

# **The Crown Estate**

## **Habitats Regulations Assessment of the Round 3 Plan**

Report to Inform Appropriate Assessment

Final version

December 2009

Entec UK Limited



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**Report for**

Dr Tim Norman  
Planning and Consents Manager  
The Crown Estate  
16 New Burlington Place  
London  
W1S 2HX

---

**Main Contributors**

Richard Knightbridge  
John Pomfret  
Anne Savage  
Alan Kirby  
Mike Raven  
Caroline Chipperfield  
Glyn Diwell  
Colin McAllister  
Alexia Chapman

---

**Issued by**

.....  
Anne Savage

**Approved by**

.....  
Richard Knightbridge

---

**Entec UK Limited**

155 Aztec West  
Almondsbury  
Bristol BS32 4UB  
England  
Tel: +44 (0) 1454 822000  
Fax: +44 (0) 1454 822010

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Entec UK Limited



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Appendix A Responses to Consultation on the Screening Report

Appendix B Responses to Consultation on the Report to Inform Appropriate Assessment

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# 1. Introduction

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## 1.1 Requirement for Habitats Regulations Assessment of the Round 3 Plan

The Crown Estate Commissioners (referred to in this document as “The Crown Estate”) are undertaking a leasing round, known as ‘Round 3’, for the next generation of offshore windfarms in UK waters, and has agreed with the Department of Energy & Climate Change (DECC) that the Round 3 proposals constitute a Plan as described in Regulation 48(1) of *The Conservation (Natural Habitats, &c.) Regulations 1994 (SI 1994 No. 2716)* (as amended) (the Habitats Regulations) and Regulation 25(1) of *The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (SI 2007 No. 1842)* (as amended) (the Offshore Habitats Regulations). The Crown Estate is the competent authority for the Round 3 Plan and must therefore undertake an Appropriate Assessment (AA) of the implications of the Plan for European sites and, under UK policy, Ramsar sites<sup>1</sup>.

The Habitats Regulations and Offshore Habitats Regulations require that, where it cannot be shown that there will not be a ‘likely significant effect’ (LSE) on a European/Ramsar site, a competent authority<sup>2</sup> undertakes an AA before deciding to undertake or give any consent, permission or other authorisation for a plan. In the context of the Round 3 Plan, this means that the AA must be undertaken by The Crown Estate before Zone Development Agreements are entered into with the chosen developers for the nine windfarm development zones that make up the Round 3 Plan.

AA forms part of a process which is frequently referred to as a Habitats Regulations Assessment (HRA). HRA involves screening to determine whether there is an LSE of the plan on any European/Ramsar sites, followed (if required) by the AA itself. As part of the HRA process, the plan-making authority may need to amend the plan to eliminate or reduce potentially damaging effects on European/Ramsar Sites.

The screening stage of the Round 3 Plan HRA was undertaken in October 2009<sup>3</sup>. This process resulted in the identification of a number of sites (or interest features of sites) where AA was required because the possibility of an LSE could not be immediately excluded. This report

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<sup>1</sup> The Regulations only specifically apply to Special Areas of Conservation (SACs), candidate SACs (cSACs), Sites of Community Importance (SCIs), and Special Protection Area (SPAs). However, UK policy extends the requirements to include Ramsar sites and potential SPAs (pSPAs), and this would include proposed extensions or additions to existing SPAs. In this report, draft SACs (dSACs), proposed SACs (pSACs) and potential SPAs (pSPAs) have been treated in the same way as fully designated sites as far as available information allows.

<sup>2</sup> See Regulation 6 in *The Conservation (Natural Habitats, &c.) Regulations 1994 (SI 1994 No. 2716)* (as amended) and Regulation 5 of *The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (SI 2007 No. 1842)*.

<sup>3</sup> Entec UK Ltd (October 2009) *Habitats Regulations Assessment of the Round 3 Plan - Screening Report*.

presents information to support the AA of the effects of the Plan on these sites, which will be undertaken by The Crown Estate. The Crown Estate may proceed without undertaking further HRA work on the Round 3 Plan only if, in light of the conclusions of the AA, it has ascertained that the Plan will not adversely affect the integrity of any European/Ramsar site.

## **1.2 The Round 3 Plan**

### **1.2.1 The Round 3 Plan and its Component Projects**

The definition of the Round 3 Plan has been set out in detail in the screening report which precedes this AA<sup>3</sup>. In essence the Plan covers the development of offshore windfarms within nine zones around the UK, including the construction, operation and decommissioning of wind turbines, intra array/export cabling and ancillary infrastructure (including offshore substations and anemometry masts).

The Crown Estate has undertaken a competitive application process to identify possible developers for each of the zones. The successful applicant for each zone, having signed a Zone Development Agreement (ZDA) with The Crown Estate, will have exclusive rights (subject to gaining the necessary consents) to develop one or more windfarms within the zone. At this stage, the number of windfarms within each zone, and the location and characteristics of these windfarm projects has not yet been defined.

Following zone award, zone developers will be responsible for designing and obtaining consent for the project(s) within the zones. Consequently, whilst it has been possible to make a number of sensible assumptions regarding the projects which will constitute the Round 3 Plan, many details are lacking. In particular, the location of windfarms within zones, the type of turbine bases to be used and the size and capacity of individual projects are all yet to be defined.

### **1.2.2 Avoidance and Mitigation Measures within the Round 3 Plan**

In addition to assumptions regarding construction, operation and decommissioning of offshore windfarm projects, a number of general environmental measures<sup>4</sup> have been incorporated within the Plan. The assessment set out in this report is based on the assumption that developers will adhere to these in developing individual projects. These measures were set out in the screening report, and are reproduced in Table 1.1. They are measures which offshore windfarm developers would normally be required to incorporate into their projects as a result of statutory consultation and regulators' requirements during the consenting process. The likely effectiveness of these measures was taken into account when undertaking the screening assessment.

As part of the AA process set out in this report, it has been necessary further to refine the Plan by incorporating additional Plan-level avoidance and mitigation measures. These are necessarily high-level objectives, the achievement of which is designed to prevent any adverse

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<sup>4</sup> Environmental measures are measures that are initially identified as being capable of mitigating potential adverse effects (or delivering enhancement). Once they have been included as part of the Plan they are referred to as environmental measures rather than mitigation, as the latter term is often associated with measures that are offered as additions to a Plan rather than integral parts of it.

effects on the interest features in European/Ramsar sites. These Plan-level avoidance and mitigation measures will be achieved through specific mitigation measures that are identified by zone developers and incorporated into the design of their windfarm projects; the developers will be required to demonstrate that, with the inclusion of these measures, their project proposals will meet the Plan-level avoidance and mitigation measures. Where a Plan-level avoidance and mitigation measure is identified within this report, some examples of project level mitigation measures have been given to demonstrate how the Plan-level avoidance and mitigation measures might be achieved at project level.

The Plan-level avoidance and mitigation measures that have been incorporated into the Round 3 Plan are listed in Sections 2-6 of this report, (and they are all listed together in Section 7.1.1).

**Table 1.1 General Environmental Measures Incorporated into the Round 3 Plan at the Screening Stage**

| Activity             | Issues                                                                                                   | Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Survey               | Noise<br>Physical disturbance<br>Vessel activity                                                         | Design of an appropriate survey methodology to provide required data whilst avoiding excessive habitat / species disturbance; plan to be produced to the satisfaction of regulators/statutory consultees.<br><br>Where there is evidence that this would mitigate adverse effects on sensitive species, timing of survey work to avoid sensitive life-cycle stages where possible (e.g. avoiding geotechnical surveys in diadromous fish migration seasons).                                                                                                                                                                                                                                                                                                    |
| Turbine installation | Physical habitat disturbance<br>Sediment mobilisation<br>Toxic contamination<br>Noise<br>Vessel activity | Micrositing of turbines to avoid sensitive habitats/species or areas of sediment contamination where sediment re-mobilisation could result in toxic effects.<br><br>If required by statutory consultees, use of methods to reduce piling noise, use of soft-start piling and use of standard mitigation to limit effects on marine mammals and diadromous fish in the area.<br><br>Where there is evidence that this would mitigate adverse effects on sensitive species, timing of piling activities to avoid sensitive life-cycle stages (e.g. diadromous fish migration seasons).<br><br>Use of Best Practicable Environmental Option (BPEO) vessel anchoring/positioning methodology and implementation of an appropriate Pollution Event Contingency Plan. |
| Turbine operation    | Scour<br>Operational noise<br>Maintenance vessel activity                                                | Where there is evidence that this would mitigate adverse effects on sensitive habitats, use of appropriately designed/located scour protection for turbine bases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Activity                | Issues                                 | Measures                                                                                                                                                                                                                                                                                                              |
|-------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turbine decommissioning | Physical habitat disturbance           | Use of BPEO decommissioning methods/standards (in the light of information available at the time of decommissioning, and to the satisfaction of statutory consultees) (e.g. turbine bases cut off below seabed, gravity bases left in situ, re-use of structures where possible, removal of debris from the sea bed). |
|                         | Disturbance of established communities |                                                                                                                                                                                                                                                                                                                       |
|                         | Sediment mobilisation                  | Use of Best Practicable Environmental Option (BPEO) vessel anchoring/positioning methodology and implementation of an appropriate Pollution Event Contingency Plan.                                                                                                                                                   |
|                         | Toxic contamination                    |                                                                                                                                                                                                                                                                                                                       |
|                         | Noise                                  | Where there is evidence that this would mitigate adverse effects on sensitive species, timing of decommissioning activities to avoid sensitive life-cycle stages (e.g. diadromous fish migration seasons).                                                                                                            |
|                         | Vessel activity                        |                                                                                                                                                                                                                                                                                                                       |
| Cable installation      | Physical habitat disturbance           | Micrositing of cables to avoid particularly sensitive coastal / intertidal / subtidal habitats, areas particularly important for bird interest features, and areas of known contamination where sediment re-mobilisation could result in toxic effects.                                                               |
|                         | Sediment mobilisation                  |                                                                                                                                                                                                                                                                                                                       |
|                         | Toxic contamination                    | Where there is evidence that this would mitigate adverse effects on sensitive species, timing of cable installation activities to avoid sensitive life-cycle stages (e.g. diadromous fish migration seasons, bird breeding/overwintering periods).                                                                    |
|                         | Noise                                  |                                                                                                                                                                                                                                                                                                                       |
|                         | Vessel activity                        | Intertidal cabling works undertaken at low tide to reduce the level of re-suspension and transport of sediments.                                                                                                                                                                                                      |
|                         |                                        | Careful planning of terrestrial site access to avoid sensitive habitats on the upper shore (e.g. vegetated shingle), and employment of appropriate mitigation measures to reduce impacts on these habitats.                                                                                                           |
|                         |                                        | Use of appropriate installation techniques to avoid adverse impacts on intertidal / coastal habitat features.                                                                                                                                                                                                         |
|                         |                                        | Where cable trenching in the intertidal is unavoidable, backfilling of trenches to reduce the potential for sediment remobilisation and facilitate recovery of benthic communities.                                                                                                                                   |
|                         |                                        | Use of cable-laying techniques most appropriate to the nature of the intertidal / subtidal substrate to avoid excessive sediment mobilisation.                                                                                                                                                                        |
|                         |                                        | Use of Best Practicable Environmental Option (BPEO) vessel anchoring/positioning methodology and implementation of an appropriate Pollution Event Contingency Plan.                                                                                                                                                   |
| Cable operation         | Electromagnetic fields                 | Burial of cables to an appropriate depth where this is considered necessary to mitigate effects on electrosensitive species.                                                                                                                                                                                          |
|                         | Scour                                  | Where there is evidence that this would mitigate adverse effects on sensitive habitats, use of cable protection in the intertidal / subtidal area (e.g. burial, scour protection, pinning over bedrock) to reduce excessive scour.                                                                                    |

| Activity              | Issues                                 | Measures                                                                                                                                                                                                                                                                                |
|-----------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable decommissioning | Physical habitat disturbance           | Use of BPEO decommissioning methods/standards (in the light of scientific information available at the time of decommissioning, and to the satisfaction of statutory consultees) (e.g. leaving a safely buried de-energised cable in situ, leaving colonised scour protection in situ). |
|                       | Disturbance of established communities | Where there is evidence that this would mitigate adverse effects on sensitive species, timing of decommissioning activities to avoid sensitive life-cycle stages (e.g. diadromous fish migration seasons, bird breeding/overwintering periods).                                         |
|                       | Sediment mobilisation                  |                                                                                                                                                                                                                                                                                         |
|                       | Toxic contamination                    |                                                                                                                                                                                                                                                                                         |
|                       | Noise                                  | Where necessary to mitigate excessive sediment disturbance, intertidal cable removal undertaken at low tide to reduce the level of re-suspension and transport of sediments.                                                                                                            |
|                       | Vessel activity                        | Careful planning of terrestrial site access to avoid sensitive habitats on the upper shore.<br><br>Use of BPEO vessel anchoring/positioning methodology and implementation of an appropriate Pollution Event Contingency Plan.                                                          |

## 1.3 HRA at Plan and Project Levels

### 1.3.1 Links between Plan and Project Level HRAs

The Crown Estate, as the competent authority for the Round 3 Plan, is obliged to undertake an HRA at Plan-level before entering into ZDAs with zone developers. However, undertaking HRA at Plan-level does not preclude the need for zone developers to undertake project-specific HRA work based on their detailed project proposals, in order to inform any AA that is needed. The requirement for AA at project level will become clear in consultation with the competent authority at project level, which could be the Infrastructure Planning Commission, the Marine and Fisheries Agency/Marine Management Organisation, the Scottish Government, the Welsh Assembly Government, the Secretary of State or a local planning authority, depending on the location and scale of projects. This project level HRA work (see Section 1.3.2) will be informed by the precise details of the projects.

The lack of definition of some project details (e.g. the precise locations of turbines and the way in which they are attached to the seabed) means that there are some effects on European/Ramsar sites/interest features that cannot reasonably be assessed at the Plan-level. In these cases, the Plan-level HRA is reliant, in part, on these effects being assessed at the project level and a conclusion being reached that there will be no adverse effect on the integrity of the relevant sites. To this end the definition of the Round 3 Plan has been framed in such a way that there is the scope for the nature/scale/location of individual projects to be changed in order to avoid adverse effects on integrity. Notably the Plan's objective to generate up to 25GW of electricity means that, if need be windfarm development within one or more zones can be excluded from the Plan. This approach is described in more detail in Section 1.4.2.

The Plan-level HRA will be of use in guiding zone developers and in assisting them to identify the sensitivities of European/Ramsar sites in relation to developments within each zone. The outcomes of the Plan-level HRA may also assist in zone level planning and survey work. However, the extent to which the Plan-level HRA can inform (and simplify) HRA at the project

level is dependent on the projects adhering to the assumptions made at Plan-level and on the extent to which the Plan-level HRA relies upon project level HRA.

It is conceivable that, at project level, developers may deviate from the assumptions in the Plan described within this HRA, but where this is the case, they will need to demonstrate (through the HRA process) that any move away from the assumptions made within the Plan will not be likely to have a significant effect on any European and Ramsar sites (or to have adverse effects on their integrity).

### 1.3.2 Requirement for Project Level HRA

Irrespective of the findings of the Plan-level AA, individual windfarm projects will require a project-level HRA. This is because all projects have the potential to affect one or more European/Ramsar sites, with the assessment of effects at the Plan-level on at least some of these sites relying upon project-level HRA. Project-level HRAs should also address, *inter alia*:

- the justification for any avoidance and mitigation measures incorporated into the Plan that are not delivered at project level; and/or
- new European/Ramsar sites that have been notified or designated following conclusion of the Plan-level HRA; and/or
- new information that exists regarding the nature and/or sensitivities of interest features within sites which have been assessed at Plan level and with that information it is not possible to exclude likely significant effects on such features or sites; and/or
- additional information that is available regarding specific in-combination effects relating to defined project proposals and with this additional information it is not possible to exclude likely significant effects on European/Ramsar sites.

In some cases, it may be possible to conclude that the project, incorporating environmental measures that are designed, at least in part, to achieve Plan-level avoidance and mitigation measures<sup>5</sup>, is not likely, either alone or in combination with other plans or projects, to have significant effects on European/Ramsar sites. In these cases, there will be no requirement for project-level AA. In other cases, though, AA will be required.

The decision regarding the need for (and scope of) AA at the project level will need to be informed by consultation with the appropriate Statutory Nature Conservation Agencies during project development.

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<sup>5</sup> See The Queen on the application of Hart DC v the Secretary of State Communities and Local Government, Judgment of Sullivan J in [2008] EWHC 1204 (Admin) case number CO/7623/2007 in the High Court on 1st May 2008 - The High Court concluded that it was appropriate to screen the need for Appropriate Assessment on the basis of the scheme including environmental measures

## 1.4 Methodology for HRA of the Round 3 Plan

### 1.4.1 Identification of LSEs at the Screening Stage

Prior to undertaking the screening stage of the HRA for the Round 3 Plan, a pre-screening exercise was undertaken to identify the European and Ramsar sites that should be screened for LSEs under the Plan. The screening approach was adapted in response to consultation on the pre-screening report<sup>6</sup>. Details of this consultation are available within Appendix A of the screening report.

Within the screening report<sup>3</sup>, UK and relevant transnational European and Ramsar sites were screened to identify those sites that had the potential for LSEs on interest features. These sites included:

- SACs, SPAs and Ramsar sites where habitat interest features (or habitats supporting bird interest features) could be affected physically by the Round 3 Plan;
- SACs containing bat interest features (*Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Myotis bechsteini* and *Barbastella barbastellus*) which could be affected by the Round 3 Plan;
- SACs containing otter (*Lutra lutra*) as an interest feature which could be affected by the Round 3 Plan;
- SACs and Ramsar sites containing diadromous fish interest features (*Salmo salar*, *Alosa alosa*, *Alosa fallax*, *Lamprologus fluviatilis*, *Petromyzon marinus* and *Anguilla anguilla*) which could be affected by the Round 3 Plan;
- SACs and Ramsar sites with marine mammal interest features (*Phoca vitulina*, *Halichoerus grypus*, *Phocoena phocoena* and *Tursiops truncatus*) which could be affected by the Round 3 Plan; and
- SPAs and Ramsar sites with migratory bird interest features which could be affected by the Round 3 Plan.

Following completion of the screening process, numerous sites were excluded from further consideration within the Plan-level HRA on the basis that there would be no LSE on the site as a result of the Round 3 Plan. For some sites it was possible to conclude that there would be no LSE on some interest features, but that the possibility of LSE on other interest features could not be excluded.

The sites for which the possibility of LSE on one or more interest features could not be excluded at the screening stage have been brought through to the AA stage of the HRA. The possibility of the Round 3 Plan having an adverse effect on the integrity of sites with these interest features is assessed in this report. These sites fall into five broad categories:

- SACs containing bat interest features;

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<sup>6</sup> Entec UK Ltd. (2009). *The Crown Estate Habitats Regulations Assessment for Round 3 Pre-screening report*.

- 
- SACs and Ramsar sites containing diadromous fish interest features<sup>7</sup>;
  - SACs and Ramsar sites containing marine mammal interest features;
  - SACs and Ramsar sites containing habitats which could be affected by the Plan; and
  - SPAs and Ramsar sites with bird interest features.

#### **1.4.2 Assessment of Effects on the Integrity of European and Ramsar Sites**

This report sets out the information that The Crown Estate will use, together with the screening report<sup>3</sup>, to undertake its AA of the Round 3 Plan. The AA process needs to be followed when assessing the effects on the conservation status of the interest features of each European/Ramsar site for which LSEs have been identified, with the conclusions relating to all of these features being combined to determine whether it can be concluded that there will be no adverse effect on the integrity of the relevant site.

Excluding effects that have been assessed at the screening stage as not likely to be significant, one of the following conclusions will be drawn for each effect on each interest feature at each site.

- AA of the effects of the Round 3 Plan at Plan level (without any reliance on project-level HRA) demonstrates that there will be no adverse effect on the integrity of the site but this will need to be revisited as a matter of course at project level HRA once project details are known.
- AA of the effects of the Round 3 Plan at Plan level (without any reliance on the conclusions of the project-level HRA) demonstrates that there will be no adverse effect on the integrity of the site, provided that additional avoidance and mitigation measures that are defined at the Plan level are achieved.
- AA of the effects of the Round 3 Plan at Plan level relies on project-level HRA to demonstrate that there will be no adverse effect on the integrity of the site. This reliance is a result of there being insufficient information about the projects that make up the Plan to enable effects on the integrity of a site reasonably to be assessed at the Plan level. This conclusion may be reached before or after mitigation opportunities have been identified, and whether or not the lack of information is recognised at an early or late stage in the assessment process.
- AA of the effects of the Round 3 Plan at Plan level, with or without reliance of project level HRA, cannot exclude the possibility of an adverse effect on the integrity of the site, even where avoidance and mitigation measures defined at Plan level have been taken into account. Consideration of alternatives to the Round 3 Plan, HRA of these alternatives and, potentially, justification of the grounds of IROPI might be required. This represents a theoretical outcome which has not been reached for any site. This is because the definition of the Round 3 Plan has been framed in such a way that there is always the scope for the nature/scale/location of individual projects to be changed in order to avoid adverse effects

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<sup>7</sup> SNH subsequently requested that these sites were also assessed for freshwater pearl mussel (*Margaritifera margaritifera*) where this was also a qualifying feature for the site.

on integrity. This reflects the Plan having an objective to generate up to 25GW of electricity, which gives the potential for both Plan and project level mitigation to exclude the development of certain parts of one or more of the nine development zones, or in extreme circumstances even the development of entire zones (should it prove impossible to mitigate any adverse effects of projects within them).

