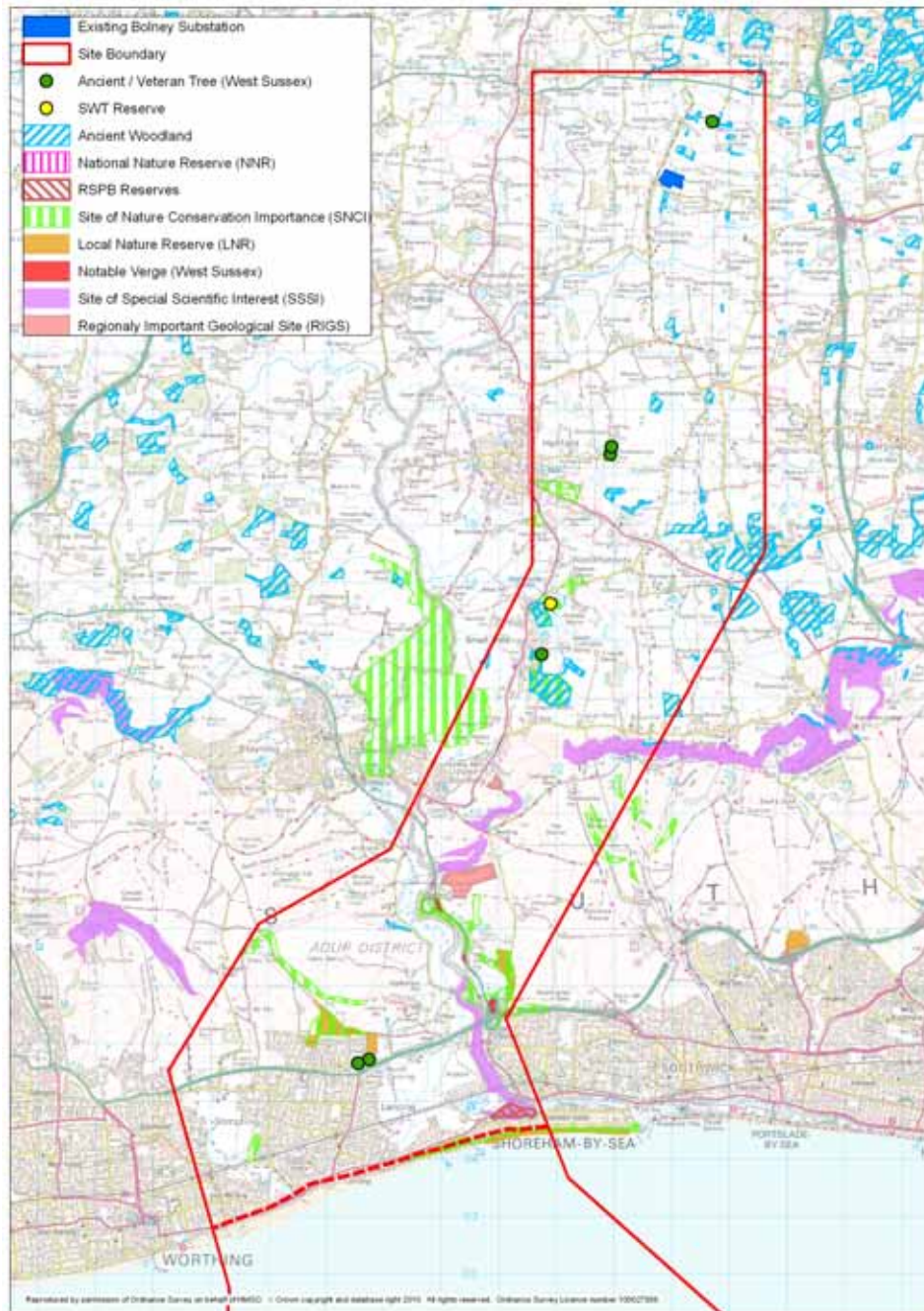


Figure 6.4: Designated conservation areas

6.5.3 Proposed Assessment Methodology

6.5.3.1 Desk-based Assessment

A desk study, together with relevant site and species surveys will be carried out to establish the existing ecology and nature conservation interest of the areas covered by the different elements of the onshore development. This data will be used to undertake the ecological impact assessment for the development project, which will be based on guidance issued by IEEM, 2006.

The desk-based assessment will include data on records of protected and notable species or habitats within the indicative cable corridor. Data will include records of non-statutory designated sites (statutory designated sites have been identified above from information freely available on the Internet) and protected and notable species within 500m of the cable route. Records of bats within 10km of the cable route will be researched. Species included will be those primarily listed on the JNCC spreadsheet of conservation designations for UK taxa as follows:

- species protected by international law i.e. species protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) or all species, including formerly designated invertebrate species⁴, on the IUCN Red List except those designated only as 'lower risk'⁵ and of 'least concern'⁶
- species listed in European directives and legislation i.e. Berne Convention 1979, Bonn Convention 1979, EC Habitats directives 1992, or the Birds Directive 1979
- nationally protected species under the Wildlife and Countryside Act 1981 (schedules 1, 2, 5 and 8) or other UK legislation (i.e. Protection of Badgers Act 1992 and the Deer Act 1991)
- all species listed as red or amber on the RSPB Birds of Conservation Concern 2002–7, excluding some species that are listed only for their breeding period i.e. between March and September
- invertebrate species that are 'nationally notable' and plant species that are 'nationally rare' or 'nationally scarce', and
- species with UKBAPS.

Early consultation will be undertaken with the following organisations, in particular to define the scope of detailed surveys for habitats and species:

- Badger Trust, Sussex
- Mid Sussex Badger Protection Group
- Badger Trust, West Sussex
- South Downs Badger Protection Group
- Sussex Bat Group
- Sussex Wildlife Trust
- Sussex Biodiversity Records Centre
- RSPB, South East Regional Office

⁴ The Red List for invertebrates was recently updated, and so some organisations/county recorders have included these latest invertebrates in their data searches

⁵ LR (lower risk) is designated for taxons that do not qualify for 'critically endangered', 'endangered' or 'vulnerable'

⁶ LC (least concern) is designated for taxons that do not qualify for 'critically endangered', 'endangered', 'vulnerable' or 'near threatened'. Widespread and abundant taxa are included in this category

- West Sussex County Council and
- Natural England.

6.5.3.2 *Extended Phase 1 Habitat Survey*

The first stage of field surveys will be an extended Phase 1 habitat survey to assess habitat to 30m either side of the cable working width. This survey will provide initial data on the location and extent of important habitats and give an indication of where protected species could possibly be located.

The results of both the Phase 1 and the desk-based assessment will be used to inform targeted Phase 2 surveys for habitats, plants and protected species.

6.5.3.3 *Protected Vertebrates*

The initial surveys will comprise a general assessment of habitat for protected animals that occur in the region, and their presence will be noted where possible. Walkover surveys cannot usually confirm species presence or absence, but the likelihood of presence can be assessed. Habitats will be assessed for the following species:

- Badger (*Meles meles*)
- bats (all species)
- Dormouse (*Muscardinus avellanarius*)
- Great Crested Newts (*Triturus cristatus*)
- Otter (*Lutra lutra*)
- reptiles (all species) and
- Water vole (*Arvicola amphibius*).

No specific surveys for birds are proposed at this stage, however, if any area is noted to be of particular importance from background data, consultation responses or initial surveys (Phase 1), then targeted bird surveys will be undertaken.

Habitats suitable for nesting birds would need to be removed outside the nesting season or checked for nesting birds prior to removal. Should any habitats specifically valuable for birds be identified during the desk-based assessment, further nesting bird surveys may be initiated.

6.5.3.4 *Terrestrial Invertebrates*

The initial surveys will comprise a general assessment of habitat for important terrestrial invertebrate species or assemblages of species.

6.5.3.5 *Phase 2 Botanical Surveys*

The exact requirements for Phase 2 surveys will be determined by the results of the initial Phase 1 habitat survey. Based on existing knowledge of the proposed project areas, it is likely that the following Phase 2 botanical surveys will be required:

- ditch and stream surveys
- hedgerow surveys
- NVC survey of grassland, woodland and selected coastal habitats around the landfalls including shingle and saltmarsh

- river corridor surveys, and
- targeted bryophyte surveys.