#### 1.4.3 In-Combination Effects

In combination effects are also considered within this report. It is conceivable that there may be no adverse effect of the Round 3 Plan alone, but that this might not be the case in-combination with other plans or projects. In these cases HRA will usually be required at the project level, for example because:

- information on the timing of Round 3 projects and thus the likelihood of in-combination survey, construction or decommissioning phase effects is not available at Plan level; and/or
- insufficient detail is available on the design of the Round 3 projects and other projects to determine how operation of the projects in-combination with other plans/projects may affect interest features.

Potential sources of in combination effects are detailed in the site assessment summary tables in this report but, as explained above, these will need to be assessed at project level when timing of construction and design details are known.

#### 1.4.4 Structure of this Report

Within this report, information has been provided to support The Crown Estate's AA of European/Ramsar sites that have been identified within the screening process as having possible LSEs. For each site/interest feature a summary table draws conclusions for consideration by The Crown Estate. The following colour-coding has been used for clarity of conclusions:

AA of the effects of the Round 3 Plan at Plan level demonstrates that the Round 3 Plan (as defined in the Screening Report), without the need for additional mitigation, will not result in an adverse effect on the conservation status of this interest feature at this site.

AA of the effects of the Round 3 Plan at Plan level demonstrates that there will be no adverse effect on the integrity of the site supporting this interest feature at this site provided that additional Plan-level avoidance and mitigation measures are met.

AA of the effects of the Round 3 Plan cannot reasonably be assessed at Plan level; the Plan-level HRA is reliant, at least in part, upon project-level HRA, which can reach a conclusion that there will be no adverse effect on the integrity of the site that supports this interest feature.

The remainder of this report is set out in the following sections:

- AA for SACs containing bat interest features;
- AA for SACs and Ramsar sites containing diadromous fish interest features;
- AA for SACs and Ramsar sites containing marine mammal interest features;
- AA for SACs and Ramsar sites containing habitat interest features;
- AA for SPAs and Ramsar sites with bird interest features; and

- summary and conclusions of the HRA of the Round 3 Plan.

Where AA has been undertaken for more than one interest feature at a site, the assessments of individual features have been undertaken in the relevant chapters and the final conclusions for the site are drawn together in the summary chapter.

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## 2. Potential for Adverse Effects on Bat Interest Features

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### 2.1 Introduction

#### 2.1.1 Sites in this Chapter

Following consultation at the pre-screening stage, it was considered necessary to screen SACs within the UK that have bat species as qualifying interest features. There are four bat species within the UK which are listed on Annex II of the Habitats Directive. These are:

- lesser horseshoe bat (*Rhinolophus hipposideros*);
- greater horseshoe bat (*Rhinolophus ferrumequinum*);
- barbastelle bat (*Barbastella barbastellus*); and
- Bechstein's bat (*Myotis bechsteini*).

The majority of sites within the UK with these bat species as qualifying interest features are fully terrestrial (i.e. they have no coastal or marine elements) and were only included within the screening process for their bat interest features. Within the screening process it was not possible to conclude that there would be no LSEs on bats as a result of the Round 3 Plan, and consequently all of the sites that support Annex II species were brought through to the AA stage. This chapter deals with the AA of bat features within these sites.

Table 2.1 shows the sites for which AA has been undertaken in this chapter, along with their qualifying interest features.

Table 2.1 Sites for which an AA of Bat Interest Features has been Undertaken

| Site Code | SAC Name                                                                         | Lesser horseshoe<br>( <i>Rhinolophus hipposideros</i> ) | Greater horseshoe<br>( <i>Rhinolophus ferrumequinum</i> ) | Barbastelle<br>( <i>Barbastella barbastellus</i> ) | Bechstein's<br>( <i>Myotis bechsteinii</i> ) | Other interest features<br>screened in |
|-----------|----------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|----------------------------------------------|----------------------------------------|
| UK0012584 | Bath and Bradford-on-Avon Bats                                                   | ✓                                                       | ✓                                                         |                                                    | ✓                                            | None                                   |
| UK0012585 | Beer Quarry and Caves                                                            | ✓                                                       | ✓                                                         |                                                    | ✓                                            | None                                   |
| UK0030095 | Bracket's Coppice                                                                |                                                         |                                                           |                                                    | ✓                                            | None                                   |
| UK0030328 | Briddlesford Copses                                                              |                                                         |                                                           |                                                    | ✓                                            | None                                   |
| UK0016373 | Chilmark Quarries                                                                | ✓                                                       | ✓                                                         | ✓                                                  | ✓                                            | None                                   |
| UK0014789 | Coedydd Derw a Safleoedd Ystlumod Meirion/<br>Meirionnydd Oakwoods and Bat Sites | ✓                                                       |                                                           |                                                    |                                              | None                                   |
| UK0012715 | Ebernoe Common                                                                   |                                                         |                                                           | ✓                                                  | ✓                                            | None                                   |
| UK0030331 | Eversden and Wimpole Woods                                                       |                                                         |                                                           | ✓                                                  |                                              | None                                   |
| UK0030148 | Exmoor and Quantock Oakwoods                                                     |                                                         |                                                           | ✓                                                  | ✓                                            | None                                   |
| UK0012661 | Glynllifon                                                                       | ✓                                                       |                                                           |                                                    |                                              | None                                   |
| UK0030168 | Hestercombe House                                                                | ✓                                                       |                                                           |                                                    |                                              | None                                   |
| UK0014787 | Limestone Coast of South West Wales / Arfordir<br>Calchfaen De Orllewin Cymru    |                                                         | ✓                                                         |                                                    |                                              | None                                   |
| UK0012658 | Mells Valley                                                                     |                                                         | ✓                                                         |                                                    |                                              | None                                   |

| Site Code | SAC Name                                                                                          | Lesser horseshoe<br>( <i>Rhinolophus hipposideros</i> ) | Greater horseshoe<br>( <i>Rhinolophus ferrumequinum</i> ) | Barbastelle<br>( <i>Barbastella barbastellus</i> ) | Bechstein's<br>( <i>Myotis bechsteini</i> ) | Other interest features<br>screened in |
|-----------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|---------------------------------------------|----------------------------------------|
| UK0030203 | Mendip Limestone Grasslands                                                                       |                                                         | ✓                                                         |                                                    |                                             | None                                   |
| UK0012804 | Mole Gap to Reigate Escarpment                                                                    |                                                         |                                                           |                                                    | ✓                                           | None                                   |
| UK0030334 | Mottisfont Bats                                                                                   |                                                         |                                                           | ✓                                                  |                                             | None                                   |
| UK0030161 | Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines                                                  | ✓                                                       |                                                           |                                                    |                                             | None                                   |
| UK0030227 | North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro                                         |                                                         |                                                           | ✓                                                  |                                             | None                                   |
| UK0030052 | North Somerset and Mendip Bats                                                                    | ✓                                                       | ✓                                                         |                                                    |                                             | None                                   |
| UK0030235 | Paston Great Barn                                                                                 |                                                         |                                                           | ✓                                                  |                                             | None                                   |
| UK0014793 | Pembrokeshire Bat Sites and Bosherton Lakes/<br>Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton | ✓                                                       | ✓                                                         |                                                    |                                             | None                                   |
| UK0030337 | Singleton and Cocking Tunnels                                                                     |                                                         |                                                           | ✓                                                  | ✓                                           | None                                   |
| UK0012650 | South Hams                                                                                        |                                                         | ✓                                                         |                                                    |                                             | None                                   |
| UK0019863 | St Albans Head to Durlston Head                                                                   |                                                         | ✓                                                         |                                                    |                                             | None                                   |
| UK0014783 | Tanat and Vyrnwy Bat Sites/ Safleoedd Ystlumod Tanat<br>ac Efyrynwy                               | ✓                                                       |                                                           |                                                    |                                             | None                                   |
| UK0012716 | The Mens                                                                                          |                                                         |                                                           | ✓                                                  |                                             | None                                   |

| Site Code | SAC Name                                                                                 | Lesser horseshoe<br>( <i>Rhinolophus hipposideros</i> ) | Greater horseshoe<br>( <i>Rhinolophus ferrumequinum</i> ) | Barbastelle<br>( <i>Barbastella barbastellus</i> ) | Bechstein's<br>( <i>Myotis bechsteini</i> ) | Other interest features<br>screened in |
|-----------|------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|---------------------------------------------|----------------------------------------|
| UK0014784 | Usk Bat Sites/ Safleoedd Ystlumod Wysg                                                   | ✓                                                       |                                                           |                                                    |                                             | None                                   |
| UK0014794 | Wye Valley and Forest of Dean Bat Sites/ Safloedd Ystlumod Dyffryn Gwy a Fforest y Ddena | ✓                                                       | ✓                                                         |                                                    |                                             | None                                   |
| UK0012727 | Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy                                             | ✓                                                       |                                                           |                                                    |                                             | None                                   |

### 2.1.2 Conservation Objectives

Conservation Objectives for bat interest features in SACs comprise some (or all) of the following elements:

*To maintain the population in a favourable conservation status, favourable condition status for this population being defined as follows: the total size of the population is at least maintained; there is sufficient breeding, foraging and hibernating habitat, of the appropriate quality, to maintain the population on a long term basis; management of the SAC is of the appropriate type and sufficiently secure such that, for the foreseeable future, there is likely to be no reduction in population size or range, nor any decline in the extent or quality of breeding, foraging or hibernating habitat.*

It is these objectives which will be used to assess the potential for the Round 3 Plan to have an adverse effect on the integrity of sites within this chapter.

### 2.1.3 Sensitivities of Bats to Round 3 Plan Activities

Any effects of onshore cable laying or substation/converter station construction would relate to effects on foraging habitat. No terrestrial sections of proposed cable routes pass through or within 1km of any SAC with bat interest features. Effects on foraging habitat further than 1km from the SACs can be avoided by cable micro-siting to avoid features that comprise good foraging habitat (e.g. trees and hedgerows). On this basis, the Round 3 Plan can be undertaken without any LSE on terrestrial sites where bats are interest features, except in relation to changes associated with offshore activity, as listed in Table 2.2, which is taken from the screening report.

Further information on the four Annex II bat species and their sensitivities to offshore activities within the Round 3 Plan is provided in Section 2.2. This information is then used to assess effects on the integrity of European sites in Section 2.3.

**Table 2.2 Sensitivities of Bats to Associated Round 3 Activities**

| Sensitivities                                          | Relevant Round 3 zone activities | Survey | Installation | Operation | Decomm -<br>issioning | Information required for assessment                                                            |
|--------------------------------------------------------|----------------------------------|--------|--------------|-----------|-----------------------|------------------------------------------------------------------------------------------------|
| Mortality due to collision of bats with turbine blades | Turbine operation                |        |              | ◆         |                       | Whether bats which are interest features are likely to be present within the development zones |
| Mortality due to pressure changes near turbine blades  | Turbine operation                |        |              | ◆         |                       | Whether bats which are interest features are likely to be present within the development zones |
| Barrier effects to the movement of migrating bats      | Turbine presence and operation   |        |              | ◆         |                       | Whether bats which are interest features are likely to be present within the development zones |

## 2.2 Species Ecology and Sensitivities

### 2.2.1 Bat Species Considered

#### Overview

The identified sites have all been designated as SACs as they support a significant proportion of an Annex II<sup>8</sup> species of bat. The Annex II species which are present in the UK are:

- lesser horseshoe bat;
- greater horseshoe bat;
- barbastelle bat; and
- Bechstein's bat.

Greater mouse-eared bat (*Myotis myotis*) is another species of British bat included in Annex II. It was declared extinct in the UK in 1990 (although since 2002 one individual has been observed hibernating over winter in southern England<sup>9</sup>). There are no SACs designated for this species in the UK and so they are not considered further in this assessment.

#### Lesser Horseshoe Bat

The lesser horseshoe bat is the smallest European species of horseshoe bat. In the UK its distribution is restricted to Wales and the south-west of England, south and west of a line from Chester to Southampton. Typically its foraging grounds are structurally rich habitats which support high hedgerows and woodland<sup>10,11</sup>. Prey is predominantly captured in flight. Their agility in flight enables them to pick prey directly from surfaces. Prey species include diptera (crane-flies), hymenoptera, lace-wings and small moths<sup>10</sup>.

Nursery roosts are often found in draught free roof spaces of churches, castles and other large buildings. They have also been found in mines<sup>10</sup>. In the winter they hibernate in caves and mines. A broad spectrum of night roosts can be used.

The lesser horseshoe bat is a relatively sedentary species, with foraging activity usually within 2.5km of its roosts, although this can extend to around 4-6.4km<sup>10</sup>. An individual's hunting ground may be around 150-400ha in size<sup>10</sup>, within which up to seven separate core areas are used.

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<sup>8</sup> European Community Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive). The species included on Annex II are so rare that the Directive requires the designation of Special Areas of Conservation (SACs) by EC member states to ensure that their populations are maintained at a favourable conservation status.

<sup>9</sup> Bat Conservation Trust (2009) UK bat species information.

<sup>10</sup> Dietz C., von Helversen O. & Nill D. (2009) *Bats of Britain, Europe and Northwest Africa*. A&C Black, London.

<sup>11</sup> Altringham, J. (2003) *British Bats*. Harper Collins Publishers.

Flight between habitats is usually associated with hedgerows, ditches and woodland edge habitat. Individuals can cross open land, such as arable fields and meadows, and even fly as far as 1.5km over water<sup>10</sup>.

### **Greater Horseshoe Bat**

The greater horseshoe bat is the largest European species of horseshoe bat. In the UK its distribution is restricted to the Wales and the south west of England, south of the line Cardigan-Cheltenham- Southampton (including the Isle of Wight). Typically this bat is associated with structurally diverse habitats including woodland, pasture, high hedges, tree lines and orchards. This species often forages close to the ground or at a height of between 4 and 6m over pasture when looking for dung beetles<sup>10</sup>. During foraging, around half of the time is spent hunting from a roost site (i.e. perch hunting). Favoured prey species include beetles (chafers and dung beetles) and moths<sup>11</sup>. More seasonal prey species include diptera, hymenoptera and caddis flies, and, to a lesser extent, spiders.

Nursery roost sites are most frequently found in roof spaces, whereas winter roosts are typically found in caves and mines.

The greater horseshoe bat is a relatively sedentary species, with only a few recorded flights of over 100km<sup>11</sup>. Foraging activity is usually within 5km but it is more usual for them to forage within 2.1km of their roost site<sup>11</sup>.

Commuting is generally associated with features such as hedges. Greater horseshoe bats rarely cross large open areas such as fields<sup>11</sup> during commuting.

### **Barbastelle Bat**

The barbastelle bat is a medium-sized bat which, in the UK, is found in southern England and Wales<sup>12</sup>. This species is typically found associated with structurally diverse woodlands, wooded riverine habitats and, to a lesser extent, is found foraging in areas supporting high hedgerows. This species emerges close to sunset and stays close to vegetation, often hunting around a tree's canopy. However, when it is dark, it will venture further from the protective cover of the canopy<sup>13</sup>. Prey species almost exclusively consist of small moths and to a lesser extent Diptera, small beetles and other flying insects.

Summer roosts are frequently found behind loose bark, in cracks in trees, and less frequently behind windows, shutters and timber cladding on buildings. Winter roosts have also been found behind bark, and also in caves, mines, disused railway tunnels, rock crevices and ruins.

The barbastelle is mainly a sedentary species with summer and winter roosts typically less than 40km apart<sup>10</sup>. Long distance flights have been demonstrated only rarely<sup>10</sup>. Foraging territories are usually in close proximity to nursery colonies, typically at a distance of around 4.5km. A typical foraging area is 8.8ha, and a single individual will hunt in up to 10 core sites in a single night<sup>10</sup>.

<sup>12</sup> F. Greenaway (2004) Advice for the management of flight-lines and foraging habitats of the barbastelle bat *Barbastella barbastellus*. English Nature Research Report Number 657.

<sup>13</sup> Greenway, F. (2001) *The Barbastelle of Britain*. British Wildlife.

### Bechstein's Bat

In the UK, Bechstein's bat is predominantly found in the south-west of England and on the Isle of Wight<sup>9,10</sup>. There have also been records in the south-west Midlands and one has been recorded in Brecon in Wales. Typically this bat is found in deciduous or mixed woodland. It is a very manoeuvrable species which is typically associated with cluttered, woodland habitats. It is able to fly close to the vegetation when foraging (i.e. 1-5m<sup>10</sup>) and can glean prey straight from the surface of leaves and branches (foliage gleaning). Prey species mainly comprise forest-inhabiting non-flying insects and other arthropods, such as beetles and spiders<sup>10</sup>.

Roosts are usually in tree trunks and crevices<sup>14</sup>, some of which may be no more than 1-1.5m height above ground. In the winter, these bats are, again, most frequently found in tree holes but individual bats may be found in sites underground.

Bechstein's bat is a sedentary species insofar as summer and winter roosts are typically only a few kilometres away from each other<sup>10</sup>. Their foraging territory is usually within 1km of the roost but sometimes this species will travel as far as 2.5km<sup>10</sup> from the roost to visit core foraging sites. Bechstein's bats are very loyal to their core foraging sites and a territory will usually encompass between three and nine of these sites<sup>10</sup>. Foraging territories vary in size, depending predominantly on the structural richness and diversity of the woodland available.

## 2.2.2 Sensitivities of Bats to Round 3 Activities

### Bats and Offshore Windfarms

Only a limited body of information is available on the effects of offshore windfarms on bats. The main piece of research which has been completed was undertaken by Vindval<sup>15</sup> working on behalf of the Swedish Environmental Protection Agency. Following earlier work by Vindval, which observed bats over the sea, the study focused on several offshore locations near Kalmar Sund in the Baltic Sea. The study revealed extensive activity by migrant species, which was mainly observed in the autumn, and an abundance of activity by certain resident species which were attracted by insects concentrated around the turbines. In total 10 different species were observed at the offshore locations investigated. At known coastal take-off points (locations where bats are known to take off for flight across the sea), 13 species were observed. It was in the vicinity of these locations that the majority of offshore observations were made<sup>15</sup>. The majority of the species observed employed aerial hawking strategies.

The species observed<sup>15</sup> in highest numbers was the soprano pipistrelle (*Pipistrellus pygmaeus*). This was followed by noctule (*Nyctalus noctula*) and Nathusius' pipistrelle (*P. nathusii*). Other British species which were observed regularly up to 10km from the coast included serotine (*Eptesicus serotinus*), Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*) and Daubenton's bat (*Myotis daubentonii*).

This type of activity was mainly observed during periods with light wind (< 5m/s), but larger species (such as noctule) could tolerate greater wind speeds. Bats were seldom observed to take

<sup>14</sup> Greenaway, F. & Hill, D.(2004) *Woodland Management advice for Bechstein's and barbastelle bat*, English Nature Research Report Number 658.

<sup>15</sup> Ahlén, I. Bach, L. & Baagøe, H. (2007) *Bats and offshore wind turbines studied in southern Scandinavia*. Pettersson, Swedish Environmental Protection Agency

off from land in wind speeds above 10m/s. During quieter periods the concentration of insects around the turbines was greater.

Lesser and greater horseshoe, and Bechstein's bats are not found in Scandinavia and were not observed during these studies. However, it is unlikely that they would routinely be found in the offshore environment because of the way in which they use the landscape, favouring cluttered and sheltered environments, and the foraging strategies which they employ (see Section 2.2) ) and the fact that they are not long distance migrants. The barbastelle bat is found in southern Scandinavia but was not observed offshore, which is unsurprising as this species is typically, although not exclusively, associated with ancient woodland and is also not a long distance migrant.

It is notable that fatality collection studies undertaken at windfarms<sup>16</sup> have not found individuals of any of the species for which SACs in the UK have been designated.

### **Guidance from Natural England on Bats and Turbines**

Natural England<sup>17</sup> and EUROBATS<sup>18</sup> have both produced guidance on how the risk of turbines to bat species and populations of bats can be assessed. This largely deals with the location of onshore turbines but, in principle, this can loosely be transposed to the offshore environment. This is because the offshore environment is a semi-natural habitat which bats may exploit, or not, due to the way in which they fly or forage, in the same way as they would any other semi-natural habitat.

Natural England<sup>17, 18</sup> considers lesser horseshoe, great horseshoe and Bechstein's bats to be at low risk from collision with wind turbines and to have a low risk of threat to their populations from windfarms. This level of risk is based on what is currently known about how bats use the landscape. For these species, this level of risk has been assessed as follows:

- Habitat preferences: these species are all closely associated with cluttered environments such as woodland or hedgerows.
- Echolocation characteristics: the call types associated with these species are more likely to be short range (i.e. they are not as suited to open environments) and, in the case of horseshoe species, they are of higher frequency (which means that they become attenuated more quickly with distance and so are not as suited to open habitats).
- Bat physiology: these species are likely to be agile or manoeuvrable, but may be susceptible to stronger winds. This is due to a combination of weight (they are often light, such as lesser horseshoe bat), with a low wing loading and aspect ratio (a value given for the wing shape which is derived from a bat's wingspan squared and divided by the wing area).

<sup>16</sup> Rodrigues, L., Bach, L., Dubourg-Savage, M.J., Goodwin, J. & Harbusch, C. (2008) Guidelines for consideration of bats in windfarm projects, Guidelines for consideration of bats wind farm projects, EUROBATS Publication Series 3, UNEP/EUROBATS Secretariat, Bonn, Germany.

<sup>17</sup> Natural England Technical Information Note TIN051 - Bats and onshore wind turbines interim guidance (2009)

<sup>18</sup> Natural England Technical Information Note TIN059 - Bats and single large wind turbines: Joint Agencies interim guidance (2009)

- Flight speed and height: these species tend to fly slowly and forage close to, and in amongst, vegetation. They are not physiologically adapted for speed or long distance flight (i.e. wing shapes).
- Hunting techniques: These species are generally not aerial hawkers (i.e. they do not feed in the open). They will exploit cluttered environments and hunt close to vegetation (i.e. gleaners). Species such as the greater horseshoe bat also rely heavily on perch hunting (they look and listen for prey from a perch).
- Flight behaviour and use of landscape: these species are all classed as ‘sedentary’ species, which means that they typically travel short distances ( $> 10\text{km}$  and  $< 100\text{km}^{19}$ ).

Natural England<sup>17</sup> considers the barbastelle bat to be at medium risk from collision with wind turbines and to have a medium risk of threat to populations from windfarms. For this species, the risk has been assessed as follows:

- Habitat preferences: this species will exploit background cluttered space but, once it is dark, it may venture further out into open space (although not as prominently as open habitat foraging species).
- Echolocation characteristics: the call type which this species employs consists of two parts. One part, which is good for use in cluttered habitats, and a second part, which is less frequently employed, for less cluttered habitats<sup>13</sup>.
- Bat physiology: the barbastelle bat is a medium-sized species with wings which facilitate a degree of manoeuvrability, but they are capable of greater speeds than a low risk species.
- Flight speed and height: This species is relatively agile and will utilise cluttered environments, especially closer to sunset and sunrise but they will also use edge habitat with open spaces being used when it is darker.
- Hunting techniques: Barbastelle bat will hunt in edge and gap habitats and, will employ aerial hawking techniques, to some degree; when it is darker they can move away from the shelter of more cluttered environments.
- Flight behaviour and use of landscape: This species is classed as a ‘sedentary’ species, which means that it typically travels short range (tens of km and less than  $< 100\text{km}^{19}$ ).

This method of risk assessment indicates that lesser horseshoe, great horseshoe and Bechstein's bats are unlikely to encounter turbines. Barbastelle bat is more likely to encounter turbines as it has been found to cross open habitats in search of foraging habitat, albeit this species is still largely associated with ancient woodland<sup>13</sup>.

Drawing on information from Natural England's guidance<sup>17</sup> that is of relevance to offshore sites, the Round 3 Plan sites are ‘low risk’ for the four Annex II bat species. This is because offshore sites satisfy the criteria in the guidance for ‘low risk’ as follows.

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<sup>19</sup> Jones, G. & Cooper-Bohannon, R. (2009) *Determining the potential ecological impact of wind turbines on bat populations in Britain*. Bat Conservation Trust.

- 
- Offshore sites are at least 100m from suitable habitat for these species, such as woodland, water bodies and linear features.
  - There are no roosts on or near the boundary of the site (the closest windfarm site is 13 km from the shore).
  - Offshore sites are likely to suffer significant exposure to high winds. Research<sup>15</sup> undertaken in Europe suggests that bats are unlikely to use sites when wind speeds are greater than 10m/s, which is likely to be experienced on a regular basis in an offshore environment that is totally devoid of shelter.

## **2.3 Potential for Effects of the Round 3 Plan**

### **2.3.1 Effects of Offshore Activities**

The installation of wind turbines (onshore or offshore) may result in mortality of bats. However, research evidence suggests that certain species are more likely to be at risk from the adverse affects of windfarms than others. This is because bat species have different migratory patterns and exploit the landscape in different ways when foraging. Therefore, as lesser horseshoe, greater horseshoe, Bechstein's and barbastelle bats have essentially adapted to exploit more cluttered environments, and do not regularly migrate over long distances, they are unlikely to cross large areas of exceptionally open habitat, as found in the offshore environment. They are thus unlikely to be routinely exposed to the potential for adverse effects from offshore activities associated with the Round 3 Plan.

On rare occasions, individuals of the Annex II species may end up in the offshore environment (e.g. they may be swept away by high winds) and come into contact with turbines. However, it is unlikely that the number of bats affected would be large enough to have a significant adverse effect on the conservation status of any SAC population.

Overall, therefore, it is concluded that the Round 3 Plan will not have an adverse affect on the integrity of SAC sites that have bats as a qualifying interest feature.

### **2.3.2 Effects of Onshore Activities**

Based on the grid connection information available at the Plan level, none of the proposed cable routes pass through any SACs that support bat interest features (see Section 2.1.1). Hence there will be no direct effects on these SACs. However, there is the potential for indirect effects on these sites as a result of a small reduction in the area of foraging habitat available to bats when they forage outside of the SACs. There is also the potential for these bats to be disturbed as a result, for example, of any temporary lighting that is used during the construction stage.

Using the usual foraging distances for Annex II species, as set out in Section 2.2.1, the sites and interest features that have the potential to be affected are:

- Ebernoe Common (barbastelle);
- Exmoor and Quantocks Oakwoods (barbastelle); and
- The Mens (barbastelle).

These effects cannot be assessed at the Plan stage as there is insufficient information available regarding the precise location and nature of cabling and any onshore grid connection construction. As such, the effects should be assessed at the project level, at which stage it may be appropriate to adopt mitigation measures such as avoiding sensitive habitats, including good foraging areas (e.g. woodlands and stream corridors), and careful use of lighting. As a consequence of adopting such measures, it will be possible to avoid potential adverse effects on the conservation objectives of relevant SACs.

### **2.3.3 Avoidance and Mitigation Measures at Plan Level**

Based on the evidence presented in this chapter, no Plan-level avoidance and mitigation measures are required for bat interest features at offshore locations, as no adverse effects on integrity are expected from the operation of turbines offshore. However, it is appropriate to include the following Plan-level avoidance and mitigation measure for bat interest features onshore in relation to the potential for indirect effects on SAC populations that forage outside the SAC boundaries.

*The Round 3 Plan must therefore be undertaken in such a way as to ensure that onshore laying of cables and any associated construction works and subsequent operational activity avoid adversely affecting the conservation status of qualifying bat populations, such that there will be no adverse effect on the integrity of any European/Ramsar sites for which these bat populations are a qualifying feature.*

This avoidance and mitigation measure could be achieved, for example, by micro-siting of cable routes and/or careful use of lighting.

### **2.3.4 Effects on Sites**

It is assessed that, with the inclusion of the above Plan-level avoidance and mitigation measure, the Round 3 Plan will have no adverse effect on the integrity of any SACs that support bat interest features. A summary of the assessment for each site is presented in Table 2.3.

Table 2.3 Summary of Site Assessment for Bats where these are an Interest Feature

| SAC code and name                           | Qualifying features assessed in this section | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                     |
|---------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0012584<br>Bath and Bradford-on-Avon Bats | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
|                                             | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
|                                             | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
| UK0012585<br>Beer Quarry and Caves          | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
|                                             | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
|                                             | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
| UK0030095<br>Bracket's Coppice              | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030328<br>Bridglesford Copses            | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0016373<br>Chilmark Quarries              | <i>Barbastella barbastellus</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
|                                             | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
|                                             | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |
|                                             | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   |                                            |                                                                                                                                                     |

| SAC code and name                                                                             | Qualifying features assessed in this section                | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0014789<br>Coedydd Derw a Safleoedd Ystlumod Meirion/<br>Meirionnydd Oakwoods and Bat Sites | <i>Rhinolophus hipposideros</i>                             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0012715<br>Ebernoe Common                                                                   | <i>Barbastella barbastellus</i><br><i>Myotis bechsteini</i> | Potentially (onshore)<br>No                    | No<br>n/a                                                             | None identified                            | With the inclusion of Plan-level mitigation, AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030331<br>Eversden and Wimpole Woods                                                       | <i>Barbastella barbastellus</i>                             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0030148<br>Exmoor and Quantock Oakwoods                                                     | <i>Barbastella barbastellus</i><br><i>Myotis bechsteini</i> | Potentially (onshore)<br>No                    | No<br>n/a                                                             | None identified                            | With the inclusion of Plan-level mitigation, AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0012661<br>Glynllifon                                                                       | <i>Rhinolophus hipposideros</i>                             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0030168<br>Hestercombe House                                                                | <i>Rhinolophus hipposideros</i>                             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |

| SAC code and name                                                                       | Qualifying features assessed in this section | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                     |
|-----------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0014787<br>Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0012658<br>Mells Valley                                                               | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030203<br>Mendip Limestone Grasslands                                                | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0012804<br>Mole Gap to Reigate Escarpment                                             | <i>Myotis bechsteini</i>                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030334<br>Mottisfont Bats                                                            | <i>Barbastella barbastellus</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030161<br>Mwyngloddiau Forest Gwydir/ Gwydyr Forest Mines                            | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |

| SAC code and name                                                                                           | Qualifying features assessed in this section                        | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030227<br>North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro                                      | <i>Barbastella barbastellus</i>                                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030052<br>North Somerset and Mendip Bats                                                                 | <i>Rhinolophus hipposideros</i><br><i>Rhinolophus ferrumequinum</i> | No<br>No                                       | n/a<br>n/a                                                            | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030235<br>Paston Great Barn                                                                              | <i>Barbastella barbastellus</i>                                     | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0014793<br>Pembrokeshire Bat Sites and Bosherton Lakes/ Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton | <i>Rhinolophus hipposideros</i><br><i>Rhinolophus ferrumequinum</i> | No<br>No                                       | n/a<br>n/a                                                            | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0030337<br>Singleton and Cocking Tunnels                                                                  | <i>Myotis bechsteini</i>                                            | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0012650<br>South Hams                                                                                     | <i>Rhinolophus ferrumequinum</i>                                    | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |

| SAC code and name                                                                                               | Qualifying features assessed in this section | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0019863<br>St Albans Head to Durlston Head                                                                    | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0014783<br>Tanat and Vyrnwy Bat Sites/<br>Safleoedd Ystlumod Tanat<br>ac Efyrrwy                              | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0012716<br>The Mens                                                                                           | <i>Barbastella barbastellus</i>              | Potentially (onshore)                          | No                                                                    | None identified                            | With the inclusion of Plan-level mitigation, AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. |
| UK0014784<br>Usk Bat Sites/ Safleoedd<br>Ystlumod Wysg                                                          | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
| UK0014794<br>Wye Valley and Forest of<br>Dean Bat Sites/ Safleoedd<br>Ystlumod Dyffryn Gwy a<br>Fforest y Ddena | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |
|                                                                                                                 | <i>Rhinolophus ferrumequinum</i>             | No                                             | n/a                                                                   |                                            |                                                                                                                                                                                                  |
| UK0012727<br>Wye Valley Woodlands/<br>Coetiroedd Dyffryn Gwy                                                    | <i>Rhinolophus hipposideros</i>              | No                                             | n/a                                                                   | None identified                            | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan.                                              |

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## 3. Potential for Adverse Effects on Diadromous Fish Interest Features

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### 3.1 Introduction

#### 3.1.1 Sites in this Chapter

The screening process identified a number of sites which have diadromous fish<sup>20</sup> species as interest features. These included SACs/Ramsar sites with the following Annex II anadromous species:

- twaite shad (*Alosa fallax*);
- allis shad (*Alosa alosa*);
- Atlantic salmon (*Salmo salar*);
- sea lamprey (*Petromyzon marinus*); and
- river lamprey (*Lampetra fluviatilis*).

In addition, there is one Ramsar site with criteria relating to these species and the catadromous European eel (*Anguilla anguilla*).

Some of these sites are estuaries through which diadromous fish species migrate, and others are freshwater reaches of rivers which provide spawning grounds for anadromous species. Freshwater sites are not directly exposed to the effects of the Round 3 Plan, but have been included in the assessment on the basis that any effects of offshore windfarm development on diadromous fish at sea have the potential to affect populations spawning/maturing in freshwater rivers.

Within the screening process it was not possible to conclude that there would be no LSE on diadromous fish as a result of the Round 3 Plan, and consequently sites where these are interest features were brought through to the AA stage. This section deals with the AA of potential effects on diadromous fish interest features within these sites. Where the sites have other interest features for which AA is required, this AA has been undertaken in the relevant section of this report (Section 3 - marine mammals, Section 4 - habitats and Section 5 - birds).

At the request of SNH, the Annex II species freshwater pearl mussel (*Margaritifera margaritifera*) was added into the species assessed within this chapter; this species is present as a qualifying feature within a number of freshwater rivers already under assessment for their Atlantic salmon interest features. Whilst freshwater pearl mussel habitats are not directly

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<sup>20</sup> diadromous fish are species that use both marine and freshwater habitats during their life cycle; anadromous species migrate from the sea to breed in freshwater; and catadromous species migrate from freshwater to breed in the sea.

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affected by activities within the Round 3 Plan, freshwater pearl mussels are dependent on salmonid populations for survival. Larval freshwater pearl mussels (glochidia) use their shells to clamp onto the gill filaments of juvenile salmon and sea trout, remaining attached for 6 – 8 months before detaching and growing to maturity in clean freshwater environments<sup>21</sup>. Consequently the viability of freshwater pearl mussel populations is directly related to the viability of salmonid populations, and where Round 3 activities have the potential to affect the integrity of populations of Atlantic salmon within SACs which also contain freshwater pearl mussel, it should be assumed that there is the potential for an adverse effect on the integrity of freshwater pearl mussel populations also.

Table 3.1 shows the sites for which AA has been undertaken in this section of the report, along with their qualifying interest features. Where sites containing salmon populations have been brought through to AA, the presence of qualifying populations of freshwater pearl mussel at the sites has been noted within the table. Other UK sites containing freshwater pearl mussel as a qualifying feature, where the salmon populations have not been identified within the screening process as potentially being subject to LSEs, have not been included within the table, as there is no pathway for the Round 3 plan to affect these freshwater pearl mussel populations.

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<sup>21</sup> Skinner, A., Young, M. & Hastie, L. (2003) *Ecology of the Freshwater Pearl Mussel*. Conserving Natura 2000 Rivers Ecology Series No. 2 English Nature, Peterborough.

**Table 3.1 Sites for which an Appropriate Assessment of Diadromous Fish and Freshwater Pearl Mussel Interest Features has been Undertaken**

| Site Code | Site Name                                                         | Atlantic salmon<br>( <i>Salmo salar</i> ) | Allis shad<br>( <i>Alosa alosa</i> ) | Twaites shad<br>( <i>Alosa fallax</i> ) | Sea lamprey<br>( <i>Petromyzon marinus</i> ) | River lamprey<br>( <i>Lampetra fluviatilis</i> ) | European eel<br>( <i>Anguilla anguilla</i> ) | Freshwater Pearl<br>Mussel ( <i>Margaritifera<br/>margaritifera</i> ) | Other interest features for which Appropriate<br>Assessment has been undertaken at this site                                                                                                                                                     |
|-----------|-------------------------------------------------------------------|-------------------------------------------|--------------------------------------|-----------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0013010 | Afon Tywi / River Tywi SAC                                        |                                           | ✓                                    | ✓                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                             |
| UK0030088 | Berriedale and Langwell Waters<br>SAC                             | ✓                                         |                                      |                                         |                                              |                                                  |                                              |                                                                       | None                                                                                                                                                                                                                                             |
| UK0020020 | Carmarthen Bay and Estuaries / Bae<br>Caerfyrddin ac Aberoedd SAC |                                           | ✓                                    | ✓                                       | ✓                                            | ✓                                                |                                              |                                                                       | Sandbanks which are slightly covered by seawater all<br>the time<br>Estuaries<br>Mudflats and sandflats not covered by sea water at low<br>tides<br>Large shallow inlets and bays<br><i>Salicornia</i> and other annuals colonising mud and sand |
| UK0030131 | Dee Estuary / Aber Dyfrdwy SAC                                    |                                           |                                      |                                         | ✓                                            | ✓                                                |                                              |                                                                       | Estuaries<br>Mudflats and sandflats not covered by sea water at low<br>tides<br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                                                                                                         |

| Site Code | Site Name                                                 | Atlantic salmon<br>( <i>Salmo salar</i> ) | Allis shad<br>( <i>Alosa alosa</i> ) | Twait shad<br>( <i>Alosa fallax</i> ) | Sea lamprey<br>( <i>Petromyzon marinus</i> ) | River lamprey<br>( <i>Lampetra fluviatilis</i> ) | European eel<br>( <i>Anguilla anguilla</i> ) | Freshwater Pearl<br>Mussel ( <i>Margaritifera<br/>margaritifera</i> ) | Other interest features for which Appropriate<br>Assessment has been undertaken at this site                                                                                                                                              |
|-----------|-----------------------------------------------------------|-------------------------------------------|--------------------------------------|---------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030170 | Humber Estuary SCI                                        |                                           |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | <i>Halichoerus grypus</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br>Sandbanks which are slightly covered by seawater all<br>the time<br>Estuaries<br>Mudflats and sandflats not covered by sea water at low<br>tides |
| UK0030252 | River Dee and Bala Lake/ Afon<br>Dyfrdwy a Llyn Tegid SAC | ✓                                         |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |
| UK0030253 | River Derwent SAC                                         |                                           |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |
| UK0030261 | River Oykel SAC                                           | ✓                                         |                                      |                                       |                                              |                                                  |                                              | ✓                                                                     | None                                                                                                                                                                                                                                      |
| UK0030262 | River South Esk *                                         | ✓                                         |                                      |                                       |                                              |                                                  |                                              | ✓                                                                     | None                                                                                                                                                                                                                                      |
| UK0019811 | River Spey SAC                                            | ✓                                         |                                      |                                       | ✓                                            |                                                  |                                              | ✓                                                                     | None                                                                                                                                                                                                                                      |
| UK0030312 | River Tay *                                               | ✓                                         |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |
| UK0030263 | River Teith SAC                                           | ✓                                         |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |
| UK0012691 | River Tweed *                                             | ✓                                         |                                      |                                       | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |
| UK0013007 | River Usk / Afon Wysg SAC                                 | ✓                                         | ✓                                    | ✓                                     | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                                                                                                                                                                      |

| Site Code | Site Name                       | Atlantic salmon<br>( <i>Salmo salar</i> ) | Allis shad<br>( <i>Alosa alosa</i> ) | Twaité shad<br>( <i>Alosa fallax</i> ) | Sea lamprey<br>( <i>Petromyzon marinus</i> ) | River lamprey<br>( <i>Lampetra fluviatilis</i> ) | European eel<br>( <i>Anguilla anguilla</i> ) | Freshwater Pearl<br>Mussel ( <i>Margaritifera<br/>margaritifera</i> ) | Other interest features for which Appropriate<br>Assessment has been undertaken at this site |
|-----------|---------------------------------|-------------------------------------------|--------------------------------------|----------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| UK0012642 | River Wye / Afon Gwy SAC        | ✓                                         | ✓                                    | ✓                                      | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                         |
| UK0013030 | Severn Estuary / Môr Hafren SCI |                                           |                                      | ✓                                      | ✓                                            | ✓                                                |                                              |                                                                       | None                                                                                         |
| UK11031   | Humber Estuary Ramsar           |                                           |                                      |                                        | ✓                                            | ✓                                                |                                              |                                                                       | Criterion 1 (estuary)<br>Criterion 3 (grey seal)<br>Criteria 5 & 6 (birds)                   |
| UK11081   | Severn Estuary Ramsar           | ✓                                         | ✓                                    | ✓                                      | ✓                                            | ✓                                                | ✓                                            |                                                                       | Criteria 5 & 6 (birds)                                                                       |

\* These sites were not originally assessed within the screening report, and have been added to the list of sites brought through to AA at the request of SNH.