6.5.3.6 *Badger*

Any habitat identified as suitable for Badger within 30m of either side of the cable working width will be subject to further walkover surveys to look for and map evidence of Badger presence such as setts, latrines, paths, footprints and hair. This will be carried out at the same time as further walkover surveys for bats described below.

6.5.3.7 *Bats*

A winter walkover survey will be carried out to assess bat roosting habitat in buildings and trees within 30m of both sides of the cable working width (an approx. 105m survey corridor). Any buildings and trees with potential to support roosting bats will be allocated a category of bat roosting potential (from 1 = low to 3 = high) according to the quality of the surrounding habitat; potential bat flight-lines and bat foraging areas locally; the nature of potential bat access points; the nature of potential bat roosting places; and the level of protection provided within those places from the elements and from predators.

The information collected during this survey will inform any future inspection survey work at potential bat roosting sites.

An assessment will be made of the likelihood that Bechstein's (*Myotis bechsteinii*) or Barbastelle (*Barbastella barbastellus*) bat could be present in, or in close proximity to, the route corridor; the corridor is within the known distribution range of both species. Bechstein's and Barbastelle are two of the rarest species in the UK, appearing on Annex II of the Habitats Directive.

Locations with high potential for roosting bats that could be adversely affected by the development will be subject to further inspection using standard methodologies employed by licensed ecologists.

Where trees are scheduled for removal because they are within the working width and cannot be avoided, all potential roosting locations will be inspected more closely for evidence of bats using tree-climbing techniques during the summer months. Where trees are not scheduled for removal but assessment has identified that they could support a maternity colony of bats, these trees will also be inspected more closely. If features cannot be safely accessed then alternative techniques such as emergence surveys may be employed.

Linear features will be chosen for night-time, bat activity surveys according to the likelihood that they will form an important bat commuting route. Linear features with trees and/or within 500m of potential roost sources such as woodlands and groups of buildings are likely to be included for activity surveys. Those within 500m of a known maternity roost of bats will also be included. The remainder are likely to be eliminated from bat activity surveys.

In order to increase objectivity and repeatability (in case monitoring is required during or after construction) Anabat SD2 bat detectors will be deployed by a senior ecologist and an assistant to record bat activity overnight at the chosen linear features in mid-summer and autumn.

In addition, some features will be surveyed by surveyors (using Pettersson D240x time expansion and Duet frequency division bat detectors with Edirol digital recorders) in order to gain an understanding of whether many bats are commuting along a feature in one direction or fewer bats are repeatedly passing by. This information cannot be gained by deploying static detectors. The surveys will commence 15 minutes before sunset and continue until one hour and 30 minutes after sunset in order to observe commuting bats.

All bat echolocation calls will be analysed using the relevant software by a suitably experienced ecologist.

6.5.3.8 *Dormouse Surveys*

Any habitat identified as suitable for Dormouse within 30m either side of the cable working width (an approx. 105m survey corridor) will be subject to either nest tube or nest box surveys for Dormouse.

In most habitats, artificial nest-tubes are widely regarded as the most appropriate technique for establishing the presence of Dormice on grounds of cost, efficacy and disturbance. Nest-tubes will be placed in April and checked four times between late May and October for Dormice and/or their nests. The density and positioning of nest-tubes will be tailored according to habitat structure and suitability.

If Dormice populations are identified in nest-tubes, then subsequent checks of these locations (and any others connected to them) will only be undertaken by an appropriately licensed ecologist. Dormice tend to use nest-tubes if there are few natural nest sites, but in some habitats (such as coppice-woodland) there are already numerous good nesting locations. In these cases, nest-boxes provide alternative, high-quality nesting sites, and are employed because they are more likely to be used by Dormice than are nest-tubes. The density and positioning of the boxes depends upon habitat structure and suitability. Nest-boxes will be checked at the same time as the nest-tubes.

6.5.3.9 *Great Crested Newts*

All ponds within 500m of the working width of the proposed cable routes will be identified from Ordnance Survey maps, aerial photographs and archival records. Ponds will also be recorded during the Phase 1 habitat survey and walkover surveys.

Initial field surveys will be carried out to assess the suitability of water bodies for Great Crested Newt using the Habitat Suitability Index developed by Oldham *et al* (2000).

Ponds suitable for Great Crested Newt will be investigated using targeted surveys to determine presence/absence and, where Great Crested Newts are present, population sizes.

Surveys will be carried out according to English Nature survey guidelines (English Nature, 2001), which outlines the survey standards as follows:

- *up to four survey visits should be conducted in suitable weather conditions during the period mid-March to mid-June*
- *two of the four survey visits should be conducted between mid-April and mid-May, and*

- *survey should ideally use four methods – egg searching, netting, torching and bottle trapping.*

If the presence of Great Crested Newt is shown on the first visit, further visits become unnecessary unless a population estimate is required. However, population estimates may be required to inform a European protected species (EPS) licence application, if necessary. Survey standards are as follows (English Nature, 2001):

- *six visits should be conducted in suitable weather conditions during the period mid-March to mid-June*
- *three of the six survey visits should be conducted between mid-April and mid-May, and*
- *survey should ideally use four methods – egg searching, netting, torching and bottle trapping.*

6.5.3.10 Otter

Any habitat identified as suitable for Otter will be subject to a systematic search 100m up and down stream from the proposed crossing point; recording field signs when encountered. Field signs include spraint (droppings), footprints, slides, paths, feeding evidence, holts (underground resting places) or couches (temporary resting places).

6.5.3.11 Reptiles

Any habitat identified as suitable for reptiles within 30m of each side of the cable working width (an approx. 105m survey corridor) will be subject to detailed surveys using artificial refugia (0.5m x 0.5m squares of corrugated tin) which reptiles often bask on or shelter under. The refugia will be placed in suitable habitat and be allowed to bed-in for at least one week before surveys commence. They will then be checked seven times between March and September under suitable weather conditions and will be removed during the last check. The number of refugia will depend on the extent of the habitat.

6.5.3.12 Water Vole

Any habitat identified as suitable for Water Vole will be subject to a systematic search 100m up and down stream from the proposed crossing point, and field signs will be recorded when the vole is encountered. Field signs include latrines, footprints, lawns, feeding evidence and burrows.

6.5.3.13 Terrestrial Invertebrates

A minimum of two invertebrate surveys will be carried out to assess the fauna present, with an initial survey carried out in May/June to target early summer species of invertebrate including beetles, butterflies and bees, with a second survey carried out in August/September to assess late-maturing invertebrate species such as Bugs. Surveys will be conducted when conditions are suitable for invertebrates (warm and sunny) in order to maximise invertebrate recording.

Surveys will involve the use of a combination of three techniques:

- Sweeping (using a standard sweep net in grasslands and scrub)
- Beating (using a beating tray for hedgerows and trees) and
- Hand searching (where appropriate, particularly in bare ground habitats).

Additional species encountered incidentally whilst undertaking the main surveys will be recorded as 'spot' surveys.

Invertebrate specimens will be retained in alcohol for identification, except dragonflies, butterflies and bumblebees, which will be caught for identification and released following confirmation of identity. The surveys will be adequate to indicate the nature conservation value of the habitat for invertebrates.

The main invertebrate groups targeted during the survey will be Beetle (*Coleoptera*), True Bug (*Heteroptera*) and Leafhopper (*Auchenorrhyncha*) and Bee (*Hymenoptera*), with additional records of other groups including Grasshopper (*Orthoptera*) and Earwig (*Dermaptera*) (which are also orthopteroid insects), dragonflies and damselflies (*Odonata*), Butterflies, and day-flying Moths (*Lepidoptera*). Other invertebrates will be recorded if these are particularly noteworthy.

6.5.3.14 Evaluation

Information gathered during the data searches and surveys described above will enable an assessment of the best cable route option with respect to ecology/nature conservation along with the other considerations outlined in this report.