### 3.1.2 Conservation Objectives

Conservation Objectives for anadromous fish interest features in SACs comprise some (or all) of the following elements:

*The feature will be considered to be in favourable condition when, subject to natural processes, each of the following conditions are met: the migratory passage of both adult and juvenile fish is not obstructed or impeded by physical barriers, changes in flows or poor water quality; the size of the fish population is at least maintained and is at a level that is sustainable in the long term; the abundance of prey species forming the fish food is maintained; and toxic contaminants in the water column and sediment are below levels which would pose a risk to the ecological objectives described above.*

It is these objectives which have been used in this section of the report to assess the potential for the Round 3 Plan to have adverse effects on the integrity of diadromous fish populations within SACs. In the absence of Conservation Objectives for Ramsar sites, the same objectives have been applied to diadromous fish within Ramsar sites.

Further information on the five diadromous fish species and their sensitivities to activities associated with the Round 3 Plan is provided in Section 3.2. This information is then used to draw AA conclusions in Section 3.3.

### 3.1.3 Sensitivities of Diadromous Fish to Round 3 Plan Activities

The potential sensitivities of diadromous fish that were examined at the screening stage are listed in Table 3.2. Where a LSE could not be ruled out at the screening stage, sites were brought through for more detailed examination of these effects at the AA stage. The sensitivities assessed in this AA primarily arise from noise and turbidity.

**Table 3.2 Sensitivities of Diadromous Fish to Associated Round 3 Activities**

| Sensitivities                                  | Relevant Round 3 zone activities                                                                                                         | Survey | Installation | Operation | Decomm -<br>issioning | Information required for assessment                               |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------------|-------------------------------------------------------------------|
| Noise injury (especially to early life stages) | Seismic surveys                                                                                                                          | ◆      |              |           |                       | Will fish be present in the area affected by noise? Noise levels. |
| Noise injury (especially to early life stages) | Installation or removal of turbines or cables (using percussive piling for installation or percussive methods/explosives for demolition) |        | ◆            |           | ◆                     | Will fish be present in the area affected by noise? Noise levels. |
| Noise disturbance (especially to shad)         | Installation or removal of turbines or cables                                                                                            |        | ◆            |           | ◆                     | Will fish be present in the area affected by noise? Noise levels. |

| Sensitivities                                                       | Relevant Round 3 zone activities              | Survey | Installation | Operation | Decomm -<br>issioning | Information required for assessment                                               |
|---------------------------------------------------------------------|-----------------------------------------------|--------|--------------|-----------|-----------------------|-----------------------------------------------------------------------------------|
| Noise disturbance (especially to shad and to fish larvae generally) | Turbine operation                             |        |              | ◆         |                       | Will fish be present in the area affected by noise? Noise levels.                 |
| Increased suspended solids concentration                            | Installation or removal of turbines or cables |        | ◆            |           | ◆                     | Will fish be present in areas affected by sediment disturbance? Turbidity levels. |

## 3.2 Species Ecology and Sensitivities

### 3.2.1 Overview of Species Interest Features

#### ***Salmo salar* -Atlantic Salmon**

The Atlantic salmon (*Salmo salar*) is listed in Annexes II and V of the European Union's (EU) Habitats Directive as a species of European importance<sup>22</sup>.

Salmon migrate from the sea to breed in freshwater, typically their natal watercourse, reflecting the well-developed homing instinct of this species. Adult males can reach up to 1.5m in length and 36kg in weight, while females can reach up to 120cm in length and 20kg in weight. The usual life span of salmon is approximately four to six years, but some can live up to 10 years<sup>22</sup>.

Salmon spawn in autumn or winter in shallow excavations in gravel deposits called redds. Salmon typically excavate redds in the shallower upper reaches of clean rivers/streams, often in reaches comprising riffle-pool sequences. After a period of one to six years spent in freshwater the young salmon undergo physiological and behavioural changes to become smolts and migrate downstream to the sea. This downstream migration typically takes place in spring, although some rivers also have autumn smolt migrations. The smolts spend time in estuaries to acclimatise to the salinity of the sea water and to a change of diet before migrating to coastal waters, and then to the distant Norwegian Sea or Greenland.

Salmon live in the sea from the ages of three to seven years, mostly near the surface or in mid-water. The distribution of Atlantic salmon ranges from the Arctic region of Russia to northern Spain, and from Greenland down the coast of Canada and United States<sup>23</sup>. The amount of time salmon spend at sea before returning to their natal watercourse to spawn varies from one to four winters.

<sup>22</sup> Hendry, K. & Cragg-Hine, D. (2003) *Ecology of the Atlantic Salmon*. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough.

<sup>23</sup> Wheeler, A. (1992) *The Pocket Guide to Saltwater Fishes of Britain and Europe*. Dragons World Ltd. Limpsfield.

When smolts reach the sea, they feed primarily on fish such as capelin and sandeels, and crustacea (particularly euphausiids and amphipods)<sup>24</sup>.

In marine waters threats to this species include changes in sea surface temperatures, which reduces the area of suitable habitat<sup>25</sup>; fish farming, resulting in localised increases in sea lice, affecting outgoing smolts<sup>26</sup>; industrial fishing, which can affect marine-phase salmon both indirectly via over-exploitation of their food source (e.g. sand eel fishery), or directly by post-smolts being netted as by-catch; and increased predation by seals<sup>27</sup>.

The mechanism by which returning adult salmon navigate back to their natal river is not fully understood. However as the salmon migrate around the coast and approach the estuary the mechanism is thought to be predominantly olfactory recognition of the chemical fingerprint of the river on which the salmon imprinted as juveniles.

#### *European Status and Distribution*

The Atlantic salmon is widely distributed within the EU, ranging from Portugal in the south to Sweden and Finland in the north. The UK salmon population comprises a significant proportion of the total European stock. Scottish rivers in particular are a European stronghold for the species<sup>30</sup>.

#### *UK Status and Distribution*

The Atlantic salmon is a widespread species in the UK and is found in several hundred rivers, many of which have adult runs in excess of 1000. The latest estimates of the UK spawning population size (ICES 2000) are, however, about 50% down on the ten-year average.

Freshwater pearl mussel (*Margaritifera margaritifera*) are dependent on salmonids (primarily Atlantic salmon and brown trout (*Salmo trutta*)) during larval development. Juvenile freshwater pearl mussel spend 6 – 8 months maturing on the fill filaments of juvenile salmonids before detaching and maturing in freshwater.

#### ***Alosa alosa* - Allis Shad and *Alosa fallax* - Twaite Shad**

The allis shad (*Alosa alosa*) and twaite shad (*Alosa fallax*) are members of the herring family. The shads form a large group of pelagic fishes found in seas all over the world except the Antarctic. They can grow to a length of between 30 to 50 cm and a weight of approximately 2kg. Allis shad are usually larger than twaite shad, which rarely exceed 40cm. They spend most of their adult lives in shallow coastal waters and estuaries travelling in shoals near the surface and range from southern Iceland and the Baltic Sea southwards to Morocco and throughout the Mediterranean<sup>23</sup>.

<sup>24</sup> Pyefinch, K.A. (1952) Capture of the pre-grilse stage salmon. *Scottish Naturalist* 64, 47.

<sup>25</sup> Friedland, K.D. & Reddin, D.G. (1993) Marine survival of Atlantic salmon from indices of post-smolt growth and sea temperature. In: Mills, D.H. (ed). *Salmon in the sea*. Fishing News Books, Oxford 119–138.

<sup>26</sup> Whelan, K.F. (1993) Decline of sea trout in the west of Ireland: an indication of forthcoming marine problems for salmon. In: Mills, D.H. (ed). *Salmon in the Sea*. Fishing News Books, Oxford, 171–183.

<sup>27</sup> Scottish Office (1997). *Report of the Scottish Salmon Strategy Task Force*. Scottish Office, Edinburgh, 86 pp.

Shad migrate into rivers to spawn during late spring (April to June), giving the shad the name of 'May Fish'<sup>28</sup>. Adults spawn at night when the eggs are released into the current where they settle among gaps in gravel substrates. Spawning sites tend to be used year after year, and relatively shallow gravel areas adjacent to deep pools are thought to represent optimal spawning habitat. Almost all adults die after spawning.

After hatching, the young remain in the slow-flowing reaches of the lower parts of rivers, then move into the estuary and eventually into coastal waters and the open sea, occasionally in water up to 300m deep. In coastal waters, the adults feed mainly on invertebrates, especially planktonic crustaceans such as calanoids, mysids and euphausiids, but also to some extent on small fish<sup>29</sup>.

#### *UK Status and Distribution*

Allis shad is rare in the UK. Although formerly known to spawn in several British river systems, the only recently-confirmed spawning site is in the Tamar Estuary (Plymouth Sound and Estuaries cSAC). There is probably a spawning population in the Solway Firth area (Maitland & Lyle 2001) but rivers in the Severn catchment may no longer support viable breeding populations (Carstairs 2000).<sup>30</sup>

Twaite shad are known to occur in a few rivers in Wales and on the England/Wales border flowing into the Severn estuary; no spawning stocks are known north of this, although the species is present in south-west Scotland, in rivers flowing into the Solway Firth, where hybrids with allis shad have been reported.

#### ***Petromyzon marinus* - sea Lamprey**

The sea lamprey (*Petromyzon marinus*) resembles an eel but is a cartilaginous fish with sucking mouthparts. It is the largest of the lampreys found in the UK, growing to a length of 100cm and a weight of approximately 2.5kg. It breeds in rivers that are accessible and lack barriers to upstream migration, and completes its life cycle in the marine environment, with adults usually being found in coastal waters, but also often far out to sea.

In British rivers, the sea lamprey usually spawns in late May or June in British rivers, when the water temperature reaches at least 15°C. It spawns in nests in clean gravel in rivers. After hatching, the lamprey larvae (ammocoetes) leave the nest and drift downstream, distributing themselves among, and buried within, silt beds. The duration of larval life varies, but averages about five years before the larvae metamorphose to adults, usually in late summer, between July and September.

The adults feed on a wide variety of marine and anadromous fishes, including sturgeon herring, salmon, cod and haddock.

<sup>28</sup> Maitland, P.S. & Hatton-Ellis, T.W. (2003) *Ecology of the Allis and Twaite Shad*. Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough.

<sup>29</sup> Maitland, P.S. and Lyle, A.A. (1991) Conservation of freshwater fish in the British Isles: the current status and biology of threatened species. *Aquatic Conservation* 1, 25–54.

<sup>30</sup> <http://www.jncc.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1102>

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### *European Status and Distribution*

The sea lamprey occurs in estuaries and accessible rivers over much of the Atlantic coastal area of western and northern Europe (from northern Norway to the western Mediterranean) and eastern North America. It has declined in some parts of its European range.

### *UK Status and Distribution*

The sea lamprey is relatively widespread in UK rivers. In some places it is common, but it has declined in parts of its range and has become extinct in a number of rivers. It appears to reach its northern limit of distribution in Scotland and does not occur north of the Great Glen.

### ***Lampetra fluviatilis* – river Lamprey**

The river lamprey (*Lampetra fluviatilis*) is a migratory species found in coastal waters, estuaries and accessible rivers.

The average length of a river lamprey is approximately 30cm with a weight of approximately 60g. It grows to maturity in estuaries around Britain and then moves into fresh water to spawn on gravel in clean rivers and streams. The larvae spend several years in silt beds before migrating downstream to estuaries<sup>31</sup>.

Mature river lamprey, spend one to two years in estuaries, before migrating into fresh water from October to December to spawn. During winter and early spring they continue to migrate upstream at night when conditions are suitable, hiding under stones and vegetation during the day.

The habitat requirements of river lampreys include suitable estuarine conditions, free from pollution and supporting suitable prey species; and migration routes from the estuary to their spawning grounds that have suitable river flows and lack barriers to migration. They also need suitable refuge habitats, clean spawning gravels and slower flowing nursery areas comprising sandy silt in fresh water.

### *European Status and Distribution*

The river lamprey is found only in western Europe, where it has a wide distribution from southern Norway to the western Mediterranean. The UK populations are considered important for the conservation of the species at an EU level.

### *UK Status and Distribution*

The river lamprey is widespread in the UK, occurring in relatively large, self-sustaining populations in many rivers from the Great Glen in Scotland southwards.

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<sup>31</sup> Maitland, P.S. (2003) *Ecology of the River, Brook and Sea Lamprey*. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

### ***Anguilla anguilla* – European Eel**

The European eel (*Anguilla anguilla*) is widely distributed throughout Great Britain and Ireland and is most often found in shallow freshwater, around the coast and in estuaries. Female eels are much larger than males, normally reaching up to 1m in length. Males are usually half the size of females<sup>32</sup>.

European eels spawn in the sea and spend most of their lives in freshwater. The yellow eel is the normal feeding and growing phase of the species which takes place in rivers, lakes and estuaries. As this species reaches maturity at approximately 4 to 10 years old, they change to silver eels.

Silver eels migrate down rivers to the sea in autumn (September to October) and are often found in shallow water along the coast, especially near the shore and in estuaries. They do not remain in coastal waters for long, but migrate to the deep Atlantic Ocean, particularly the Sargasso Sea, which is approximately 4,000km from Europe. In these deep waters the eels breed at depths of between 100 to 300m. Once at the breeding ground, eggs are laid and fertilized in deep water and then the adult fish die. The eggs hatch during March and April and float back to Europe as larvae (leptocephali) in the Gulf Stream, taking about three years to reach the shore, developing into glass eels and subsequently elvers as they migrate up rivers. Once in a suitable habitat they grow and develop into yellow eels.

As young fish, eels feed on worms, molluscs, copepods, insect larvae, shrimps, crabs and small fishes. The post larval stages eat planktonic animals. Maturing eels do not feed (Wheeler 1992<sup>33</sup>).

### **3.2.2 Summary of Species' Ecology**

Tables 3.3 summarises information about the ecology of diadromous fish interest features. Figure 3.1 illustrates the timing of the key stages in their life cycle

**Table 3.3 Summary of Ecology of Diadromous Fish Interest Features**

| <b>Species</b> | <b>Freshwater phase</b>                                                                                                                                                                                    | <b>Marine phase</b>                                                                                                                                                                                                       |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Salmon</b>  | Salmon spawn in their natal watercourses during autumn and winter and typically begin entering freshwater in advance of this<br><br>Salmon spend 1 to 5 years in freshwater before migrating to the coast. | Smolts typically begin their migration to the sea in Spring. Young salmon live in the sea from 3-7 years, mostly near the surface or in mid-water. Salmon are known to congregate around Greenland and the Faroe islands. |

<sup>32</sup> Dipper, F. (1987). British Sea Fishes. Underwater World Publications. London.

<sup>33</sup> Wheeler, A. (1992) The Pocket Guide to Saltwater Fishes of Britain and Europe. Dragons World Ltd. Limpsfield.

| Species                                          | Freshwater phase                                                                                                                                                | Marine phase                                                                                                                                                                                                |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Shad species (Allis shad and twaite shad)</b> | Shad migrate into rivers during Spring.                                                                                                                         | Adults spend most of their lives in coastal waters and estuaries.                                                                                                                                           |
| <b>Sea Lamprey</b>                               | Sea Lampreys typically spawn in late May, June and into July.                                                                                                   | Adults are usually found in coastal waters, but also often far out to sea                                                                                                                                   |
| <b>River Lamprey</b>                             | Lamprey migrate into fresh water from October to December and spawn in spring and early summer (March to June).                                                 | Mature river lamprey, spend one to two years in estuaries, before moving upstream in autumn into medium to large rivers.                                                                                    |
| <b>Common eel</b>                                | Migrate downstream from rivers to coastal waters during September and October before heading out to open seas. The returning glass eels enter rivers in spring. | Breeding and spawning takes place in deep open seas (Sargasso Sea). Larvae begin to migrate passively, taking one to three years to float back to Europe, developing into glass eels during this migration. |

**Figure 3.1 Timing of the Key Stages in Species' Life Cycles**

| Species                      | Jan                         | Feb | Mar                                                                  | Apr                                                   | May                           | Jun | Jul | Aug | Sep                                                  | Oct                                                         | Nov                                           | Dec |
|------------------------------|-----------------------------|-----|----------------------------------------------------------------------|-------------------------------------------------------|-------------------------------|-----|-----|-----|------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------|-----|
| <b>Salmon</b>                | Spawning in freshwater      |     | Migration from freshwater to coastal waters                          |                                                       |                               |     |     |     |                                                      | Migration into freshwaters to spawn.                        |                                               |     |
| <b>Allis and twaite shad</b> |                             |     |                                                                      | Migration from coastal waters to freshwater to spawn. |                               |     |     |     |                                                      |                                                             |                                               |     |
| <b>River Lamprey</b>         | Continue migrating upstream |     | Spawning period in freshwater                                        |                                                       |                               |     |     |     |                                                      | Begins migration from coastal waters to freshwater to spawn |                                               |     |
| <b>Sea Lamprey</b>           |                             |     |                                                                      |                                                       | Spawning period in freshwater |     |     |     |                                                      |                                                             |                                               |     |
| <b>Common eel</b>            |                             |     | Spawning period in marine waters and migration of elvers into rivers |                                                       |                               |     |     |     | Migrate down stream to coastal waters and estuaries. |                                                             | Begins migration to deep sea waters to breed. |     |

### 3.2.3 Sensitivities of Diadromous Fish to Round 3 Activities

#### Sensitivity of Diadromous Fish to Noise

Fish hear/sense noise and vibration using either an bone (otolith) in the inner ear, or a combination of both the swim bladder and the inner ear. Fish with larger otoliths may be more sensitive to low-frequency sounds. The otoliths are important in the detection of flow fields (hydrodynamic/water movements). In some fish the swim bladder transforms sound pressure into particle motion which in turn stimulates the inner ear/otolith. Low frequency sound has the

character of hydrodynamic motion in the near field, therefore it is likely that windfarms will produce flow fields<sup>34</sup>.

Behavioural audiograms for different species of fish vary widely. Some fish species are 'hearing generalists', detecting sounds up to 500–1,000Hz, with an optimum around 100 to 400Hz. These species detect sound mainly via the inner ear<sup>35</sup>. 'Hearing specialists' use a combination (mechanical coupling) of the swim bladder and inner ear to detect sound of frequencies up to 3,000Hz, with an optimum around 300 to 1,000Hz<sup>35</sup>. The most important flow fields that fish encounter are caused by the motion of predators or prey. These are of low frequency depending on the size of the animal. The frequency arising from ordinary swimming movements is usually below 50Hz with higher frequencies only generated in the case of abrupt movement such as escape responses or predator attacks<sup>36</sup>.

The hearing and sensitivity response of many marine organisms overlaps, to an extent, with noise in the marine environment from anthropogenic sources. The oceans are characterised by a permanent level of background noise, caused by wind, waves, currents, precipitation, and anthropogenic activity, such as shipping. In general, anthropogenic noise tends to be broadband and of low frequency within the range of 10Hz to 1000Hz<sup>34</sup>. Frequencies below 200Hz are dominated by shipping noise. Frequencies from about 200Hz to 10kHz result from sea surface effects. Background noise levels in shallow waters are higher than in the open sea.

The effects of anthropogenic noise on fish are broadly categorised into behavioural and physiological effects and sensitivity to sound levels differs between species<sup>34</sup>. The sensitivity of a particular fish species to noise and vibration depends on:

- the audible frequency threshold - eels have thresholds reported to extend below 100Hz;
- the presence and size of a swim bladder - fish with swim bladders will be more at risk than those without; larger fish whose swim bladders resonate at lower frequencies will be more sensitive to windfarm noise than smaller fish whose swim bladder volume is less, although the swim bladder is not thought to be an important part of detecting sound amongst Atlantic Salmon;
- mechanical coupling of the swim bladder to the ear, which is more typical of hearing specialists.
- the resonance frequency of the otolith system - possibly, the larger the otolith, the lower the resonant frequency;

<sup>34</sup> Vella, G., Rushford, I., Mason, E., Hough, A., England, R., Styles, R., Holt, T. & Thorne, P. (2001) Assessment of the effects of noise and vibration from offshore windfarms on marine wildlife. University of Liverpool, Centre for Marine and Coastal Studies Environmental Research and Consultancy.

<sup>35</sup> Thomsen, F., Ludemann, K., Kafemann, R. & Piper, W. (2006) *Effects of offshore windfarm noise on marine mammals and fish*, Biola, Hamburg Germany on behalf of Cowrie Ltd

<sup>36</sup> Hoffman, E., Astrup J., Larsen F., Munch-Peterson S., & Strottrup J. (2000) *The effects of marine windfarms on the distribution of fish, shellfish and marine mammals in the Horns Rev area*. Baggrundsrapport nr 24. Report to ELSAMPROJERT A/S. Danish Institute of Fisheries Research.

- behavioural features such as schooling/aggregating behaviour may also influence the sensitivity of fish to offshore windfarm noise<sup>34</sup>.

As described above fish hear in a relatively restricted low frequency range. Many species hear in the range from about 30Hz to 1kHz, although sensitivities in the infrasonic (<20Hz) and ultrasonic range (>20kHz) are known among some species. Hearing thresholds are frequency-dependant. In marine fish, threshold values are known between 63 and 103dB re 1μPa. Sound measurements during the construction of offshore turbines and other marine structures revealed the highest energies in the low frequency range (about 30Hz - 2kHz). This corresponds with the hearing range of fish. From various measurements of piling activities, sound pressure levels at a distance of 1m from the sound source were calculated between 227 and 260dB re 1μPa (peak level).

Studies of the impact of anthropogenic noise on fish have considered the effects of geophysical surveys, particularly the effects from 'airguns' used for seismic surveys. These devices can produce a range of effects on fish behaviour from avoidance to physiological effects. Studies have shown that noise associated with shipping can cause avoidance (or attraction) which can lead to avoidance of migration routes, feeding areas and spawning areas<sup>34</sup>. Intermittent loud noise may have an adverse effect on local fish populations, causing alarm responses and probable movement of fish away from construction areas.

There is no common procedure for the foundation grounding of wind turbines at sea. Different types of foundations may be considered, depending on water depth, sediment and turbine type and may have different magnitudes of effects on fish. The grounding of gravity foundations causes minor sound emissions. Monopiles are cylindrical large-bore steel tubes with thick walls which are hammered upright into the sea bed. Tripod and jacket foundations have various small (partly inclined) tubes which are hammered into the bottom. Piling can be done with impact or vibration hammers. At sea, impact hammers with a high maximum sound energy may be used. Sound emissions also vary with seabed structure, water depth, type of foundation, type of piling, and mitigation measures adopted. Results from measurements during piling have been published from Sweden, Great Britain and Germany. The range of piling noise has its maximum in the low frequency range. Highest energies occurred in the range of 30 - 2000 Hz. This frequency range overlaps with the hearing range of many fish species<sup>37</sup>.

Both physiological and behavioural effects are considered possible due to the noise of offshore pile driving. However the risk of mortalities is likely to be low/localised. Injuries and deafness are also possible. Other potential effects include stress responses. The effects that are most likely to occur are behavioural reactions. These could lead to avoidance and flight reactions, alarm response, and changes of shoaling behaviour, which could in turn alter local distribution/abundance.

During the construction of offshore windfarms, noise is also generated by construction and supply vessels. The frequency range and the sound level of vessels depends on their size, their system of powering, and their operation. The frequencies emitted are between 20Hz and 10kHz with source levels from 130 to more than 160dB re 1μPa at 1m. This sound induction can last over extended periods. For example, the construction work at the Horns Rev windfarm in

<sup>37</sup> Zucco, C., Wende, W., Merck, T., Köchling, I., & Köppel, J. (eds.) (2006) Ecological Research on Offshore Wind Farms: International Exchange of Experiences PART B: Literature Review of Ecological Impacts. Federal Agency for Nature Conservation

Denmark lasted from September 2001 to September 2002, with an interruption of several months during the winter. Some fifteen to twenty ships were present for construction and supply purposes.

The emissions of operational wind turbines are known for single turbines with capacities of between 500kW and 2MW. Relevant emissions occur in the low-frequency range (about 20Hz to 1kHz) and considerable variations have been observed.  $L_{eq}$ -levels in 1/3 octave bands were registered between 102 and 125dB re 1μPa. For the future wind turbines of approximately 5MW, extrapolations predict continuous sound levels of up to 150dB re 1μPa.

In some cases fish are known to readily habituate and utilise windfarm sites at higher than normal densities, taking advantage of the shelter provided and probably also the additional food resources provided by colonising animals.

Relatively few studies have investigated the impact of wind turbines on fish. Therefore avoidance reactions amongst fish have not been satisfactorily demonstrated. However, based on the information summarised above, it is likely that the operational noise of offshore windfarms could cause behavioural reactions (avoidance) in some fish. This will vary between species depending on a range of factors. However a study of the effects of operational turbine noise on migrating eels<sup>38</sup>, did not show a significant effect of the Svante Windfarm on this species.

#### **Sensitivity of Diadromous Fish to Turbidity**

Elevated turbidity can abrade or clog fish gills/membranes and lead to secondary infections. There is no evidence of detrimental effects of suspended solids on salmonids at concentrations <25mg/l. Turbidity levels up to 80mg/L are also acceptable to salmonids<sup>39</sup> and levels exceeding this will be tolerated and are experienced by Atlantic salmon for short periods during spates.

There are limited data on the effects of turbidity on shad, lampreys and eels. However all five species spend long periods in estuaries and migrate up spate rivers and are therefore likely to tolerate a range of suspended sediment concentrations. All of these species inhabit rivers that also support salmonids and are also likely to be unaffected by suspended sediment concentrations <25mg/l. This is the upper limit of the standard set for salmonid rivers under the European Freshwater Fish Directive 2006<sup>40</sup>. All of the above species are likely to tolerate concentrations well in excess of 25mg/l for periods, particularly whilst they are in estuaries and following spates. Eels in particular are tolerant of a range of conditions, including stagnant/still water, estuaries and spate rivers and are likely to be tolerant of temporary periods of elevated concentrations of suspended sediment. This species also has the ability to close its gill flaps and cross damp ground.

<sup>38</sup> Westerberg, H. (2000) *Impact Studies of Sea-based Wind Power in Sweden. "Technische Eingriffe in marine Lebensraume"*

<sup>39</sup> Crisp, D. T. (2000) *Trout and Salmon: Ecology, Conservation and Rehabilitation*. Blackwell Science, Oxford

<sup>40</sup> Directive 2006/44/EC of the European Parliament and of the Council of 6<sup>th</sup> September 2006 on the quality of freshwaters needing protection or improvement in order to support fish life

### 3.3 Effects of the Round 3 Plan

#### 3.3.1 *Salmo salar* - Atlantic Salmon

Effects of the Round 3 Plan on salmon are likely to have effects on any associated populations of freshwater pearl mussel; this is the only mechanism for the Round 3 Plan to have an effect on freshwater pearl mussel. Therefore, where the two species are both present as qualifying features within a European site where LSEs have been identified in relation to salmon, the conclusion that is drawn for salmon is also drawn for freshwater pearl mussel.

##### Noise Effects

Any noise-related mortality/injury to Atlantic salmon is likely to be localised to the source of noise, e.g. piling and seismic surveys. Salmon smolts congregating into shoals in an estuary as well as adults passing turbine locations are likely to be susceptible to noise-related effects. However these localised, temporary effects of relatively short duration are likely to affect only small numbers of salmon and are unlikely to have significant effects on the conservation status of salmon populations.

The operating noise of wind turbines could influence salmon behaviour, either by attracting or repelling fish, with the distance of these effects from the noise source being influenced by ambient noise levels, which are often weather-related. Research indicates that salmon may detect operational windfarm noise at distances of approximately 1km<sup>35</sup>. However it is likely to be feasible to minimise the risk of these effects through the design of the turbine cluster such that the turbines are, as a guide, over 1km apart. All the development zones are over 1km from the coast/estuaries.

##### Turbidity

There is no evidence of detrimental effects of suspended solids on salmon at concentrations <25mg/l. Turbidity levels up to 80mg/l are also acceptable and levels exceeding this will be tolerated and are experienced by salmon for short periods during spates<sup>39</sup>. The cable works within estuaries are likely to be localised and of short duration. Therefore significant effects on salmon due to elevated turbidity during cable works are unlikely. The appropriate timing of works in estuaries will mitigate these effects. Increases in turbidity off-shore during turbine installation are likely to be brief/intermittent and are therefore also unlikely to have significant effects on salmon populations.

#### 3.3.2 *Alosa alosa* - Allis Shad and *Alosa fallax* - Twaite Shad

##### Noise Effects

There is limited information available on the marine habitat requirements of, and/or noise effects on shad. Herring, a species related to shad, is likely to detect the noise of wind turbines up to 4km away<sup>35</sup>. However as shad have a predominantly coastal distribution, operational noise generated by wind turbines over 4km offshore is unlikely to have a significant effect on these species. Similarly there is unlikely to be significant shad mortality/injury due to piling at off-shore turbine locations. Noise generated by operational wind turbines and during turbine construction is likely to be masked to some extent by background noise, which tends to be higher at coastal locations.

There is limited scope for intense noise at the head of the tide in estuaries to cause localised mortality/injury of shoaling/feeding juveniles. However any such noise is likely to be localised and of short duration and these effects would be effectively mitigated by appropriate timing of cabling works and use of appropriate cabling techniques. Therefore noise generated during wind turbine construction and operation is likely to have no significant effects on shad.

#### **Turbidity**

Shad feed on zooplankton in estuaries. Therefore prolonged increases in turbidity in estuaries are likely to influence feeding success. However they are likely to be tolerant of the range of turbidities that are typical of estuaries. Therefore, given the temporary nature of the works within estuaries and the appropriate timing of the works, short term increases in turbidity are unlikely to have significant effects on the conservation status of shad. It is reasonable to assume that shad will also exhibit behavioural avoidance of highly turbid water and move to other parts of the estuary. It is therefore concluded that appropriate timing of works in the upper estuary and the adoption of appropriate working practices will avoid effects on juvenile shad that could affect the species' conservation status.

### **3.3.3 *Petromyzon marinus* - Sea Lamprey**

#### **Noise Effects**

Although sea lampreys do occur in open oceans, they are likely to be most concentrated at coastal and estuarine locations. Therefore noise generated by the construction/piling and operation of offshore wind turbines is likely to have no significant effects on the conservation status of lamprey populations. Temporary noise of relatively short duration generated by works in estuaries is also unlikely to have significant effects on lamprey populations.

#### **Turbidity**

Lampreys spend long periods in estuaries and are likely to be exposed to a range of suspended sediment concentrations. They are also likely to tolerate elevated suspended sediment concentrations similar to those tolerated by salmonids as described above. Therefore temporary, localised increases in turbidity in estuaries are likely to have no significant effects on lamprey populations.

### **3.3.4 *Lampetra fluviatilis* – River Lamprey**

#### **Noise Effects**

River lampreys predominantly inhabit coastal estuaries prior to their upstream spawning migration. Therefore noise generated by the construction/piling and operation of offshore wind turbines is likely to have no significant effects on the conservation status of lamprey populations. Temporary noise of relatively short duration generated by works in estuaries is also unlikely to have significant effects on lamprey populations.

#### **Turbidity**

There is limited available information on lampreys' tolerance of turbidity. However they spend long periods in estuaries and are likely to be exposed to a range of suspended sediment concentrations. They are also likely to tolerate elevated suspended sediment concentrations similar to those tolerated by salmonids as described above. Therefore temporary, localised

increases in turbidity in estuaries are likely to have no significant effects on lamprey populations. As this species inhabits estuaries prior to its upstream spawning migrations it is unlikely to be affected by increases in turbidity associated with turbine construction and cabling offshore.

### **3.3.5 *Anguilla anguilla* – European Eel**

#### **Noise Effects**

A previous study<sup>38</sup> of the operational effects of wind turbines on eels did not record any change in the swimming patterns of eels passing within 0.5km of a wind turbine. Therefore, although there is limited information on the effects of wind turbine noise on fish, the information that is available indicates that wind turbines at greater than 0.5km spacing would be unlikely to affect migrating eels. Wind turbine spacing for the 5MW turbines likely to be used in Round 3 zones would be greater than this. It is possible that passive migration of eel larvae via ocean currents may restrict the potential for behavioural avoidance of or attraction to windfarm noise. However this is dependent on the timing of metamorphosis from larvae to glass eels.

#### **Turbidity**

Eels are tolerant of a range of conditions, including open oceans, stagnant/still water, estuaries and spate rivers. This species also has the ability to close its gill flaps and cross damp ground. Therefore eels are likely to be tolerant of temporary periods of elevated concentrations of suspended sediment. Temporary increases in turbidity are unlikely to have significant effects on eels.

### **3.3.6 Avoidance and Mitigation Measures at Plan Level**

A number of general environmental measures pertinent to reducing the effects of Round 3 Plan activities have already been incorporated within the Round 3 Plan. It has been assumed in the Plan-level HRA that these measures will be employed, where, following consultation with regulators and statutory consultees, it has been concluded that a likely significant effect would arise in their absence, and on this basis it has been possible to exclude the possibility of a LSE and adverse effect on integrity of some European/Ramsar sites. The relevant general environmental measures which have already been incorporated into the Plan for diadromous fish are:

- survey plans to be designed to avoid causing excessive species disturbance to the satisfaction of statutory consultees;
- if required by statutory consultees, use of methods to reduce piling noise, use of soft-start piling and use of standard mitigation to limit effects on diadromous fish in the area;
- where there is evidence that this would mitigate adverse effects on sensitive species, timing of noise generating activities (e.g. seismic geotechnical surveys, percussive piling, cable-laying works, decommissioning activities) to avoid diadromous fish migration seasons where possible;
- burial of cables to an appropriate depth where this is considered necessary to mitigate effects on electro-sensitive fish species – this was considered at screening stage to provide

complete elimination of this effect, so this effect was not carried forward for appropriate assessment;

- inter-tidal cabling or cable removal works undertaken at low tide, when fewer fish migrate and to reduce the level of resuspension of sediments and thus turbidity that might affect fish;
- use of cable-laying techniques most appropriate to the nature of the intertidal / subtidal substrate to avoid excessive sediment mobilisation and thus turbidity that might affect fish.

Whilst the environmental measures already included in the Plan will be sufficient to mitigate effects on the majority of sites, based on the evidence presented in this chapter, it is considered that additional more specific Plan-level avoidance and mitigation measures are required for diadromous fish populations at certain sites in order to ensure that the Plan does not have adverse effects on the integrity of these sites.

*The Round 3 Plan must be undertaken in such a way as to ensure that cable installation or decommissioning works within an estuary do not impede migration of diadromous fish which are interest features of a European/Ramsar site in that estuary or in a river draining to it to an extent which would have an adverse effect on the conservation status of the interest feature or the integrity of the site.*

*Furthermore, the Round 3 Plan must be undertaken in such a way as to ensure that cable installation or decommissioning works within an estuary do not damage freshwater habitat of diadromous fish which are interest features of a European/Ramsar site in that estuary or in a river draining to it to an extent which would have an adverse effect on the conservation status of the interest feature or the integrity of the site.*

It is possible to implement these Plan-level avoidance and mitigation measures at project level, although the methods chosen for their implementation may vary between projects as a result of the nature of those projects. Examples of possible project level mitigations for estuaries where diadromous fish are interest features of a European/Ramsar site in the estuary or in a river accessed via the estuary are given below. This is not intended to be an exhaustive list, and the effectiveness of the measures will vary considerably between projects.

- undertaking all cable works in estuaries or close to the mouths of estuaries during daylight and at low tide when fewer fish migrate;
- avoiding work and lighting in estuaries at night to avoid disruption of nocturnal migrations;
- selecting the best available cable technology and installation methods in terms of their noise characteristics relative to the sensitivity to noise of fish species;
- avoiding works in estuaries immediately after spates, when fish are more likely to migrate;
- timing of noise generating activities (e.g. seismic geotechnical surveys, percussive piling, cable-laying works, decommissioning activities) to avoid diadromous fish migration seasons where possible, taking into account periods of both upstream migration of adult fish (and glass eels/elvers) and outward/downstream migration of juveniles and adult eels;
- avoiding cabling upstream of the zone of saline influence to avoid disturbance of freshwater habitats of diadromous fish.

Zone developers will be obliged to undertake Plan-level avoidance and mitigation measures where it is necessary to prevent adverse effects on the integrity of European/Ramsar sites. The requirement for the application of these Plan-level avoidance and mitigation measures at project level will need to be assessed during project level HRA, in light of the specific locations and design of individual projects, and consequently their potential adversely to affect European/Ramsar sites. Determination of the most appropriate way(s) of implementing Plan-level avoidance and mitigation measures at project level will also be undertaken at project level, in consultation with regulators and statutory nature conservation agencies. Zone developers should also take into account the emerging environmental guidance relating to the Round 3 Plan when planning appropriate project-level mitigation measures. It may also be appropriate for developers to consider zone-wide mitigation strategies in addition to project-specific measures.

### **3.3.7 Effects on Sites**

The Table 3.4 shows the outcome of AA on each of the sites with sensitive diadromous fish species as interest features.

**Table 3.4 Summary of Site Assessment for Diadromous Fish where these are an Interest Feature**

| Site                                                           | Interest features assessed in this section                                                            | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                                                                       | Site conclusions                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Afon Tywi / River Tywi SAC                                     | <i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | No                                             | n/a                                                                   | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures        | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 8, no works are to be undertaken in the Tywi Estuary and the species undertake short coastal migrations. |
| Berriedale and Langwell Waters SAC                             | <i>Salmo salar</i>                                                                                    | No                                             | n/a                                                                   | Scottish Territorial Waters windfarm, Beatrice Demonstrator, oil and gas                                         | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 1 and no works are to be undertaken in the Estuary.                                                      |
| Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC | <i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | No                                             | n/a                                                                   | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary                                      | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 8, no works are to be undertaken in the Bay and the species undertake short coastal migrations.          |
| Dee Estuary / Aber Dyfrdwy SAC                                 | <i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                                              | Potentially                                    | No                                                                    | Round 1 and 2 windfarms and possible extensions, aggregates, navigational dredging, port activities, oil and gas | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan when Plan-level mitigation is employed.                                                                                                          |

| Site                                                   | Interest features assessed in this section                                     | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                                                                                          | Site conclusions                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Humber Estuary SCI and Humber Estuary Ramsar           | <i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                       | Potentially                                    | No                                                                    | Round 2 windfarm and possible extension, aggregates, navigational dredging, port activities                                         | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan when Plan-level mitigation is employed.                                                                                                                                                                                                            |
| River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC | <i>Salmo salar</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | Potentially                                    | No                                                                    | Round 1 and 2 windfarms and possible extensions, aggregates, navigational dredging, port activities (all in or outside Dee Estuary) | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan when Plan-level mitigation is employed.                                                                                                                                                                                                            |
| River Derwent SAC                                      | <i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                       | Potentially                                    | No                                                                    | Round 2 windfarm and possible extension, aggregates, navigational dredging, port activities (all in or outside Humber Estuary)      | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan when Plan-level mitigation is employed.                                                                                                                                                                                                            |
| River Oykel SAC                                        | <i>Salmo salar</i><br><i>Margaritifera margaritifera</i>                       | No                                             | n/a                                                                   | Beatrice Demonstrator (outside estuary)                                                                                             | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 1 and no works are to be undertaken in the Estuary. As there is no indication of an effect on salmon populations it is assumed that there will be no effect on freshwater pearl mussel populations either. |

| Site                | Interest features assessed in this section                                            | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects             | Site conclusions                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| River South Esk SAC | <i>Salmo salar</i><br><i>Margaritifera margaritifera</i>                              | No                                             | n/a                                                                   | Scottish Territorial Waters windfarm (outside estuary) | AA at Plan level shows no effects on the conservation status of salmon populations or the integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 2 and no works are to be undertaken in the Estuary. As there is no indication of an effect on salmon populations it is assumed that there will be no effect on freshwater pearl mussel populations either. |
| River Spey SAC      | <i>Salmo salar</i><br><i>Petromyzon marinus</i><br><i>Margaritifera margaritifera</i> | No                                             | n/a                                                                   | None identified                                        | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 1 and no works are to be undertaken in the Estuary. As there is no indication of an effect on salmon populations it is assumed that there will be no effect on freshwater pearl mussel populations either.  |
| River Tay SAC       | <i>Salmo salar</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>        | No                                             | n/a                                                                   | Scottish Territorial Waters windfarm (outside estuary) | AA at Plan level shows no effects on the conservation status of salmon populations or the integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 2 and no works are to be undertaken in the Estuary.                                                                                                                                                        |
| River Teith SAC     | <i>Salmo salar</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>        | No                                             | n/a                                                                   | Scottish Territorial Waters windfarm (outside estuary) | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The Forth Estuary site is at some distance from Zone 2 and no works are to be undertaken in the Estuary.                                                                                                                                           |

| Site                            | Interest features assessed in this section                                                                                  | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                                                                | Site conclusions                                                                                                                                                                                                                                        |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| River Tweed SAC                 | <i>Salmo salar</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                                              | No                                             | n/a                                                                   | None identified                                                                                           | AA at Plan level shows no effects on the conservation status of salmon populations or the integrity of the site from implementation of Round 3 Plan. The site is at some distance from Zone 2 and no works are to be undertaken in the Estuary.         |
| River Usk / Afon Wysg SAC       | <i>Salmo salar</i><br><i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | No                                             | n/a                                                                   | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at distance from Zone 8, and no works are to be undertaken in the inner Severn Estuary. |
| River Wye / Afon Gwy SAC        | <i>Salmo salar</i><br><i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | No                                             | n/a                                                                   | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at distance from Zone 8, and no works are to be undertaken in the inner Severn Estuary. |
| Severn Estuary / Môr Hafren SCI | <i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                                             | No                                             | n/a                                                                   | Aggregates, possible tidal power scheme                                                                   | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at distance from Zone 8, and no works are to be undertaken in the inner Severn Estuary. |

| Site                  | Interest features assessed in this section                                                                                                              | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site conclusions                                                                                                                                                                                                                                        |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Severn Estuary Ramsar | <i>Salmo salar</i><br><i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br><i>Anguilla anguilla</i> | No                                             | n/a                                                                   | Aggregates, possible tidal power scheme    | AA at Plan level shows no effects on the conservation status of the interest features or integrity of the site from implementation of Round 3 Plan. The site is at distance from Zone 8, and no works are to be undertaken in the inner Severn Estuary. |

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## 4. Potential for Adverse Effects on Marine Mammal Interest Features

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### 4.1 Introduction

#### 4.1.1 Sites in this Chapter

A large number of SACs with marine mammals as interest features were included within the screening process, along with one Ramsar site which had a Ramsar criterion relating to marine mammals. The four species under consideration are the two Annex II pinniped species grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*), and the two Annex II cetacean species harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*).