The potential impacts of the proposals on habitats and species of nature conservation value along the final route will be assessed taking into account the available information. Adhering to best practice as detailed within the IEEM guidance on EclA (2006) the following stages will be included in the assessment process:

- 'scoping, involving consultation to ensure the widest possible input to the definition of the scope of an EclA (in practice, scoping is iterative throughout the EclA process)
- identification of the likely zone of influence arising from the whole lifespan of the project
- identification and evaluation of ecological resources and features likely to be affected
- identification of the biophysical changes likely to affect valued ecological resources and features
- assessment of whether these biophysical changes are likely to give rise to a significant ecological impact, defined as an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts
- refinement of the project to incorporate ecological enhancement measures, mitigation measures to avoid or reduce negative impacts, and compensation measures for any residual significant negative impacts
- assessment of the ecological impacts of the refined project and definition of the significance of these impacts
- provision of advice on the consequences for decision making of the significant ecological impacts, based on the value of the affected resource or feature, and
- provision for monitoring and following up the implementation and success of mitigation measures and ecological outcomes, including feedback in relation to predicted outcomes.'

The process will be iterative as knowledge is gained through ongoing consultation and survey work. This will be reported in the ecology section of the ES.

6.6 Archaeology and Cultural Heritage

6.6.1 Preliminary Environmental Baseline

6.6.1.1 Methodology

A preliminary baseline data collection has been undertaken for the indicative onshore cable route corridor. Data was gathered from the following sources:

- EH online downloads
- NMR (consulted via Heritage Gateway), and
- MAGIC website.

6.6.1.2 Results

Ancient Monuments and Archaeological Areas Act, 1979

There are nine scheduled monuments (SMs) within the indicative corridor.

Planning (Listed Buildings and Conservation Areas) Act, 1990

There are no Grade 1 listed buildings within the indicative corridor, seven Grade II* listed buildings and 189 Grade II listed buildings (See Figure 6.5).

Registered historic parks and gardens and battlefields

Registered parks and gardens and battlefields are protected under Planning Policy Statement 5 (Planning for the Historic Environment, 2010).

No registered historic parks and gardens or battlefields are located within the indicative corridor.

Heritage assets

Under PPS5 *Heritage Assets* (i.e. non-statutory protected sites recorded by County and National Historic Environment Records) are a material consideration to the planning and environmental impact assessment processes.

There are numerous heritage assets recorded by the NMR within the area of the indicative route corridor, representing all periods from Palaeolithic to modern and ranging in relative importance from High to Negligible.

Area of archaeological potential

The indicative corridor has a high to low potential for archaeological remains of all periods with a greater potential for the prehistoric – Roman and Medieval periods in the areas not impacted on by modern development or intensive agriculture. Although a large number of remains are recorded, many archaeological sites will not be visible from any surface evidence and will only come to light as a result of further investigation.

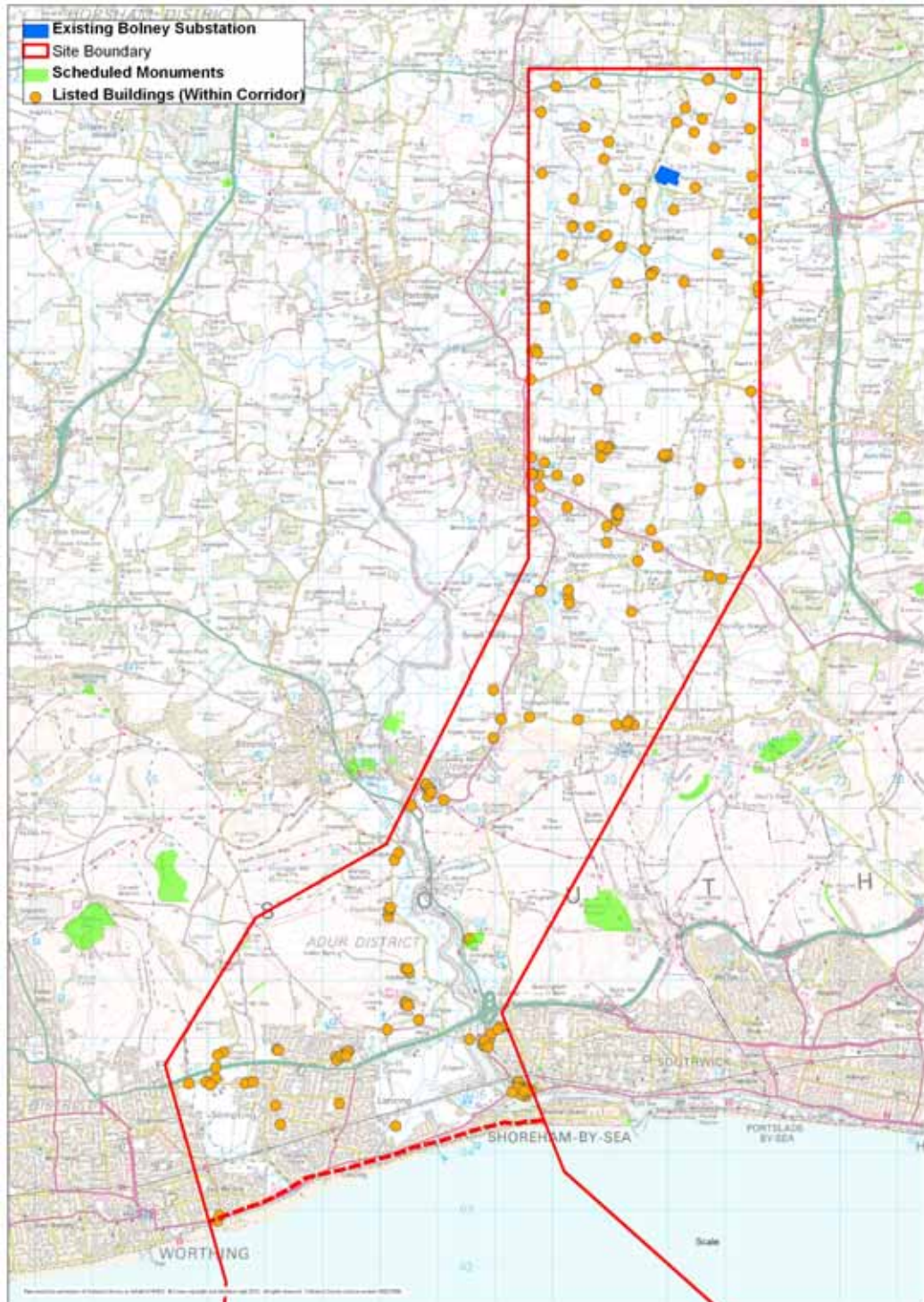


Figure 6.5: Recorded archaeological sites

Also of note are the South Downs, where a large number of scheduled prehistoric monuments follow the ridge, indicating that the area has a particularly high archaeological potential. Although the cable will be routed to avoid scheduled monuments and known archaeological sites, there will remain a risk of encountering other previously unrecorded remains.

6.6.2 *Key Potential Environmental Impacts*

Potential damage could occur during top soil stripping, benching, cable trenching, and intrusive geotechnical survey to buried archaeological remains, either previously recorded or unknown.

Temporary visual impacts could also occur on upstanding heritage assets (such as listed buildings), but any such impacts will only occur during construction activities and will have no residual impact when the cable is laid and the working width reinstated.

6.6.3 *Proposed Assessment Methodology*

6.6.3.1 *Desk-based Assessment*

A desk-based assessment of the archaeological and cultural heritage resources potentially impacted upon by the onshore electrical grid connection will include an examination of data on protected and non-protected sites, including:

- Scheduled monuments
- Listed buildings
- Registered battlefields
- Registered parks and gardens
- Conservation areas, and
- Historic Environment Record listed heritage assets.

The principal sources to be consulted will be as follows:

- NMR maintained by EH
- Historic Environment Records maintained by West Sussex County Council
- Data held by the County Record Office (historic mapping and published research), and
- Aerial photographs

The information gathered from the data sources will be compiled into a gazetteer and report accompanied by appropriate 10:000 mapping, with a view to identifying potential archaeological and cultural heritage features, and proposing interpretations regarding their sensitivity.

6.6.3.2 *Field Reconnaissance Survey*

A walkover survey will be undertaken along the proposed cable routes from the landfall site to the substation at Bolney. This activity will include an assessment of the likely presence of any previously unrecorded archaeological or cultural heritage remains within the area of the proposed cable routes, and a determination of the condition of any recorded archaeological or cultural heritage sites from the baseline sources identified along the proposed lines of the cable route.

6.6.3.3 *Impact Assessment*

The above will be used to produce a section for the ES. The following will be assessed:

- The known archaeological and cultural interest of the study area

- The potential of encountering archaeological remains
- The known or potential relative significance of the recorded heritage assets, the likely magnitude of change to those assets and the significance of the effect on those assets, and
- The scope of any necessary further archaeological evaluation or mitigation.

The archaeological and cultural heritage assessment will be undertaken in accordance with the Institute for Archaeologists' (IfA) Standard and Guidance for Archaeological Desk-based Assessments and the IFA Code of Conduct.

6.6.3.4 *Consultation*

The archaeology officer for West Sussex County Council will be consulted at the outset of the project to determine that the scope of work is acceptable for the purposes of the ES. The officer will be asked to comment on recommendations for further assessment, field evaluation and/or mitigation.

No activities with the potential to significantly impact on archaeology are anticipated to take place during the operation of the proposed onshore electrical grid connection, and as such the assessment of archaeological impacts during the operational phase has been scoped out of the EIA.

6.7 **Landscape and Visual Impact**

6.7.1 ***Preliminary Environmental Baseline***

National character assessment

As a national mapping exercise the Countryside Agency (now Natural England) produced a series of countryside character reports, including Volume 7: South East and London. This report shows that the location of the indicative corridor is mainly within the Low Weald and South Downs character areas. Bolney, the end point of the corridor, is located just within the High Weald character area. To the east of Worthing, the corridor may affect the South Coastal Plain character area.

County level character assessment

West Sussex County Council completed a landscape character assessment in 2003. From this assessment, 42 unique landscape character areas within West Sussex were identified. The indicative corridor falls within six character areas including:

- Landscape character area SD3: Central Downs
- Landscape character area SD5: Downland Adur Valley
- Landscape character area LW10: Eastern Low Weald
- Landscape character area LW11: Eastern Scarp Footslopes
- Landscape character area LW9: Upper Adur Valley, and
- Landscape character area SC13: Worthing and Adur Fringes.

South Downs National Park

Parts of the indicative cable corridor lie within the Sussex Downs National Park. Previously designated as the South Downs AONB, this designation was revoked when the South Downs was formally recognised as a national park on 31st March 2010.

In December 2005, the South Downs integrated landscape character assessment was prepared for the South Downs Joint Committee, in partnership with the Countryside Agency, English Heritage, Hampshire County Council, West Sussex County Council and East Hampshire District Council by Land Use Consultants.

The character assessment divides the area (previously designated as an AONB) into 18 landscape types and 49 character areas. The indicative corridor lies within the following character areas:

- Landscape type A: Open Downland
- Landscape type F: Major River Flood Plains, and
- Landscape type I: Scarp Slopes.

Designations

A list of designations and notes relevant to the indicative cable corridor is provided in Table 6.4 below and shown on Figure 6.6.

Table 6.3: Landscape designations

List	Within Indicative Corridor	Comments
Scheduled monuments	✓	Nine exist within the indicative corridor
Historic parks and gardens	n/a	No known historic parks and gardens within the indicative corridor
AONBs	n/a	No AONBs within the indicative corridor
Regional trail	✓	The indicative corridor runs through the South Downs Way
Listed buildings	✓	There are 196 listed buildings within the indicative corridor
National Trust	✓	There are two National Trust sites within the indicative corridor
National park	✓	The indicative corridor runs through the South Downs National Park for approximately 7.5km

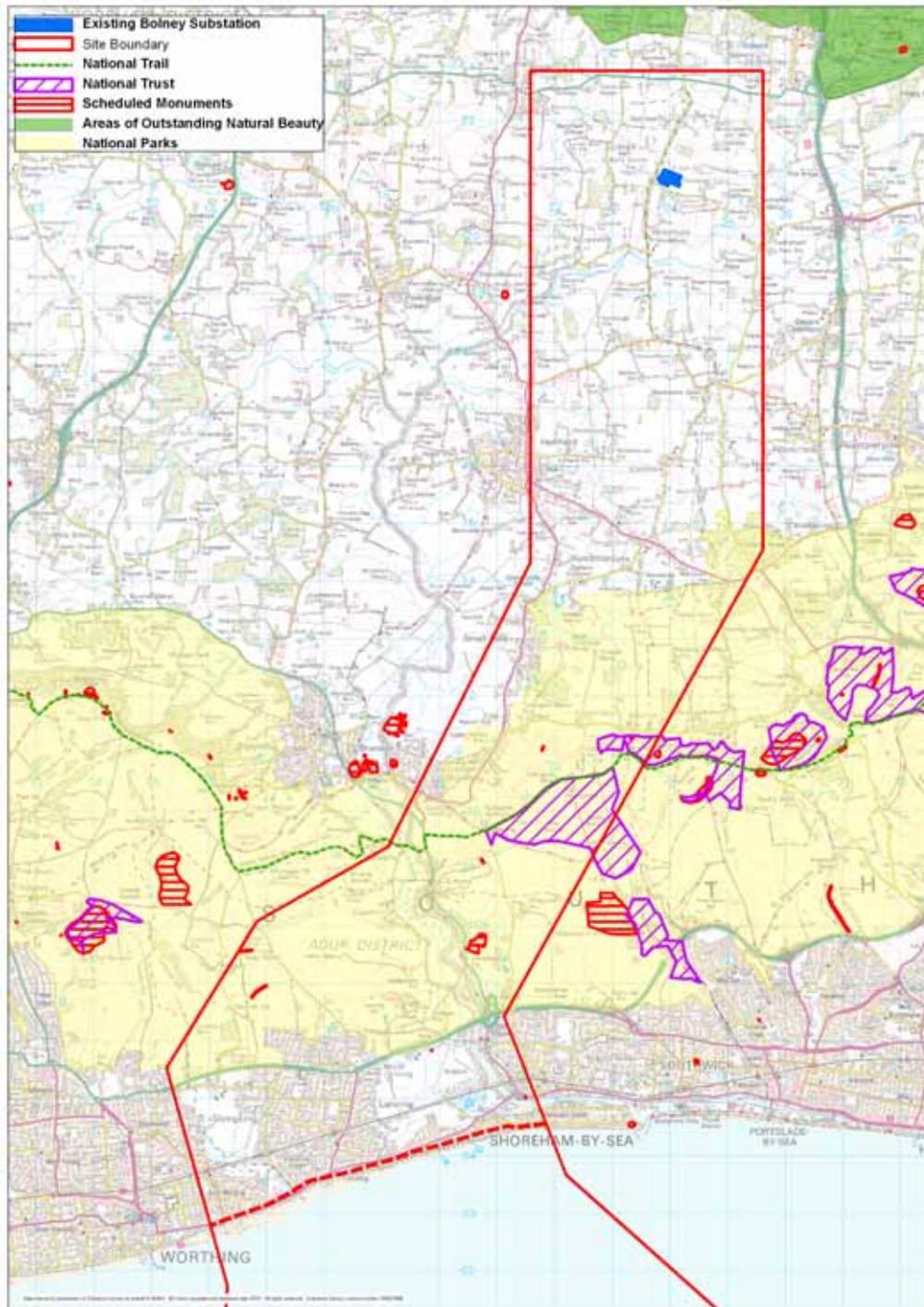


Figure 6.6: Landscape designations

6.7.2 Key Potential Environmental Impacts

During construction

The indicative cable corridor runs through a densely developed coastal strip, followed by the South Downs, with numerous landscape, nature conservation, heritage and recreational designations and interests. The indicative corridor also encompasses a number of residential and tourist areas and individual properties.

The indicative cable corridor is likely to require the construction of approximately 7.5km of cable through the South Downs National Park and measures would be required to ensure that any temporary effects during construction are minimised through careful routing to avoid, where feasible, woodland, protected downland grassland, hedgerows and river corridor vegetation.

Potential landscape and visual impacts are a consequence of the direct effects of cable route construction activities on specific landscape features, therefore, measures to mitigate the visual impacts are the same as those used to mitigate the effects on specific landscape features. Indirect effects on landscape character are caused by those impacts directly affecting certain specific landscape elements, which combine to form distinct landscape character, i.e. the numerous field boundaries crossed by the cable route. The preferred approach is to underground the cables, therefore, the cables will not be a physical element in the visible landscape.