It is recognised that all species of cetacean in UK waters are listed in Annex IV of the Habitats Directive and are European Protected Species (EPS). As such, an EPS licence will be required by zone developers for undertaking any activities which could result in disturbance of these species. However, this consideration lies outwith the HRA process, and only Annex II species are considered within the AA.

As well as UK marine mammal sites included in the screening process, a number of transnational SACs within the north Atlantic were also included, owing to the highly mobile nature of marine mammal species (particularly cetaceans) and the possibility that animals using the site may also occur in significant numbers outside the site on a regular basis. The majority of the sites screened for marine mammal interest features were screened only for these features.

Within the screening process it was not possible to conclude that there would be no Likely Significant Effect on marine mammals as a result of the Round 3 Plan, and consequently the sites were brought through to the AA stage. This section deals with the AA of marine mammal interest features within these sites. Where the sites have other interest features for which AA is required, this AA has been undertaken in the relevant section of this report (Section 3 for marine mammals, Section 4 for habitats and Section 5 for birds).

Table 4.1 shows the sites for which AA has been undertaken in this section, along with their qualifying interest features.

Table 4.1 Sites for which an AA of Marine Mammal Interest Features has been Undertaken

| Country | Site Code | Site Name                                       | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required                                                                                                                                                                                    |
|---------|-----------|-------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK      | UK0030230 | Ascrib, Islay and Dunvegan SAC                  | ✓                                     |                                         |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0017072 | Berwickshire and North Northumberland Coast SAC |                                       | ✓                                       |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0012712 | Cardigan Bay / Bae Ceredigion SAC               |                                       | ✓                                       |                                               | ✓                                                | None                                                                                                                                                                                                                                |
| UK      | UK0019806 | Dornoch Firth and Morrich More SAC              | ✓                                     |                                         |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0030182 | Eileanan agus Sgeiran Lios mór SAC              | ✓                                     |                                         |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0017096 | Faray and Holm of Faray SAC                     |                                       | ✓                                       |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0030311 | Firth of Tay and Eden Estuary SAC               | ✓                                     |                                         |                                               |                                                  | None                                                                                                                                                                                                                                |
| UK      | UK0030170 | Humber Estuary SCI                              |                                       | ✓                                       |                                               |                                                  | <i>Halichoerus grypus</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br>Sandbanks which are slightly covered by seawater all the time<br>Estuaries<br>Mudflats and sandflats not covered by sea water at low tides |

| Country | Site Code | Site Name                                                 | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required                       |
|---------|-----------|-----------------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------|
| UK      | UK11031   | Humber Estuary Ramsar site                                |                                       | ✓                                       |                                               |                                                  | Ramsar criteria 1 (estuary), 5 and 6 (birds) and 8 (lamprey)           |
| UK      | UK0030172 | Isle of May SAC                                           |                                       | ✓                                       |                                               |                                                  | None                                                                   |
| UK      | UK0013694 | Isles of Scilly Complex SAC                               |                                       | ✓                                       |                                               |                                                  | None                                                                   |
| UK      | UK0013114 | Lundy SAC                                                 |                                       | ✓                                       |                                               |                                                  | Sandbanks which are slightly covered by seawater all the time<br>Reefs |
| UK      | UK0012694 | Monach Islands SAC                                        |                                       | ✓                                       |                                               |                                                  | None                                                                   |
| UK      | UK0019808 | Moray Firth SAC                                           |                                       |                                         |                                               | ✓                                                | None                                                                   |
| UK      | UK0012711 | Mousa SAC                                                 | ✓                                     |                                         |                                               |                                                  | None                                                                   |
| UK      | UK0016612 | Murlough SAC                                              | ✓                                     |                                         |                                               |                                                  | None                                                                   |
| UK      | UK0012696 | North Rona SAC                                            |                                       | ✓                                       |                                               |                                                  | None                                                                   |
| UK      | UK0013116 | Pembrokeshire Marine / Sir Benfro Forol SAC               |                                       | ✓                                       |                                               |                                                  | None                                                                   |
| UK      | UK0013117 | Pen Llyn a'r Sarnau / Lleyrn Peninsula and the Sarnau SAC |                                       | ✓                                       |                                               | ✓                                                | None                                                                   |
| UK      | UK0030069 | Sanday SAC                                                | ✓                                     |                                         |                                               |                                                  | None                                                                   |
| UK      | UK0030067 | South-East Islay Skerries SAC                             | ✓                                     |                                         |                                               |                                                  | None                                                                   |

| Country | Site Code | Site Name                                            | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|------------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| UK      | UK0016618 | Strangford Lough SAC                                 | ✓                                     |                                         |                                               |                                                  | None                                             |
| UK      | UK0017075 | The Wash & North Norfolk Coast SAC                   | ✓                                     |                                         |                                               |                                                  | None                                             |
| UK      | UK0030289 | Treshnish Isles SAC                                  |                                       | ✓                                       |                                               |                                                  | None                                             |
| UK      | UK0012687 | Yell Sound Coast SAC                                 | ✓                                     |                                         |                                               |                                                  | None                                             |
| Belgium | BEMNZ0001 | Trapegeer-Stroombank SAC                             | ✓                                     |                                         | ✓                                             |                                                  | None                                             |
| Belgium | BEMNZ0002 | SBZ 1 / ZPS 1 SAC                                    | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Belgium | BEMNZ0003 | SBZ 2 / ZPS 2 SAC                                    | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Belgium | BEMNZ0004 | SBZ 3 / ZPS 3 SAC                                    | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Belgium | BEMNZ0005 | Vlakte van de Raan SAC                               | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Germany | DE0916391 | NTP S-H Wattenmeer und angrenzende Küstengebiete SAC | ✓                                     | ✓                                       | ✓                                             | ✓                                                | None                                             |
| Germany | DE1003301 | Doggerbank SAC                                       | ✓                                     |                                         | ✓                                             |                                                  | None                                             |
| Germany | DE1011401 | SPA Östliche Deutsche Bucht SAC                      | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Germany | DE1115391 | Dünenlandschaft Süd-Sylt SAC                         |                                       | ✓                                       |                                               |                                                  | None                                             |
| Germany | DE1209301 | Sylter Außenriff SAC                                 | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |

| Country | Site Code | Site Name                                                      | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|----------------------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Germany | DE1315391 | Küsten- und Dünenlandschaften Amrums SAC                       |                                       | ✓                                       |                                               |                                                  | None                                             |
| Germany | DE1714391 | Steingrund SAC                                                 | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Germany | DE1813391 | Helgoland mit Helgoländer Felssockel SAC                       | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Germany | DE2016301 | Hamburgisches Wattenmeer SAC                                   | ✓                                     |                                         | ✓                                             |                                                  | None                                             |
| Germany | DE2104301 | Borkum-Riffgrund SAC                                           | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Germany | DE2306301 | Nationalpark Niedersächsisches Wattenmeer SAC                  | ✓                                     |                                         | ✓                                             |                                                  | None                                             |
| Germany | DE2323392 | Schleswig-Holsteinisches Elbästuar und angrenzende Flächen SAC | ✓                                     |                                         |                                               |                                                  | None                                             |
| Germany | DE2507301 | Hund und Paapsand SAC                                          | ✓                                     |                                         |                                               |                                                  | None                                             |
| Germany | DE2507331 | Unterems und Außenems SAC                                      | ✓                                     |                                         |                                               |                                                  | None                                             |
| Denmark | DK00AY176 | Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC     | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| Denmark | DK00CY040 | Venø, Venø Sund SAC                                            | ✓                                     |                                         |                                               |                                                  | None                                             |
| Denmark | DK00EY133 | Agger Tange, Nissum Bredning, Skibsted Fjord og Agerø SAC      | ✓                                     |                                         |                                               |                                                  | None                                             |

| Country | Site Code | Site Name                                                      | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|----------------------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Spain   | ES0000001 | Illas Cíes SAC                                                 |                                       |                                         |                                               | ✓                                                | None                                             |
| Spain   | ES0000254 | Illa de Ons SAC                                                |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES0000317 | Penarronda-Barayo SAC                                          |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES0000318 | Cabo Busto-Luanco SAC                                          |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES0000319 | Ría de Ribadesella-Ría de Tinamayor SAC                        |                                       |                                         |                                               | ✓                                                | None                                             |
| Spain   | ES1110005 | Costa da Morte SAC                                             |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES1110006 | Complexo húmido de Corrubedo SAC                               |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES1140004 | Complexo Ons - O Grove SAC                                     |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES1140010 | Costa da Vela SAC                                              |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| Spain   | ES1200047 | Yacimientos de Icnitas SAC                                     |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| France  | FR2200346 | Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC | ✓                                     |                                         |                                               |                                                  | None                                             |
| France  | FR2300121 | Estuaire de la Seine SAC                                       | ✓                                     |                                         |                                               |                                                  | None                                             |
| France  | FR2500077 | Baie du Mont Saint-Michel SAC                                  | ✓                                     |                                         |                                               | ✓                                                | None                                             |

| Country | Site Code | Site Name                                                                                                        | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| France  | FR2500079 | Les Iles Chausey SAC                                                                                             |                                       | ✓                                       |                                               | ✓                                                | None                                             |
| France  | FR2500088 | Marais du Cotentin et du Bessin - Baie des Veys SAC                                                              | ✓                                     |                                         |                                               |                                                  | None                                             |
| France  | FR3100474 | Dunes de la Plaine Maritime Flamande SAC                                                                         | ✓                                     |                                         |                                               |                                                  | None                                             |
| France  | FR3100478 | Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant SAC   | ✓                                     | ✓                                       | ✓                                             |                                                  | None                                             |
| France  | FR3100480 | Estuaire de la Canche, Dunes Picardes Plaquees sur l'Ancienne Falaise, Foret d'Hardelot et Falaise d'Equihen SAC | ✓                                     |                                         |                                               |                                                  | None                                             |
| France  | FR5300009 | Cote de Granit Rose de Milliau a Tome, Archipel des Sept-Iles SAC                                                |                                       | ✓                                       |                                               |                                                  | None                                             |
| France  | FR5300011 | Cap d'Erquy, Cap Frehel SAC                                                                                      |                                       |                                         |                                               | ✓                                                | None                                             |
| France  | FR5300012 | Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC                                       |                                       |                                         |                                               | ✓                                                | None                                             |
| France  | FR5300018 | Archipel de Molene et Ile d'Ouessant SAC                                                                         |                                       | ✓                                       |                                               | ✓                                                | None                                             |

| Country | Site Code | Site Name                                         | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|---------------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| France  | FR5300019 | Presqu'île de Crozon SAC                          |                                       | ✓                                       |                                               |                                                  | None                                             |
| France  | FR5300020 | Cap Sizun, Ile de Sein SAC                        |                                       | ✓                                       |                                               | ✓                                                | None                                             |
| France  | FR5300029 | Golfe du Morbihan, Cote Ouest de Rhuys SAC        |                                       |                                         |                                               | ✓                                                | None                                             |
| France  | FR5300033 | Archipel de Houat-Hoedic, Pointe du Conguel SAC   |                                       |                                         |                                               | ✓                                                | None                                             |
| France  | FR5300052 | Cote de Cancale a Parame SAC                      |                                       |                                         |                                               | ✓                                                | None                                             |
| France  | FR5400469 | Pertuis Charentais SAC                            |                                       |                                         | ✓                                             | ✓                                                | None                                             |
| France  | FR7200679 | Bassin D'Arcachon SAC                             |                                       |                                         |                                               | ✓                                                | None                                             |
| Ireland | IE0000090 | Glengarriff Harbour and Woodland SAC              | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000101 | Roaringwater Bay and Islands SAC                  |                                       | ✓                                       | ✓                                             |                                                  | None                                             |
| Ireland | IE0000133 | Donegal Bay (Murvagh) SAC                         | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000147 | Horn Head and Rinclevan SAC                       |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000190 | Slieve Tooley/Tormore Island/Loughros Beg Bay SAC |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000197 | West of Ardara/Maas Road SAC                      | ✓                                     |                                         |                                               |                                                  | None                                             |

| Country | Site Code | Site Name                                    | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|---------|-----------|----------------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Ireland | IE0000204 | Lambay Island SAC                            |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000268 | Galway Bay Complex SAC                       | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000278 | Inishbofin and Inishshark SAC                |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000328 | Slyne Head Islands SAC                       |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000458 | Killala Bay/Moy Estuary SAC                  | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000495 | Duvillaun Islands SAC                        |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000507 | Inishkea Islands SAC                         |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0000622 | Ballysadare Bay SAC                          | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000627 | Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0000707 | Saltee Islands SAC                           |                                       | ✓                                       |                                               |                                                  | None                                             |
| Ireland | IE0001482 | Clew Bay Complex SAC                         | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0002111 | Kilkieran Bay and Islands SAC                | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0002158 | Kenmare River SAC                            | ✓                                     |                                         |                                               |                                                  | None                                             |
| Ireland | IE0002165 | Lower River Shannon SAC                      |                                       |                                         |                                               | ✓                                                | None                                             |

| Country     | Site Code | Site Name                       | Common seal ( <i>Phoca vitulina</i> ) | Grey seal ( <i>Halichoerus grypus</i> ) | Harbour porpoise ( <i>Phocoena phocoena</i> ) | Bottlenose dolphin ( <i>Tursiops truncatus</i> ) | Other interest features for which AA is required |
|-------------|-----------|---------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Ireland     | IE0002172 | Blasket Islands SAC             |                                       | ✓                                       | ✓                                             |                                                  | None                                             |
| Ireland     | IE0002283 | Rutland Island and Sound SAC    | ✓                                     |                                         |                                               |                                                  | None                                             |
| Netherlands | NL1000001 | Waddenzee SAC                   | ✓                                     | ✓                                       |                                               | ✓*                                               | None                                             |
| Netherlands | NL1000018 | Oosterschelde SAC               | ✓                                     |                                         |                                               |                                                  | None                                             |
| Netherlands | NL2003062 | Noordzeekustzone SAC            | ✓                                     | ✓                                       | ✓                                             | ✓*                                               | None                                             |
| Netherlands | NL2007001 | Eems-Dollard SAC                | ✓                                     |                                         |                                               |                                                  | None                                             |
| Netherlands | NL4000017 | Voordelta SAC                   | ✓                                     |                                         |                                               | ✓*                                               | None                                             |
| Netherlands | NL9803061 | Westerschelde SAC               | ✓                                     |                                         |                                               |                                                  | None                                             |
| Sweden      | SE0520170 | Kosterfjorden-Väderöfjorden SAC | ✓                                     |                                         | ✓                                             |                                                  | None                                             |

#### 4.1.2 Conservation Objectives

Conservation Objectives for marine mammal interest features in SACs comprise some (or all) of the following elements:

*To avoid deterioration of the habitats or significant disturbance, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status.*

*To ensure for the qualifying species that the following are established then maintained in the long term: population of the species as a viable component of the site; distribution of the species within the site; distribution and extent of habitats supporting the species; structure, function and supporting processes of habitats supporting the species; no significant disturbance of the species.*

It is these objectives which will be used to assess the potential for the Round 3 Plan to have an adverse effect on the integrity of the SACs with marine mammal interest features within this section. In the absence of Conservation Objectives for Ramsar criteria, the same objectives have been applied to Ramsar sites where marine mammals are part of a Ramsar criterion.

Further information on the two pinniped and two cetacean species and their sensitivities to activities within the Round 3 Plan is provided in Section 4.2. This information is then used to draw AA conclusions in Section 4.3.

#### 4.1.3 Sensitivities of Marine Mammals to Round 3 Plan Activities

##### Overview

Potential sensitivities of marine mammals examined at the screening stage are detailed in Table 4.2. Where LSE could not be demonstrated at the screening stage, sites were brought forward for more detailed examination of these effects at the AA stage. The key sensitivities of marine mammals considered at this stage can be categorised as:

- noise;
- effects on prey species and/or foraging sites; and
- damage to haul-out sites.

Since the beginning of the planning and installation of offshore windfarms, the possible impacts on marine mammals have been investigated and discussed intensively within the public and the scientific community. Offshore windfarms have a potential to have an impact upon marine mammals in several ways, from disruption of the mammal's prey to noise impacts. In particular, the noise created during pile-driving operations involves sound pressure levels that are high enough to impair the hearing system or cause mortality of marine mammals near the source, and to disrupt their behaviour at considerable distance from the construction site.

Anthropogenic marine noise, depending on source and intensity, can be defined as a form of pollution comprising energy that may degrade habitat and have adverse effects on marine life ranging from disturbance of communication or group cohesion to injury and mortality<sup>41</sup>.

Many marine organisms are known to produce underwater sounds, often used in a behavioural context. Pinnipeds, for example, use a variety of sounds both in and out of the water to carry out complex social information such as dominance and territoriality.

**Table 4.2 Marine Mammal Sensitivities and Associated Round 3 Activities**

| Sensitivities                      | Relevant Round 3 zone activities                                                                                                                | Survey | Installation | Operation | Decommission | Information required for assessment                                                                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|--------------|---------------------------------------------------------------------------------------------------------------------|
| CETACEANS                          |                                                                                                                                                 |        |              |           |              |                                                                                                                     |
| Change in prey species populations | Establishment of fishery exclusion zones round windfarms may lead to increase in prey species but noise from turbines may decrease fish supply. |        |              | ◆         |              | Will R3 activities affect important feeding areas for cetaceans in SAC populations?                                 |
| Noise disturbance/displacement     | Seismic surveys                                                                                                                                 | ◆      |              |           |              | Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |
| Noise injury                       | Installation or removal of turbines or cables (using percussive piling for installation or percussive methods/explosives for demolition)        |        | ◆            |           | ◆            | Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |
| Noise disturbance/displacement     | Installation or removal of turbines or cables                                                                                                   |        | ◆            |           | ◆            | Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |
| Noise disturbance/displacement     | Turbine operation                                                                                                                               |        |              | ◆         |              | Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |

<sup>41</sup> ASCOBANS (2009) Adverse anthropogenic marine/ocean noise impacts on cetaceans and other biota. 16th ASCOBANS Advisory Committee Meeting, Doc. AC16/Doc.46 (S), Brugge, Belgium

| Sensitivities                                                              | Relevant Round 3 zone activities                                                                                                                      |        |              |           |              | Information required for assessment                                                                                 |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|--------------|---------------------------------------------------------------------------------------------------------------------|
|                                                                            |                                                                                                                                                       | Survey | Installation | Operation | Decommission |                                                                                                                     |
| Noise disturbance/displacement                                             | Increased vessel activity                                                                                                                             | ◆      | ◆            | ◆         | ◆            | Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |
| <b>PINNIPEDS</b>                                                           |                                                                                                                                                       |        |              |           |              |                                                                                                                     |
| Change in prey species populations                                         | Establishment of fishery exclusion zones round windfarms may lead to increase in prey species but noise from turbines may decrease fish supply.       |        |              | ◆         |              | Will R3 activities affect important feeding areas for seals in SAC populations?                                     |
| Noise disturbance/displacement                                             | Seismic surveys                                                                                                                                       | ◆      |              |           |              | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |
| Noise injury                                                               | Installation or removal of turbines or cables (using percussive piling for installation or percussive methods/explosives for demolition)              |        | ◆            |           | ◆            | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |
| Direct damage to haul-out sites                                            | Cable installation or decommissioning                                                                                                                 |        | ◆            |           | ◆            | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |
| Modification of hydrodynamic functioning causing erosion of haul-out sites | Presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring), possibly presence of turbines in zones closer to shore |        |              | ◆         |              | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |
| Noise disturbance/displacement                                             | Installation or removal of turbines or cables                                                                                                         |        | ◆            |           | ◆            | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |
| Noise disturbance/displacement                                             | Turbine operation                                                                                                                                     |        |              | ◆         |              | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis      |

| Sensitivities                  | Relevant Round 3 zone activities |        |              |           |              | Information required for assessment                                                                            |
|--------------------------------|----------------------------------|--------|--------------|-----------|--------------|----------------------------------------------------------------------------------------------------------------|
|                                |                                  | Survey | Installation | Operation | Decommission |                                                                                                                |
| Noise disturbance/displacement | Increased vessel activity        | ◆      | ◆            | ◆         | ◆            | Do seal from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis |

### Noise/Vibration

Sound is an aural sensation caused by pressure variations in the fluid surrounding an organism's ear (or other hearing mechanism). Noise is most simply defined as 'unwanted sound'. Noise in the marine environment can be split into two different categories: natural and anthropogenic.