For the majority of the route, the cables will only impact on the landscape in the short term, during construction and for a brief period afterwards. The cable route working width will be visible through the landscape during construction when sections of field boundaries and other vegetation are removed and topsoil stripped back within the fenced working corridor. Once construction is complete the cables will be buried and the land will be restored so that its original use is reinstated, and boundaries replaced.

One of the objectives of reinstatement of the cable route is to restore the visual and physical integrity of the landscape, as closely as possible, to its previous condition.

The cable will be routed to avoid many of the key features highlighted within the landscape character assessments of areas along the route including trees, mature hedgerow trees, woodlands, protected down grasslands, river corridor vegetation, etc., wherever possible. However, there are distinctive linear features such as field boundaries, (hedgerows, fences and walls) tree-lined watercourses, railway lines and areas of open grassland that, because of their length, orientation or extent, it will not be possible to avoid. In these cases mitigation measures will be applied to minimise the impact (e.g. using existing gaps in field boundaries); specific measures will also be taken to reinstate the features in keeping with the character of the local area.

Mitigation measures will require the reinstatement of affected landscape features in the same style or with the same species mix of the original and/or to match adjacent boundaries. Reinstatement and planting will match existing contours, materials and species composition as far as practicable.

The time taken for impacted areas/sections to integrate into the landscape will depend on the land use or habitat type affected. For the majority of the cable route, through pastoral and arable fields, the land will be returned to agricultural use within 12 months. For more complex habitats such as chalk grasslands and marsh, although vegetation may become established within two years it is likely to take five years or more for the vegetation to visually merge with adjacent habitat. It is anticipated that with appropriate mitigation measures in place, such as translocated grassland, hedges and new tree and hedge planting, together with sympathetic ground modelling, the visual impact of the onshore electrical grid connection will reduce considerably in the short term.

In the unlikely event that an overhead power line option is required in any section of the route, a comprehensive landscape and visual assessment will be undertaken as

part of the route option study, which would be undertaken. The study would include, landscape assessment and topographical intervisibility analysis.

During operation

During the operation of the cable route, the only potential impacts on landscape and visual amenity is that caused by the restrictions on new/or replacement planting in close proximity to the cable route (assuming installation is underground), and the residual effects of the time taken for differing habitats and features to re-establish.

The greatest potential for impacts on landscape character and visual amenity will be as a result of the proposed substation at Bolney and, to a lesser extent, at the proposed landfall locations. Recommendations for screen planting at Bolney will be proposed, if necessary.

6.7.3 Proposed Assessment Methodology

The assessments will be undertaken with reference to guidance on landscape and visual assessment. Guidance includes:

- Landscape Institute and IEMA Guidelines for Landscape and Visual Impact Assessment: Second Edition 2002
- The Countryside Agency Landscape Character Assessment, Guidance for England and Scotland 2002, and
- Seascape Character Assessment (SCA) guidance document (currently being prepared by Natural England with Scottish Natural Heritage) expected to be available in early 2011.

The principle objectives of the assessment will be:

- To describe, classify and evaluate the existing landscape likely to be affected by the scheme during the construction and operations phases of the project
- To identify visual receptors with views of the proposed development, and
- To assess the significance of the direct and indirect effects on landscape character and visual resources, taking into account the measures proposed to mitigate any of the effects identified.

There are six key stages to the overall assessment process as follows:

- Recording and analysis of the existing landscape character and visual context associated with the study area through desk-based and field-based appraisal
- Appreciation of the nature, forms and features of the proposed works
- Assessment of the sensitivity of the existing landscape and identified visual receptors to change, and the magnitude of change likely to result from implementation of the proposed works
- Evaluation of the significance of the changes identified
- Identification of mitigation measures appropriate to the proposed works and landscape of the receiving environment, and
- Assessment of the residual effects on landscape character and visual amenity.

The scope of the study to determine the assessment of effects on the landscape character and visual amenity along the route/s of the proposed onshore cable will include an assessment of:

- alternative landfall site/s
- onshore cable route and
- Substation in the vicinity of Bolney.

A desk-based review will be undertaken of the baseline landscape environment in order to identify main policy and landscape constraints. This will include:

- Landscape character area assessments: owing to the recent designation of the South Downs National Park, a considerable array of landscape character assessments, appraisals and management plans have already been prepared covering much of the study area. These will be reviewed and mapped where relevant to the onshore electrical grid connection.
- Planning: a review will be undertaken of the various development plans to set out the planning and landscape policy framework and again these will be mapped as relevant to the study area.
- Other key constraints and visual receptors such as cultural heritage designations, ecological designations, archaeological sites, tourism sites, public rights of way, panoramic viewpoints, etc., will be mapped in order to inform the landscape appraisal process.
- Landscape and visual amenity: using the above baseline data, descriptions classification and evaluation of the proposed cable route, the landfall site, and substation site will be undertaken. This will provide an assessment of landscape sensitivity to change. While the cable is likely to be largely underground, it will run through both the South Downs National Park, and the populated areas around the coast. It will create temporary visual impacts during the construction phase, and there is potential for it to create a new manmade linear feature in the landscape until the vegetation is fully reinstated. The visual impact of the proposed substation may also require mitigation.

A field survey (vantage point survey) will be undertaken, to assess the local landscape character and visual impacts of the three key aspects of the onshore electrical grid connection. The survey will include an assessment from the South Downs Way and other popular public rights of way. Photographs and plans will illustrate the differing landscape characteristics along the proposed route.

The assessment will include a clear consideration of the various phases of the work, i.e. disturbance to landscape elements within the working width of the proposed cable trench during site clearance and construction. The assessment will include a consideration of the potential effects on the landscape character and visual amenity of the proposed route corridor, and recommendations will be made as to the preferred route to minimise impacts on landscape character and specific landscape elements. The assessment will include a consideration of the success of proposed landscape and ecological mitigation proposals.

Chartered landscape architects will undertake the impact assessment and provide input to the onshore human environment section of the ES.

6.8 Noise and Vibration

6.8.1 Preliminary Environmental Baseline

The indicative cable corridor runs through a mix of urban residential and rural agriculture and green space. From available mapping, noise-sensitive receptors in the area surrounding the indicative cable corridor and the substation at Bolney would be identified and consultation undertaken with the relevant environmental health officer (EHO) to agree the extent of the baseline noise monitoring and to agree construction noise criteria for the project.

Depending on the results of the consultation process, ambient measurements may be required at locations along the indicative cable corridor to represent the nearest sensitive residential receptors from construction activities. Background noise measurements will be required to represent the residential receptors nearest to the proposed substation. On-site monitoring will take place at ground level outside identified receptors or at a representative location (3.5m from any reflecting surfaces) over a period sufficient to include the proposed hours of operation of the substation.

6.8.2 Key Potential Environmental Impacts

The potential temporary effects of construction noise may arise from:

- Activities carried out on the surface along the proposed cable route (mainly earth moving and excavation)
- Construction activities at the substation site including landscaping
- Directional drilling activities, and
- Heavy goods vehicles servicing the proposed cable corridor and substation, delivering or removing materials (including spoil and fill) and plant.

There are unlikely to be any operational effects relating to operational or maintenance traffic but operational noise effects may arise from the operation of the proposed substation. An assessment would be required to determine whether noise emissions from the permanent substation would be likely to have significant effect on nearby sensitive receptors.

6.8.3 Proposed Assessment Methodology

During the cable route construction phase, construction noise will potentially affect nearby receptors/locations. The noise will derive from within the working width (i.e. from topsoil stripping, drilling, trenching and reinstatement). Noise levels from construction activities will be predicted using the sound/power levels and methodology described in BS 5228: 1997 'Noise and vibration control on construction and open sites'. Predicted levels of noise from construction activities will be assessed with regard to the guidance in BS 5228, additional guideline on noise levels set out in BS 8233 and the World Health Organisation (WHO) community noise guidelines. Vibration will only be considered as an issue where significant piling works are required.

Operation of the extended substation will be assessed in accordance with BS 4142 'Method for rating industrial noise affecting mixed residential and industrial areas' and according to the guideline noise levels set out in BS 8233 and the WHO community noise guidelines.

6.9 Recreation

6.9.1 *Preliminary Environmental Baseline*

There are a number of recreational facilities in the vicinity of the landfall between Worthing and Shoreham-by-sea. These include Brooklands Pleasure Park, which provides a range of local recreational facilities including 'Diddyland', which includes a range of children's attractions such as a miniature railway, children's play area and a boating lake, Brooklands Golf Centre comprising a nine-hole golf course and a pitch and putt course, Brooklands Go-karts and Mini-Moto Club, Widewater Lagoon and Lancing Beach, which has a public footpath running from the west of the beach to the north.

Also within the indicative corridor, beyond the A27, is Lancing College. Within the grounds of the College there is an open air theatre and the college chapel is open to visitors at certain times.

To the north of Brooklands Pleasure Park, the railway and the A27 the indicative cable corridor crosses the South Downs National Park. The two statutory purposes of national parks, as updated by section 61 of the Environment Act 1995, are:

- Conserving and enhancing the natural beauty, wildlife and cultural heritage of the national parks, and
- Promoting opportunities for the understanding and enjoyment of the special qualities of the parks by the public.

A number of PRowS cross the indicative cable corridor including:

- The South Downs Way, a 160km long 'national trail' following the old routes and droveways along the chalk escarpment and ridges of the South Downs; and
- The Monarch's Way is a 990km (615 mile) long distance footpath from Worcester to Shoreham-by-Sea.

The indicative corridor includes areas of access land over which there is a right of open access on foot under the Countryside and Rights of Way Act 2000.

6.9.2 *Key Potential Environmental Impacts*

Potential environmental impacts may include:

- Temporary disruption to the recreational use of areas of public open space, recreational facilities, amenity land, and/or access land, and
- Temporary disruption to public rights of way.

6.9.3 *Proposed Assessment Methodology*

The assessment of the recreational impacts of the onshore electrical grid connection will include:

- Review of relevant policy and plans
- Desk top study to identify recreational resources, including parks, leisure facilities, visitor attractions, areas of access land and the PRow network in proximity to the project, including any long-distance recreational routes

- Site visit to establish the nature and use of the recreational resources identified, including the condition of PRoWs within or adjacent to the project area
- Consultation with West Sussex County Council and relevant local authorities, tourist board, local ramblers, British Horse Society (BHS) and other relevant interest groups, and
- Assessment of impacts on the recreational resources identified during the construction period.

It is anticipated that the potential impacts associated with the onshore electrical grid connection will be temporary in nature lasting for the construction phase and while reinstatement becomes established. No activities with the potential to significantly impact on recreation are anticipated to take place during the operation of the proposed onshore electrical grid connection, and as such the assessment of recreational impacts during the operational phase has been scoped out of the EIA.

6.10 Transport

6.10.1 Preliminary Environmental Baseline

Within the indicative corridor, the most significant area for transport infrastructure is the southern section, between Worthing and Shoreham-by-sea, where transport infrastructure includes the A259 coastal road, the local road network south of the A27 and the A27 itself.

There are a number of major road crossings within the indicative corridor as indicated below in Table 6.4. The indicative corridor also crosses the main railway line from Portsmouth to Brighton (between Lancing and Shoreham-on-Sea railway stations), which is operated by Network Rail.

Table 6.4: Count of road/rail crossings

Type of Road	Number of Crossings
Motorways	0
A roads	4
Minor roads	9
Rail crossing	1

6.10.2 Key Potential Environmental Impacts

During the construction phase, construction traffic is likely to be generated by a range of activities including:

- Construction workers arriving and leaving site areas
- Supply of construction materials and plant including cable and substation components
- Movement of plant

- Removal of soil resources, spoil or waste, and
- Service vehicles and visitors.

Once construction of the substation and cable-laying operation is complete, the effect on the local road system will be minimal. There will be no permanent staffing needed at the substation, but access will be required from time to time for routine maintenance.

6.10.3 Proposed Assessment Methodology

The construction transport assessment will be concentrated on road traffic associated with the construction of the onshore elements of the Rampion Offshore Wind Farm i.e. the assessment excludes the supply of personnel and materials to ports elsewhere serving the offshore construction project. It is assumed that all personnel, construction vehicles and materials travelling to the various site locations will travel by road.

The environmental effects of traffic will be assessed in accordance with guidance contained in the following principle sources:

- The 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA, 1993) and
- The Design Manual for Roads and Bridges (DMRB) Volume 11 – Environmental Assessment (Department of Transport *et al*) June 1993 (plus updates).

The Guidelines for the Environmental Assessment of Road Traffic suggest two broad rules can be used as part of a screening process to identify the appropriate extent of the assessment area. These are:

Rule 1 – Include highway links where traffic flows would increase by more than 30% (or the number of HGVs would increase by more than 30%); and

Rule 2 – Include any other specifically sensitive areas where traffic flows would increase by 10% or more.

Where the predicted increase in traffic flow is lower than the thresholds, the guidelines suggest the significance of the effects can be stated to be low or insignificant, and further detailed assessments are not warranted.

A formal Transport Assessment (TA) should not be required to accompany the application for the onshore elements of the offshore wind farm development, as TAs principally relate to developments that generate significant permanent increases in travel as a direct consequence of their function, for example, retail parks and residential developments. Information to be included in the EIA will address the local effects from the development on transport during construction, and mitigation measures to deal with any identified effects will be suggested.

In addition to general HGVs accessing the landfall sites and cable corridors, abnormal loads carrying substation construction components would be transported on vehicles that are longer, wider and heavier than standard HGVs.

A route access study (RAS) will be undertaken to identify the most suitable route for transporting the construction components to the various locations between landfall and substation from the nearest suitable port of entry. Data collected will include physical highway constraints, amenity issues and highway capacity constraints. Daily traffic flow data will be obtained for key routes to construction areas. This report will detail an

assessment of the suitability of the route to accommodate the manoeuvrability and loading requirements of the transportation vehicles and components associated with the onshore development. The RAS will include vehicular swept path analysis to identify areas where road modifications or improvements would be required.

The RAS will include consultation with the relevant structural authorities regarding the suitability of the proposed access route from the nearest suitable port of entry to the development.

No activities with the potential to significantly impact on traffic are anticipated to take place during the operation of the proposed onshore electrical grid connection, and as such the assessment of effects on traffic during the operational phase has been scoped out of the EIA.

6.11 Electric and Magnetic Fields

An issue that is often raised in relation to high voltage underground cables, electricity substations and other significant electrical installations is that of EMF. EMFs generated by electrical substations are generally lower than those from overhead power lines and the field strengths diminish rapidly with distance from the substation to normal background levels. The layout of the proposed onshore substation for the Rampion Offshore Wind Farm, and distances between equipment and the site boundary, will be such that it fully complies with national guidelines designed to limit EMF levels both for occupational exposure for workers within the site and at the external boundary fence. As such, EMFs from the proposed onshore substation have been scoped out of the EIA.

EMFs from buried cables have been found to be concentrated in a relatively narrow band directly above the cable and no restriction is likely to apply further than about 10 m from any cable. Assessment of EMFs generated by the proposed underground cable will be completed in the event that the proposed cable is located in close proximity to any dwellings, in order to ensure compliance with national guidelines.

7 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

The ES will comprise three volumes as follows:

- Volume 1: Non-technical Summary
- Volume 2: Environmental Statement Main Text
- Volume 3: Environmental Statement Appendices

Volume 2 (Environmental Statement Main Text) will commence with a number of introductory sections including: Project Description, Need and Alternatives, Planning Policy and EIA Methodology. The introductory sections will be followed by a series of topic-based sections. The topic-based sections will be presented under the key headings of Offshore and Onshore. Based on the content of this scoping report the following topics are proposed to be assessed during the EIA and reported in the ES:

Offshore

Physical Environment

Bathymetry, Geology and Hydrodynamics

Biological Environment

Benthos and Sediment Quality

Fish and Shellfish Ecology

Nature Conservation

Marine Mammals

Marine Ornithology

Human Environment

Landscape, Seascape and Visual

Marine Archaeology

Navigation and Shipping

Civil and Military Aviation

Socio-economics

Commercial Fisheries

Other Marine Users

Onshore

Physical Environment

Agriculture and Soils

Air Quality

Ground Conditions and Water Resources

Biological Environment

Ecology and Nature Conservation

Human Environment

Archaeology and Cultural Heritage

Landscape and Visual Impact

Noise and Vibration

Recreation

Transport

Electric and Magnetic Fields

Volume 2 will conclude with a section on environmental management including a commitments register incorporating all mitigation measures identified as part of the EIA.