Much natural noise (including background noise) consists of random pressure fluctuations with no obvious periodic or repeating component. A good example of this is the sound of rushing water. Ambient ocean noise is caused by a plethora of natural sources and is characterised by extreme geographical and temporal variability. Wind and waves are common ambient ocean noise, as well as precipitation (rain and hail), movement of seabed materials, and natural seismic activity. Other sources of natural noise are biological in origin, such as marine mammals, fish and invertebrates.

Anthropogenic noise can come from several sources including boats and shipping, seismic surveying, drilling platforms, sonar, explosions, and now offshore windfarms. The type of noise offshore windfarms produce overlaps with other anthropogenic noise sources. For example, during the construction of the windfarm there will be an increase in shipping activity. The hearing and sensitivity response of many marine organisms overlaps, to an extent, with noise in the marine environment from anthropogenic sources. In general, anthropogenic noise tends to be broadband and of low frequency within the range of 10Hz to 1kHz. Table 4.3 shows the frequency and source levels of various offshore windfarm activities. The resulting effects of anthropogenic noise are broadly categorised into behavioural and physiological effects.

There are three broad categories of noise. Impulsive (pulse) noise is transient in nature and is generally of wide bandwidth and short duration. It is best characterised by quoting the peak amplitude and repetition rate. Continuous wideband noise is normally characterised as a spectrum level, which is the level in a 1Hz bandwidth. This level is usually given as intensity in decibels (dB) relative to a reference level of 1 micro Pascal ( $\mu\text{Pa}$ ). Tonals are very narrowband signals and are usually characterised as amplitude in dB re  $1\mu\text{Pa}$  and frequency.

**Table 4.3 Approximate Source Levels, Frequency and Type of Sound Created by Offshore Windfarm Activities**

| Phase            | Activity                  | Frequency (Hz) | Source level (dB re 1 Pa @ 1m) | Type       |
|------------------|---------------------------|----------------|--------------------------------|------------|
| Pre-construction | Seismic survey            | 10 – 1000      | 210 - 259                      | Temporary  |
|                  | Increased vessel activity | 10 – 1000      | 152 - 177                      | Continuous |
| Construction     | Piling                    | 20Hz - >2000   | 243 - 257                      | Temporary  |
|                  | Increased vessel activity | 10 – 1000      | 152 - 177                      | Continuous |
| Operation        | Increased vessel activity | 10 – 1000      | 152 - 177                      | Continuous |
|                  | Operational turbines      | 50, 160, 200   | <90 - 115                      | Continuous |
| Decommissioning  | Increased vessel activity | 10 – 1000      | 152 - 177                      | Continuous |
|                  | Explosives                | <20            | up to 279                      | Temporary  |

Source: <sup>42,43, 44</sup>

Noise monitoring at various offshore windfarms around the UK indicates that there is an increase in the source level of the pile driving with an increase in pile diameter. It usually takes between one to two hours to drive one pile into the seabed<sup>43</sup>. It was also determined that in a simulated model the radius of detectability of piling noise will be at least 80km and perhaps more.

It should be noted that on the scale of windfarm development within the Round 3 Plan, the noise from pile driving activities is temporary (in that it will not continue for the lifetime of the windfarm) but may extend into months or even years (where piled bases are used for the turbines). The scale of development will therefore need to be taken into account when assessing the potential for effects on marine mammals. It will also be important to assess the cumulative effects arising from the construction of multiple windfarm projects within a zone, and the possibility of effects arising from construction of projects within a number of zones simultaneously.

Vessel noise is dependent on vessel size, engine size, speed and propeller rotational frequency. In general, the bigger the ship, the higher the source level produced and the lower the dominant frequency range of the noise. Ship noise also contributes to airborne noise.

During turbine operation the noise in the immediate vicinity is very low, and only dominates over background noise in a few limited bands of frequency. Even within this range, the noise is

<sup>42</sup> Vella, G., Rushforth, I., Mason, E., Hough, A., England, R., Styles, P., Holt, T., & Thorne, P. (2001) Assessment of the effects of noise and vibration from offshore wind farms on marine wildlife. University of Liverpool, Centre for Marine and Coastal Studies, Environmental Research and Consultancy.

<sup>43</sup> Thomsen, F., Lüdemann, K., Kfemann, R., & Piper, W. (2006) Effects of offshore wind farm noise on marine mammals and fish. biola, Hamburg, Germany on behalf of COWRIE Ltd.

<sup>44</sup> Nedwell, J.R., Parvin, S.J., Edwards, B., Workman, R., Brooker, A.G., & Kynoch, J.E. (2007) Measurement and interpretation of underwater noise during construction and operation of offshore windfarms in UK waters. Subacoustech Report No. 544R0738 to COWRIE Ltd.

usually only a few dB above the background noise, and in some cases this is dominated by noise from distant shipping.

Explosions, which can be used for the decommissioning of offshore windfarms, have very powerful impulses with fast rise times, and can result in non-auditory damage.

The mechanisms by which sound propagates through the water are well understood. In shallow waters, where generally most offshore wind turbines are located, the underwater sound radiating from the tower structure may be channelled by the seabed and water surface and the sound levels will decrease in proportion to the distance from the source, equivalent to a 3dB drop for each doubling of distance from the source<sup>42</sup>. In addition, recent evidence was provided that by modifying the chemistry of seawater, climate change is likely to extend the distance at which sounds travels in the oceans, thus compounding any negative effect on cetaceans which already exists<sup>45</sup>.

There are four zones of noise influence that are dependent on the distance between the source and the receiver. The zone of 'hearing loss' is the area close to the noise source where the received sound level is high enough to cause tissue damage resulting in auditory damage. In extreme cases, mortality can result from exposure very close to the source. The zone of responsiveness is the next zone in distance; this is the region in which the mammal reacts behaviourally or physiologically. The zone of audibility is defined as the area within which the animal is able to detect the sound. The zone of masking is variable, usually somewhere between the audibility and responsiveness zone. This is the region within which noise is strong enough to interfere with detection of other sounds, such as echolocation clicks.

The behavioural impacts of anthropogenic sound on marine mammals are well documented. These impacts include attraction or avoidance behaviour, panic and increases in the intensity of vocal communication; the responses may vary with the sex, age and experience of the individual. Potential effects of noise on cetaceans include changes in hearing sensitivity and behavioural patterns, and acoustically-induced stress. The implications of these effects on the well-being of the animals and their populations are less well understood<sup>46</sup>. It is possible that marine mammals may have similar conditions to those linked with chronic stress in humans, for example coronary heart disease, immune suppression, anxiety and depression, cognitive and learning difficulties, and infertility.<sup>47</sup>

In practice, construction methods will be developed and implemented by the zone developers at the project level. For example, turbine installation will not necessarily be pile-driven at all sites, especially the deeper, offshore sites. In these instances other methods will be employed such as

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<sup>45</sup> ASCOBANS (2009) Noise Pollution. 16th ASCOBANS Advisory Committee Meeting, Document AC16/Doc.47 (O), Brugge, Belgium

<sup>46</sup> National Research Council. 2003. *Ocean Noise and Marine Mammals*. Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals, National Academies Press.

<sup>47</sup> Wright, A.J., Deak, T., & Parsons, E.C.M. (2007). Concerns related to chronic stress in marine mammals. International Whaling Commission, based upon "Considerations of the Effects of Noise on Marine Mammals and other Animals - Special issue of the International Journal of Comparative Psychology, 20(2-3).

pin-piling of jacket bases, or the use of gravity bases. As pile driving is the 'worst-case' scenario in terms of noise, this method will be assessed.

### **Effects on Foraging Grounds and Prey Species Populations**

Marine mammals, particularly cetaceans, range widely in search of food. It is clear that there are areas outside of the boundaries of SACs with these mammal species as qualifying interest features which provide important foraging grounds for these species. Effects of the Round 3 Plan in these areas could result in displacement of mammals from their feeding areas and/or disturbance of prey species within these areas, with consequent effects for marine mammal populations within SACs.

Displacement of mammals from feeding areas is likely to result from noise and increased human activity (as described in the previous section). Effects on prey species could also result from activities which generate noise (for example where fish species are disturbed or injured by noise). Activities which cause disturbance and/or physical removal of seabed habitats could also affect prey availability directly (for example in terms of benthic invertebrate prey, or turbidity effects on fish) and indirectly (in terms of effects on upper trophic levels as a result of effects on invertebrates).

These effects are likely to be most apparent during construction of windfarms, although during windfarm operation there may also be effects on foraging areas via scour around turbine bases and operational noise. Conversely the exclusion of fishing around turbines, and the growth of benthic communities on turbine bases may lead to an increase in prey availability.

### **Damage to Pinniped Haul-Out Sites**

Hauling-out is the behaviour of temporarily leaving the water between periods of foraging activity for sites on land (or ice). Hauling-out is necessary for mating and giving birth, as well as predator avoidance, thermal regulation, social activity, and rest.

Damage caused to pinniped haul-out sites are classified as either direct or indirect impacts. Direct impacts result from damage caused by the cable installation or decommissioning. Indirect effects are caused by modification of hydrodynamic functioning causing erosion. For example, structures protruding above the sea such as cable armouring, could cause such changes. Damage to pinniped haul-out sites could impact the seals by displacing them from the site.

## **4.2 Species Ecology and Sensitivities**

### **4.2.1 Cetaceans**

#### ***Phocoena phocoena* - Harbour Porpoise**

The Harbour Porpoise (*Phocoena phocoena*) is one of the smallest ocean mammals. Harbour porpoise have a short, stocky body resulting in a rotund shape, which enables them to limit heat loss in the cold northern climes of the cool temperate and subpolar waters of the Northern Hemisphere. Harbour porpoises reach sexual maturity at an age of 3 to 6 years, and at body lengths of about 1.35m in males and 1.45m in females. Mating occurs in summer, and the gestation period is one year or less. Young are generally born in summer, and have been recorded between May and August (with a strong peak in June) around the British Isles.

Throughout its range, the Harbour Porpoise is limited to the waters of the continental shelf by its demersal foraging behaviour and diving capacity, and are seldom found in waters with an annual average temperature of above 17°C. The species is abundant in the central and northern North Sea and on the continental shelf west of the British Isles. In the Eastern Atlantic the harbour porpoise ranges from the coasts of Iceland, the Faroes and the coasts of Europe, going south as far as Cabo de Espichel in Portugal. In some areas, especially on the East coast of Scotland, agonistic interactions with bottlenose dolphins (*Tursiops truncatus*) may play a role in determining the limits of the range. Some seasonal migration occurs, mostly inshore in summer and offshore in winter. Studies<sup>48</sup> on populations in the Skagerrak/North Sea showed no overlaps in the home range of the adult porpoises. The authors suggest a population boundary in the northern Kattegat across the Danish island of Læsø. In only a very few cases was there a crossover between individuals moving through the Danish waters/North Sea/Skagerrak Sea, and this occurred during winter migration months. It is currently unknown whether the porpoises residing in the Southern North Sea are genetically connected with the Northern North Sea population or belong to a separate fourth population in the southern North Sea<sup>49</sup>. The SCANS II survey conducted in 2005<sup>50</sup> showed a population of 231,000 in the North Sea; in terms of population trends, results indicated that harbour porpoise densities in the southern parts of the North Sea have increased, while densities in more northerly regions declined between 1994 and 2005. Encouragingly, the results suggest that abundance in the North Sea as a whole has not changed significantly.

Harbour porpoises eat a wide variety of fish and cephalopods, and the main prey items appear to vary on regional and seasonal scales. In the North Atlantic, harbour porpoises feed primarily on clupeoids and gadoids, while studies of harbour porpoises in Shetland, Scotland and west Wales have indicated that the main prey items are pelagic shoaling fish such as sandeels, whiting and herring. This foraging is closely related to tidal cycle, with pelagic fish becoming concentrated in the tidal race; the channels are used by the porpoises to herd and catch this prey.

### ***Tursiops truncatus* – Bottlenose Dolphin**

Bottlenose dolphins belong to the family Delphinidae, the family of oceanic dolphins. The bottlenose dolphin is a robust, chunky dolphin with a well-defined (usually short and stubby) beak, sharply demarcated from the forehead by a distinct crease. The dolphins are coloured light grey to black dorsally, with a light belly. Geographical variation in bottlenose dolphins is not well understood, there are known to be a number of different populations which may be considered to constitute distinct sub-species, although northerly populations (including those in the UK and North Sea) are probably part of the same sub-specific group. Bottlenose dolphins reach sexual maturity between 5 to 12 years for females and 10-13 years for males, and at body

<sup>48</sup> Teilmann, J., Dietz, R., Larsen, F., Desporters, G., & Geertsen, B. (2003) Seasonal migrations and population structure of harbour porpoises (*Phocoena phocoena*) in the North Sea and inner Danish waters based on satellite telemetry. Annual Meeting of the European Cetacean Society, Tenerife, Spain.

<sup>49</sup> Teilman, J., Sveegaard, S., Dietz, R., Petersen, I.K., Berggren, P., & Desportes, G. (2008) *High density areas for harbour porpoises in Danish waters*. NERI Technical Report No. 657.

<sup>50</sup> Hammond *et al.* (2006) Small cetaceans in the European Atlantic and North Sea (SCANS-II). Final report for Life Project LIFE04NAT/GB/000245, St Andrews University, Fife, Scotland.

lengths of 260cm and 235cm respectively. Spring and summer or spring and autumn calving peaks are known for most populations, with the gestation period lasting approximately 12 months. Evidence from wild dolphins has shown that nursing could continue well beyond the age of three years.

Bottlenose dolphins have a very complex social organisation. Pod size may range from two to 200 individuals, but most frequently between five to 15 individuals. Bottlenose dolphins are highly sociable and tactile. They can often be seen swimming side by side, nudging and rubbing against one another. During feeding, in particular, and in a social context, the dolphins may be highly active. Aerial behaviour such as leaps, head-slams and tail-slapping may occur, as well as throwing kelp or prey items in the air. They have also been observed riding the crest of advancing waves in rough seas.

Bottlenose dolphins have both coastal and pelagic populations. Coastal populations in the UK and Europe are considered to be 'remnant' populations and are likely to be vulnerable to further decline. Insufficient information exists to determine the migratory patterns of bottlenose dolphins, or even if they do migrate. In coastal waters, the species often favours large river estuaries, headlands or sandbanks, where there is uneven seabed relief and/or strong tidal currents. Studies by Sykes *et al.*<sup>51</sup> found that chlorophyll a and fish distribution were the main factors influencing bottlenose dolphin distribution. These findings indicate that feeding is an important factor affecting their distribution along the Dorset coast.

Previous work by Parsons *et al.*<sup>52</sup> on the population structure of bottlenose dolphins in UK coastal waters found low levels of genetic diversity along the East Coast of Scotland, and in Welsh populations. They also found less evidence of genetic differentiation between the populations of the East Coast of Scotland and those in Wales than between the neighbouring coastal populations of East and West Scotland. It has also been suggested that there are genetic differences between animals that reside offshore and those that inhabit inshore waters; they might possibly be distinct species. Comparisons of photo-ID images also suggests that there is no evidence of interchange between bottlenose dolphins in the southern coasts (Normandy and the Channel Islands) and the northern coasts of the English Channel (South coast of England).

In UK coastal waters, peak sightings occur between July and October, with a secondary peak reported in some localities during March and April; however, animals are present near to shore in every month of the year. Figure 4.1 shows the Recommended Management Units for bottlenose dolphins in the ASCOBANS Agreement Area and Environs.

An ASCOBANS report<sup>53</sup> on the favourable conservation status of bottlenose dolphins shows a big decline of coastal populations. In the Netherlands and Belgium there is a complete loss where they were once spotted and studied regularly. Bottlenose dolphin populations around the

<sup>51</sup> Sykes, R., Allen, J., & Owens, C. (2003) Factors influencing the seasonal distribution of sightings of bottlenose dolphins (*Tursiops truncatus*) along the Dorset coast. Annual Meeting of the European Cetacean Society, Tenerife, Spain.

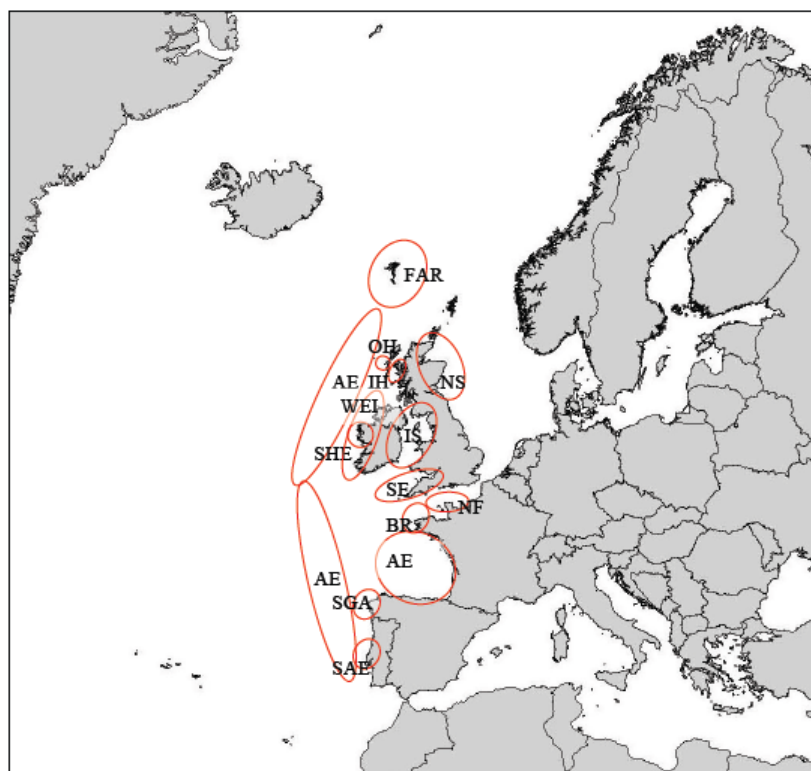
<sup>52</sup> Parsons, K.M., Noble, L.R., Reid, R.J., & Thompson, P.M. (2002) Mitochondrial genetic diversity and population structuring of UK bottlenose dolphins (*Tursiops truncatus*): is the NE Scotland population demographically and geographically isolated? *Biological Conservation*, 1038: 175-182.

<sup>53</sup> ASCOBANS (2009) Favourable conservation status of bottlenose dolphins. 16th ASCOBANS Advisory Committee Meeting, Brugge Belgium, Document AC16/Doc.34(O)

UK have been declining. On the east coast of England there is now no coastal population, and groups once regularly seen on the Humber and in the Thames are now no longer present. At Morecambe Bay, sightings and strandings are at a very low level. The coastal group on the west coast of Wales (Cardigan Bay) and those of Moray Firth are still present as a permanent population. Cardigan Bay still is important for bottlenose dolphins, and has been for many years, with the main concentration in Southern Cardigan Bay<sup>54</sup>. Studies undertaken on the Moray Firth bottlenose dolphin population indicate that it is small and vulnerable, with variable numbers from one year to the next. It is below the IUCN's value of 250 for a critically endangered population<sup>55</sup>.

Although bottlenose dolphins appear to be non-selective in their feeding habits, the dominant fish in their diet are known to produce some sounds. These may include grunts, whistles, or growls and may make them more susceptible to predation. It has been suggested that bottlenose dolphins may detect and perhaps orientate to fish prey by listening for the sound they produce. Evidence indicates that bottlenose dolphins are active and feeding day and night. The diet varies according to the local prey available.