Volume 3 will comprise appendices to the main text and will include references, a glossary, and technical appendices.

Appendix 1 References

- ABPmer, 2009. Coastal Processes Scoping Zone EON02, South Coast. Report Number R.1476
- ABPmer, 2004. English Channel Extreme Tidal Level Review. Prepared for Peter Brett Associates (acting on behalf of the Environment Agency). ABP Marine Environmental Research Ltd, Report No. R.1085.
- Austin, G.E., Collier, M.P., Calbrade, N.A., Hall, C. & Musgrove, A.J. (2008). Waterbirds in the UK 2006/7: The Wetland Bird Survey. BTO/WWT/RSPB/JNCC, Thetford. Barne J, Robson C, Kaznowska S, Doody J, Davidson N and Buck A eds 1998. Coasts and Seas of the United Kingdom. Region 8 Sussex: Rye Harbour to Chichester Harbour. Peterborough, Joint Nature Conservation Committee (Coastal Directories Series.)
- Belderson, R.H., Johnson, M.A., Kenyon, N.H. 1982 Bedforms. In Stride, A.H. (ed). Offshore tidal sands. Processes and deposits. Chapman and Hall, London, 27–57.
- BERR, 2008. Atlas of UK Marine Renewable Energy Resources: Atlas Pages. A Strategic Environmental Assessment Report, March 2008. Produced by ABPmer, Met Office and POL. Report and associated GIS layers available at: <http://www.renewables-atlas.info/>
- Burt, M.L., Borchers, D.L. and Paxton, C.G.M. (in press). Model-based abundance estimates from SCANS-II, RUWPA, University of St Andrews, 20 p. Centrica Energy Limited (2007). Lincs Offshore Wind Farm Environmental Statement.
- Crosby, A., Hamblin, R. J. O. and Bouysse, P., (1988) "Dungeness - Boulogne Sheet 50°N-00° 1:250,000 series Solid Geology, British Geological Survey and Bureau de Recherches Geologiques et Minieres. Published by the Ordnance Survey, Southampton.
- Curry D., Smith, A. J., and Hamilton, D., 1977. 'Wight Sheet 50°N-02°W 1:250,000 series Solid Geology', British Geological Survey. Published by the Ordnance Survey, Southampton. Defra, 2006. Flood and Coastal Defence Appraisal Guidance, FCDPAG3 Economic Appraisal, Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006.
- DTI (2006). Aerial Surveys of Waterbirds in Strategic Wind Farm Areas: 2004/05 Final Report.
- Duck, C. (1998). Seals. Chapter 5.14. In: J.H. Barne, C.F. Robson, S.S. Kaznowska, J.P. Doody and N.C. Davidson (eds.), Coasts and seas of the United Kingdom – Region 8: Sussex, Rye Bay to Chichester Harbour. Joint Nature Conservation Committee, Peterborough, ISBN 1 873701 82 9.
- EMU Ltd, 1999. Hastings Shingle Bank and South Hastings Environmental Assessment.
- Evans, C.D.R, Crosby, A., Wingfields, R.T.R., James, J.W.C., Slater, M.P., and Newsham, R., 1998. Inshore seabed characterisation of selected sectors of the English coast. British Geological Survey Technical Report WB/98/45. Marine Geology Series.

- Evans, P.G.H., Anderwald, P. and Baines, M.E., 2003. UK Cetacean Status Review. Report to English Nature and Countryside Council for Wales. Sea Watch Foundation, Oxford, 162 p.
- Garthe, S. and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. *Journal of Applied Ecology*, 41: 4, 724.
- Grochowski, N.T.L., Collins, M.B., Boxall, S.R., Salomon, J., Breton, M., and Lafite, R., 1993. Sediment transport pathways in the Eastern English Channel. *Oceanologica Acta*, 16 (5–6), 531–537.
- Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jørgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F., and Øien, N. (1995). Distribution and abundance of the harbour porpoise and other small cetaceans in the North Sea and adjacent waters. Final Report to the European Commission under contract LIFE 92-2/UK/27, 242 p.
- HR Wallingford. (1993). South Coast Seabed Mobility Study. Summary Report. Report EX 2795, July 1993.
- Holme, N.A. 1966. The bottom fauna of the English Channel. II. *Journal of the Marine Biological Association of the United Kingdom*, 46: 401–493.
- Irving R. 1996. A Dossier of Sussex Marine Sites of Nature Conservation Importance. Sussex Marine SNCI Steering Group, West Sussex County Council, East Sussex County Council, English Nature, World Wide Fund For Nature (UK) and Environment Agency.
- Irving, R. A., 1999. Report of the Sussex Seasearch Project, 1992–8. Published by the Sussex Seasearch Project. English Nature, Lewes and Brighton and Hove Council, Brighton.
- James, J.W.C., Coggan, R.A., Blyth-Skyrme, V.J., Birchenough, S.N.R., Bee, E., Limpenny, D.S., Verling, E., Vanstaen, K., Pearce, B., Johnston, C.M., Rocks, K.F., Philpott, S.L., and Rees, H.L., 2007. Eastern English Channel Marine Habitat Map. *Sci. Ser. Tech Rep., Cefas Lowestoft*, 139: 191pp.
- Jones, L.A, Irving, R., Cosgrove, A.R.P., Coyle, M.D., Gilliland, P.M., & Murray, A.R. Eastern Channel Marine Natural Area Profile: A contribution to regional planning and management of the seas around England. Peterborough: English Nature.
- Mackey, M. Perales i Giménez, D. and Ó Cadhla, O. (2004). SEA678 Data Report for Offshore Cetacean Populations. Report to the UK Department of Trade and Industry by the Coastal & Marine Resources Centre Environmental Research Institute, University College Cork, 47 p.
- Nedwell, J., Langworthy, J. and Howell, D. (2003). Assessment of sub-sea acoustic noise and vibration from offshore wind turbines and its impact on marine wildlife; initial measurements of underwater noise during construction of offshore windfarms, and comparison with background noise. Subacoustech report 544R0424, May 2003.
- Pawson, M.G., 1995. Biogeographical identification of English Channel fish and shellfish stocks. *Fish. Res. Tech. Rep., MAFF Direct. Fish. Res., Lowestoft (99)*: 72pp.

- Pesante, G., Evans, P.G.H., Baines, M.E., and McMath, M. (2008). Abundance and Life History Parameters of Bottlenose Dolphin in Cardigan Bay: Monitoring 2005–7. Countryside Council for Wales Marine Monitoring Report, 61, 81 p.
- Reid, J., Evans, P.G.H. & Northridge, S.P. (2003). Cetacean Distribution Atlas. Joint Nature Conservation Committee, Peterborough. 68 p.
- SCOS (2007). Scientific Advice on Matters Related to the Management of Seal Populations: 2007. Report by SMRU, St. Andrew's University to the National Environmental Research Council, 93 p.
- Tittley, I., Price, J.H., Fincham, A.A., and George, J.D., 1986. The macrobenthos of chalk and greensand shores in south eastern England. (Contractor, British Museum (Natural History), London). Nature Conservancy Council, CSD Report No. 677.
- Tougaard, J., Carstensen, J., Henriksen, O.D., Skov, H. and Teilmann, J. (2003). Short-term effects of the construction of wind turbines on harbour porpoises at Horns Rev. Hedeselkabet, Roskilde, Denmark, 72pp.
- Vagle, S. (2003). On the impact of underwater pile-driving noise on marine life. Report prepared for the Canadian Coast Guard, Department of Fisheries and Oceans, Canada (unpublished), 41pp. Available from www.dfo.mpo.gc.ca.
- Ventham, D., 1990. The shore fauna of Brighton, East Sussex. Vol 1. Cnidaria, Annelida, Chelicerata, Crustacea and Unirama. A report for the Nature Conservancy Council. xv + 235pp.
- Ventham, D., 1992. The shore fauna of Brighton, East Sussex. Vol. 2 Protozoa (Foraminifera), Porifera, Nemertea, Mollusca, Bryozoa, Echinodermata, Chordata (Tunicata, Vertebrata (Pisces)). A report for English Nature. xv + 117pp.
- Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G. and Baillie, S. (eds) (2002) The Migration Atlas: movements of the birds of Britain and Ireland. T and A.D. Poyser, London
- Williams, A.D., Williams, R., Heimlich-Boran, J.R., Evans, P.G.H., Tregenza, N.J.C., Ridoux, V., Liret, C. and Savage, S. (1997). A preliminary report on an investigation into bottlenose dolphins (*Tursiops truncatus*) of the English Channel: a collaborative approach. Pp. 217–220. In: European Research on Cetaceans – 10., P.G.H. Evans (ed.). European Cetacean Society, Kiel, Germany, 334 p.
- Wilson, B., Thompson, P.M. and Hammond, P.S. (1997). Habitat use by bottlenose dolphins: seasonal distribution and stratified movement patterns in the Moray Firth, Scotland. *Journal of Applied Ecology*, 34, pp 1365–1374.
- Wood C.J. (1998). Movement of bottlenose dolphins around the south-west coast of Britain. *Journal of Zoology*, 246, pp 155–163
- Wood, E.M. 1992. Coastal zone planning: information review and survey proposals for the sublittoral zone between Arun and Chichester. A report for English Nature, West Sussex County Council, National Rivers Authority, Arun District Council and Chichester Harbour Conservancy.

Appendix 2 Glossary

AC	Alternating current
AIS	Automatic Identification System (an automated broadcast ID system for commercial shipping)
ALC	Agricultural Land Classification
ALSF	Aggregate Levy Sustainability Fund
Amphidrome	Convergent nodal point of co-tidal lines (tides oscillate around this point)
AONB	Area of outstanding natural beauty
AQMA	Air quality management area
ASA	Archaeological search area
ATC	Air Traffic Control
BAP	Biodiversity action plan (UKBAP)
BERR	Business Enterprise and Regulatory Reform (now the UK Department for Business Innovation and Skills)
BGS	British Geological Survey
BHS	British Horse Society
Bryophyte	A group of non-vascular terrestrial plants
BTO	British Trust for Ornithology
BWEA	British Wind Energy Association
CAA	Civil Aviation Authority
CD	Chart datum
CEFAS	Centre for the Environment, Fisheries and Aquaculture Science (UK Government advisors)
Circalittoral	Deeper subtidal waters extending from the infralittoral to the approximate limits of the continental shelf
CITES	Convention on International Trade in Endangered Species of wild fauna and flora
CNIS	Channel Navigation Information Service (shipping traffic information and regulation specifically for the English Channel, operated by the MCA in Dover)
COWRIE	Collaborative Offshore Wind Research into the Environment (UK research and advisory body)
CPA	Coastal Protection Act

DBA	Desk-based assessment
DCO	Development consent order
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food, and Rural Affairs
Diadromous	Term to describe fish that migrate between freshwater and marine habitats
DMRB	Design Manual for Roads and Bridges
DTI	Department for Trade and Industry
EA	Environment Agency
EC	European Community
EcIA	Ecological impact assessment
EH	English Heritage
EHO	Environmental health officer
EIA	Environmental impact assessment
Elasmobranch	Collective term to describe cartilaginous fish (sharks and rays)
EMF	Electro-magnetic field
EC&R	E.ON Climate and Renewables
EPA	Environmental Protection Agency (USEPA)
Epifauna	Animals that live on the surface of the seabed
EPS	European protected species
ES	Environmental statement
ESAS	European Seabirds at Sea (survey records database)
EU	European Union
EUNIS	European Nature Information System
FEPA	Food and Environment Protection Act
FRA	Flood risk assessment
GLVIA	Guidelines for landscape and visual impact assessment
GPS	Global Positioning System (satellite navigation system)
GSA	Guide to Best Practice in Seascape Assessment
HDD	Horizontal directional drilling
HGV	Heavy goods vehicle

ICES	International Council for the Exploration of the Sea
ICNIRP	International Commission for Non-ionising Radiation Protection
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IFA	Institute for Archaeologists
IHO	International Hydrographic Organisation
Infauna	Animals living within the seabed sediments
Infralittoral	The shallow subtidal waters closest to the shore (below MLWS)
ITZ	Inshore traffic zone
IUCN	International Union for Conservation of Nature
JCD	Joint Cetacean Database
JCP	Joint Cetacean Protocol
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
JTB	Joint transition bay
KV	Kilovolts
LAQM	Local air quality management
LDD	Local development document
LDF	Local development framework
LNR	Local nature reserve
LPA	Local planning authority
LVIA	Landscape and visual impact assessment
MaRS	Crown Estate Marine Resource System
MCA	Maritime and Coastguard Agency
MCZ	Marine conservation zone
MESH	Mapping European Seabed Habitats
Metocean	Combined meteorological and oceanographic characteristics
MFA	Marine and Fisheries Agency
MGN	Marine guidance note
MMO	Marine Management Organisation

MoD	Ministry of Defence
MSNCI	Marine site of nature conservation importance
MW	Megawatt
NATS	National Air Traffic Services
NE	Natural England
NERL	National Air Traffic System En-Route Ltd
NFFO	National Federation of Fishermen's Organisations
NM	Nautical miles
NMR	National Monuments Record
NNR	National nature reserve
NPS	National policy statement
NSIP	Nationally significant infrastructure project
NVC	National vegetation classification
O&M	Operations and maintenance
OFCOM	Independent regulator and competition authority for the UK communications industries
OFGEM	Office of the Gas and Electricity Markets
OFTO	Offshore transmission operator
OREI	Offshore renewable energy installations
PEXA	(Offshore military) practice and exercise areas
PMRA	Protection of Military Remains Act (1986)
PPG	National planning policy guidance
PPS	National planning policy statement
PRoW	Public right of way
PWA	Protection of Wrecks Act 1973
RAS	Route access study
REZ	UK renewable energy zone
RIVO	Netherlands Institute for Fisheries Research
Rochdale Envelope	The "Rochdale Envelope" defines the projected maximum extents for the development, for which significant effects are assessed. The detailed design of the project may vary within the parameters of this envelope, without the EIA becoming invalidated.

RSPB	Royal Society for the Protection of Birds
RSS	Regional spatial strategy
RYA	Royal Yachting Association
SAC	Special area of conservation (designated under the EU Habitats and Species Directive)
SAST	Seabirds at Sea Team
SCA	Seascape character assessment
SCADA	Supervisory control and data acquisition system
SCANS	Survey of cetaceans of the North Sea and adjacent waters
SCOS	National Environmental Research Council's Special Committee on Seals
SDNPA	South Downs National Park Authority
SEA	Strategic environmental assessment
SM	Scheduled monument
SMP	Shoreline management plan
SMRU	Sea Mammal Research Unit (part of the University of St. Andrews)
SNH	Scottish Natural Heritage
SoCC	Statement of community consultation
SPA	Special protection area (designated under the EU Birds Directive)
SSC	Suspended sediment concentration
SSSI	Site of special scientific interest
SUT	Society for Underwater Technology
SVIA	Seascape and visual impact assessment
SWF	Seawatch Foundation
SWT	Sussex Wildlife Trust
TA	Transport assessment
TCE	The Crown Estate
TCPA	Town and Country Planning Act
TPO	Tree preservation order
TSS	Shipping traffic separation zone
TZC	Target zone capacity
UKHO	United Kingdom Hydrographic Office

UKOOA	United Kingdom Offshore Operators Association
UXO	Unexploded ordnance
VHF	Very high frequency (marine radio band)
VMR	Voluntary Marine Reserve
VMS	Fishing vessel monitoring system operated by the FAO (UN Food and Agriculture Organisation)
VTs	Vessel Traffic Services
WA	Wessex Archaeology
WBC	Worthing Borough Council
WEBS	Wetland bird survey
WHO	World Health Organisation
Winterbourne	An ephemeral chalk stream
WWT	Wildfowl and Wetlands Trust
ZPS	Zone de protection spéciale (French SPA designated under the EU Birds Directive)
ZTV	Zone of theoretical visibility