**Figure 4.1 Recommended Management Unit (MU) Source: ASCOBANS 2009**



<sup>54</sup> Baines, M.E. & Evans, P.G.H. (2009) Atlas of the Marine Mammals of Wales. CCW Monitoring Report No. 88

<sup>55</sup> Thompson, P. M, Lusseau, D, Corkrey, R. & Hammond, P. S. (2004). Moray Firth bottlenose dolphin monitoring strategy options. Scottish Natural Heritage Commissioned Report No. 079 (ROAMENO. F02AA409).

## Sensitivities

### Underwater Noise

Marine mammals, in particular cetaceans, have highly-developed acoustic sensory systems, which enable them to communicate, navigate, orientate, avoid predators and forage, in an environment where sound propagates far more efficiently than does light. Cetaceans produce and receive sound over a very wide range of frequencies. Generally cetaceans (and other marine mammals) have been found to be most sensitive to sounds within the frequency range of their vocalisations<sup>56</sup>. The frequency range of vocalisation is shown in Table 4.4.

**Table 4.4 Underwater Vocalisation of Bottlenose Dolphin and Harbour Porpoise.**

| Species                                         | Vocalisation             | Frequency range | Dominant frequencies | Source levels (dB) |
|-------------------------------------------------|--------------------------|-----------------|----------------------|--------------------|
| Bottlenose dolphin<br><i>Tursiops truncatus</i> | Echolocation             | 2 – >150 kHz    | 110 – 130 kHz        | up to 218 – 228    |
|                                                 | Whistles                 | 0.8 – 24 kHz    | -                    | 125 – 173          |
|                                                 | Low-frequency narrowband | <2 kHz          | 0.3 – 0.9 kHz        | -                  |
| Harbour porpoise<br><i>Phocoena phocoena</i>    | Echolocation             | 110 – 150 kHz   | -                    | 135 – 177          |
|                                                 | Clicks                   | 2 kHz           | -                    | 100                |

Source: <sup>42</sup>

Responses of cetaceans to noise varies greatly from subtle reactions such as small changes in swimming direction, to strong avoidance behaviour. Other reactions include attraction, panic, and increases in the intensity of vocal communication.

Controlled experiments of harbour porpoise behaviour to offshore windfarm noise has been undertaken. A study by Koschinski *et al.*<sup>57</sup> looked at behavioural responses of free-ranging harbour porpoises to recorded offshore wind turbine noise. They concluded that the porpoises were able to hear the sound played back to them and seemed cautious when confronted with this new acoustic stimulus. In another controlled experiment Kastelein *et al.*<sup>58</sup> tested the reactions of porpoises in a floating pen to different signals with frequencies around 12 kHz. They found aversive responses at received levels of 97 – 111 dB<sub>Leq</sub> re 1µPa. The signal tested resembling

<sup>56</sup> SMRU Ltd. (2007) Assessment of the potential for acoustic deterrents to mitigate the impact on marine mammals of underwater noise arising from the construction of offshore windfarms. Commissioned by COWRIE Ltd (project reference DETER-01-07)

<sup>57</sup> Koschinski, S., Culik, B.M., Damsgaard Henriksen, O., Tregenze, N., Ellis, G., Jansen, C. & Kathe, G. (2003) Behavioural reactions of free-ranging porpoises and seals to the noise of a simulated 2 MW windpower generator. *Mar Ecol Prog Ser*, 265: 263 – 273.

<sup>58</sup> Kastelein, R.A., Verboom, W.C., Muijsers, M., Jennings, N.V. & van der Heul, S. 2005. The influence of acoustic emissions for underwater data transmission on the behaviour of harbour porpoises (*Phocoena phocoena*) in a floating pen. *Mar. Env. Res.* 61, 19-39.

pile-driving noise induced an adverse response. However it should be noted that the animals had no possibility to swim away further than the borders of the pen. Although these are both controlled studies and thus may not accurately reflect what may occur at offshore windfarms, they do demonstrate that harbour porpoises will react and change their behaviour, even if transiently, to both construction and operational noise. Harbour porpoise have been identified to be more sensitive to noise than other odontocete species tested so far <sup>59</sup>.

Observations undertaken at two offshore windfarms, Horns Rev and Nysted, both noted a change in porpoise behaviour. At Horns Rev the porpoises exhibited relatively more directional swimming patterns compared to non-construction days at a distance of 11-15km away. At Nysted, porpoise abundance reportedly declined after construction with no return to baseline levels. However, since absolute abundance levels were low to start with these results were difficult to interpret.

It should be noted that at both Horns Rev and Nysted, pingers and seal-scarers were used before piling commenced. From Table 4.3 we can see that pile-driving noise is broadband, however with most energy below 1 kHz and therefore below ranges of best hearing in porpoises. The seal scarers were reported to have possibly caused an avoidance response at larger distances than expected, since the source levels were rather high (13 – 15kHz). Since harbour porpoises have very acute hearing in that frequency range it cannot be ruled out that effects were caused by a combination of the mitigation measure along with the pile driving. On the other hand it was also found that a decrease of acoustic activity was found during pile-driving in a harbour close to the Nysted site where no mitigation measures were employed.

From the theoretical and empirical studies discussed above, Thomsen *et al.* <sup>43</sup> suggest a rather wide zone of responsiveness in harbour porpoises to aversive sound. As a conservative measure the radius of responsiveness to pile-driving noise can only provisionally be defined to within 15-20km, leading to a zone of several hundred km<sup>2</sup>.

Few studies have been conducted on bottlenose dolphins, however detailed observation of their audiogram indicates that the zone of audibility for pile-driving noise might be quite similar to that for harbour porpoises. David<sup>60</sup> estimated a detection distance of 40km for pile-driving noise for bottlenose dolphins.

Studies conducted on shipping noise show that there may be an effect on cetaceans. Dolphins of many species show tolerance to and may even approach vessels whilst at the same time, other members of the same species may show avoidance. This may be due to the dolphins internal state, whether the animal is socialising (attraction) or foraging (avoidance). Harbour porpoises are normally shy and tend to avoid more often than not. However they have often been observed in areas of high shipping activity. Whether these behavioural changes are a response to the noise or to visual cues (i.e. curiosity) still remain to be determined.

<sup>59</sup> Lucke, K., Lepper, P.A., Blanchet, M., & Siebert, U. (2008) Testing the acoustic tolerance of Harbour Porpoise hearing for impulsive sounds. *Bioacoustics Journal*, Vol 17, No 1-3.

<sup>60</sup> David, J.A. (2006) Likely sensitivity of bottlenose dolphins to pile-driving noise. *Water and Environment Journal* 20, 48-54.

It may be argued that the effects of pile-driving periods would shadow any effects from construction ships. During the operational phase this could be different and the noise exposure from maintenance ships might cause additional stress for cetaceans.

Physiological effects are less well documented. Extended exposure to high levels of continuous noise and/or impulsive sound with high rise times can lead to injuries of the hearing structures in cetaceans, resulting in permanent hearing loss and other injuries. The mass standings of beaked whales that were associated with naval exercises demonstrated this. Animals close to the source, exposed to a sudden onset of pile-driving noise or explosives, might therefore be injured.

### **Effects on Foraging Grounds and Prey Species Populations**

The prey species of the two cetacean species are mainly fish and certain types of invertebrates such as cephalopods. Cetaceans may be displaced from their feeding areas by windfarm activities, and prey species could be affected via loss of habitat or displacement.

It is not thought that construction of offshore windfarms will cause a significant impact upon the integrity of the fish populations in the immediate area, although there may be displacement of cetaceans from some foraging areas. Impacts on fish from Round 3 noise activity may occur within a very short distance of the source, although this is unlikely to affect fish populations as a whole, and thus the availability of fish as a prey species<sup>61</sup>. The presence of turbines within the water column may attract and support a greater fish population than prior to the construction of the offshore windfarm, although this effect is not well documented.

## **4.2.2 Pinnipeds**

### ***Phoca vitulina* – Common Seal**

Also known as the harbour seal, the common seal is a true seal found along temperate and Arctic marine coastlines of the Northern hemisphere and the smaller of the two breeding seals in the UK. The coat colour is variable, ranging from black-grey to sandy brown with many small spots, with the males often darker in colour than the females. The head is small and cat-like, and the nostrils are small and terminal, forming a 'V'.

Common seals, which are non-migratory, are the most widespread of the pinnipeds, with the subspecies *P. vitulina vitulina* found in the eastern Atlantic, from northern Portugal to the Arctic, including Greenland and Iceland. In Europe they occur off Icelandic, Danish, German, and Dutch coasts, as well as around the UK. The UK itself supports 45 percent of the European population (five percent of the world population), with the main population centres occurring in the Moray Firth, The Wash and Firth of Tay and Eden Estuary, west Scotland, the Northern Isles and the Hebrides. The figure below shows the foraging areas of individual common seals tagged on the Isle of Skye, Jura, Islay, Orkney, Shetland, the Moray Firth, St Andrews Bay and The Wash between 2001 and 2005<sup>61</sup>. This figure shows that common seals can range up to approximately 150 kilometres. They haul-out and breed on beaches and low-lying rocks, terraces, and ice.

<sup>61</sup> Sharples, R.J. *et al.* (2005) Distribution and movements of harbour seals around the UK. SCOS Briefing Paper 05/5.

Common seals are gregarious, forming groups of up to 1,000 individuals on land. They are extremely wary and shy, and are easily frightened into the water. At sea they are most often seen alone or in small groups. When feeding, common seals generally travel up to 50 kilometres from the haul-out sites to feed and may stay out at sea for days, although studies have shown that they can travel further, up to 150 kilometres in some instances (see figure below). They can dive for up to 10 minutes and reach depths of 50 metres or more. Common seals feed on a wide variety of fish, cephalopods, and crustaceans of surface, mid-water, and benthic habitats.

UK and European populations of common seal declined during the spread of Phocine Distemper Virus in the 1990s. Most recent analyses indicate that UK populations may still be in decline over much of their range, for a variety of reasons which are not fully understood, although recovery is evident elsewhere in the North Sea<sup>62</sup>.

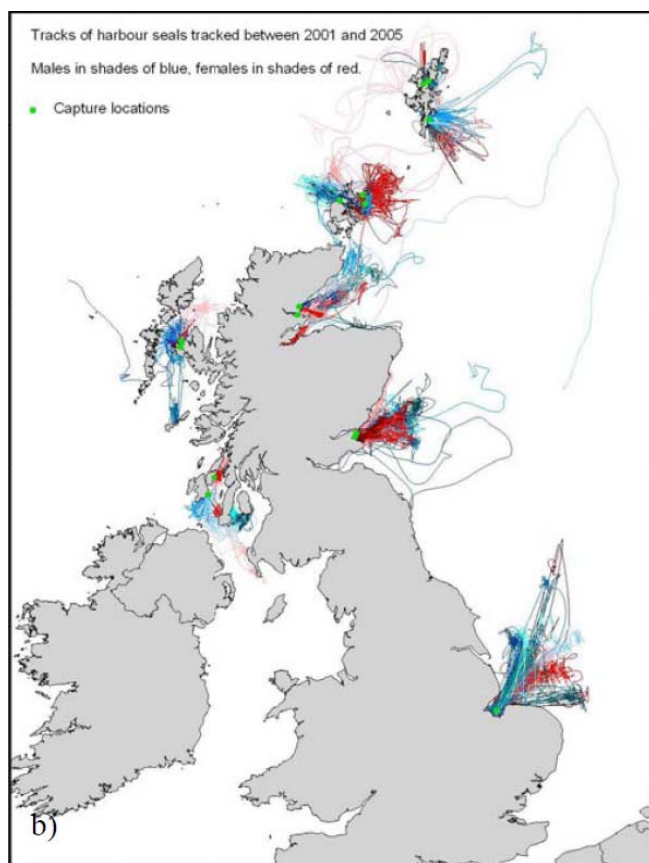
### ***Halichoerus grypus* – Grey Seal**

The grey seal *Halichoerus grypus* (meaning “hooked-nosed sea pig”) is found on both shores of the North Atlantic Ocean and the North Sea. It is a large seal of the family Phocidae. About half the world’s population of grey seal breeds in Britain. The coat colour of Britain’s grey

seals, the larger of two species of breeding seals, varies from grey to brown to silver, often with blotches. The bulls can be distinguished from the females by their darker fur colours.

In autumn females congregate at traditional rookeries (pupping sites), with pupping and breeding occurring between late September and early March. When the males come ashore to mate they compete (using gestures and vocalizations) for sole access to a group of females, and can have as many as ten. After birth the pups rapidly put on weight and develop the blubber layer essential for maintaining body temperature. The grey seals in the British Isles breed the earliest, followed by those in Norway and Iceland, and finally those off Canada and in the Baltic Sea.

Grey seals have a cold temperate to subarctic distribution in the North Atlantic. There are three somewhat isolated stocks: a western Atlantic



stock; an eastern Atlantic stock split between Iceland, the Faeroe Islands, Norway, the United Kingdom, and Ireland; and a Baltic Sea stock. In Europe, grey seals are generally coastal; they

<sup>62</sup> SMRU (2008) Scientific Advice on Matters Related to the Management of Seal Populations: 2008 - Report to the Special Committee on Seals.

haul-out on isolated beaches and rocky ledges of outlying islands to pup and to moult in the late winter and spring. In some localities, they move well inland to pup and breed. At other times of the year they may haul out and rest between foraging trips, often choosing sites offering good access to the open sea. Satellite tracking has shown that individuals can forage up to several hundred miles offshore, lasting several days. The seals tend to be based at specific haul-out sites, however they will occasionally move to a new haul-out site.

Grey seals feed in inshore benthic habitats, on a wide variety of fish and benthic invertebrates. They also feed on schooling fish and occasionally on seabirds. Major changes have been observed in diet in relation to changes in fish stock abundance. When feeding, grey seals can dive up to depths of 30 to 70 metres.

Grey seal populations in the UK and Europe are considered to be increasing in size, although the rate of increase is slowing<sup>62</sup>.

### **Sensitivities**

Pinnipeds use a variety of sounds both in and out of the water to carry out complex social information such as dominance and territoriality. Vocalisation in pinnipeds is thought to be particularly important in the development of the mother-pup relationship. Unlike cetaceans, pinnipeds spend a portion of their lives on land and thus vocalise both in and out of water. There are very few reports of physiological damage or conditions linked to anthropogenic noise, and very little is known of the frequencies and sound intensities required for physiological damage. Also, conducting studies on hauled-out seals is compounded by the difficulty in determining whether the reactions recorded were due to noise or visual cues.

The most common reaction of hauled-out seals to anthropogenic noise is to simply enter the water. Underwater, most reactions to construction and operational noises are very similar to those of cetaceans. Most of the studies conducted on the cetaceans, both the theoretical and empirical studies, were also conducted on seals.

Indirect effects are mainly noise from any passing vessels. It has been observed that seals are very shy creatures, with an automatic reaction to dive into the water if they have been disturbed. Such disturbance can be caused by noise from piling (if construction is close to a haul-out site) or an increase in vessel movement. Looking at the empirical studies conducted at Horns Rev and Nysted, grey seals transited Horns Rev during pile-driving. However, during pile-driving at Nysted, compared to non-construction days a 10-60% decrease in the number of hauled out grey seals on a sandbank 10 km away from the construction area was observed. However this effect was short lived as the overall number of seals remained the same throughout the whole construction phase. Following these studies it was considered that the zone of audibility for pile-driving noise will most certainly be as wide as for harbour porpoises and potential behavioural reactions might be expected in distances comparable to porpoises.

Evidence of habituation to offshore windfarm is presented in observations of grey seals 1.5km from Näsrevet Windfarm in Sweden. The windfarm comprises five turbines of 500kW with a well-established local grey seal colony. The results of the observations gave no indication that the seals were affected. The only impact observed was avoidance of boats that passed close to the haul-out site during the construction phase.

For grey seal the zone of responsiveness of pile-driving is even more difficult to assess than for cetaceans. Several observations have been made that impulsive sounds have a smaller impact on

seals than on cetaceans. Seismic surveys using airgun arrays, however, have been reported to result in a strong avoidance behaviour in grey seals<sup>43</sup>.

A study conducted by Koschinski *et al.*<sup>57</sup> recorded the behavioural reactions of common seals to recorded operational noise. The seals showed distinct behavioural response by increasing their median distance to the sound source when surfacing. Since only underwater sound was produced the seals may have avoided the sound by lifting their heads out of the water. This has been reported by fish farmers using acoustic harassment devices (AHDs). Another possible explanation is a masking effect on biologically significant sounds, such as prey sounds during foraging.

In general it is thought that seals tolerate and habituate to anthropogenic noise and activity, once the animals realise that the noise source is not a threat. For example, both grey and harbour seals in the UK permit the close approach of tour boats that repeatedly visit haul-out locations.

### **Effect on Foraging Grounds and Prey Species Populations**

The prey species of the two pinnipeds species are mainly fish and benthic invertebrates. Pinnipeds may be displaced from their feeding areas by windfarm activities, and prey species could be affected via loss of habitat or displacement.

It is not thought that construction of offshore windfarms will cause a significant impact upon the integrity of the fish populations in the immediate area, although there may be displacement of cetaceans from some foraging areas. Impacts on fish from Round 3 noise activity may occur within a very short distance of the source, although this is unlikely to affect fish populations as a whole, and thus the availability of fish as a prey species<sup>43</sup>. The presence of turbines within the water column may attract and support a greater fish population than prior to the construction of the offshore windfarm, although this effect is not well documented.

### **Impacts Upon Haul-Out Sites**

Pinnipeds use haul-out sites mainly for breeding, resting, and socialising. Any direct or indirect impacts upon haul-out sites could affect the behaviour of pinnipeds, such as mating. Impacts are classified as either direct or indirect.

Connection cables running through the haul-out site could result in a direct impact upon the haul-out site. This could result in displacement of the seal colony to another site.

Indirect impacts caused by hydrodynamic modification leading to habitat erosion could potentially disturb the haul-out site enough to displace the seals to an alternative site. However, this is only likely to be a significant issue where cables are laid close to haul-out sites.

## **4.3 Effects of the Round 3 Plan**

### **4.3.1 Introduction**

Most observed effects caused by offshore windfarms on marine mammals have been on much smaller windfarms than those which will be constructed as part of the Round 3 Plan. The scale of development indicates that the effects on mammals will be larger (particularly as a result of the cumulative effects of multiple projects). However, it is by no means certain that all Round 3

windfarm projects will use pile driving of turbine bases, and there will be a clear need for assessment of effects on a project-by-project basis as well as at Plan level.

Whilst effects on individual marine mammals arising from offshore windfarm developments may occur at some distance from the source, adverse effects on the integrity of sites where marine mammal populations are qualifying interest features would be expected only where individuals from those populations occur in significant numbers on a regular basis in the areas of development. Consequently the assessment of effects on sites has focussed on the distribution and movement patterns of marine mammal species, as outlined below.

#### **4.3.2 *Tursiops truncatus* – Bottlenose Dolphin**

Bottlenose dolphins are known for their wide distribution found throughout the world's oceans. They have been documented to have a wide range of movement and are not restricted to specific areas. Currently there is insufficient scientific information to determine the migratory patterns of bottlenose dolphins, or even if they do migrate. However some studies have been conducted on bottlenose dolphin movements in the eastern Atlantic and North Sea.

From Figure 4.1 it is clear that the distribution and range of dolphins from sites around west coast of France, Spain, and west coast of Ireland do not overlap with the Round 3 Plan. It is highly unlikely that bottlenose dolphins from these areas frequent the Round 3 zones.

Bottlenose dolphins at German, Dutch and French (north coast) sites may potentially interact with Round 3 zones off the east coast of the UK. As bottlenose dolphins have such a wide distribution and because of the lack of scientific information it is difficult to rule out these sites as a result of the distance between the site and the Round 3 zones. Therefore bottlenose dolphins from these sites may potentially be impacted by Round 3 activity, however more information will be needed to assess the extent of the impact as this is dependant on the precise location and type of construction activities of the windfarm and turbine operation. This, therefore, needs to be carried out at project level.

The potential for bottlenose dolphin populations at Cardigan Bay and Moray Firth to interact with the Round 3 zones is highly likely given the close proximity of the zones to the sites and the distribution and range of those populations. Avoidance and mitigation measures are available to minimise any adverse effects upon the populations. Again the extent of the impacts are dependant on type and location of construction and operational activities and thus more in depth studies need to be carried out at project level.

#### **4.3.3 *Phocoena phocoena* – Harbour Porpoise**

The distribution and range of the harbour porpoise has been studied in greater depth than that of bottlenose dolphins. They are restricted to waters below 17°C and on the continental shelf and they tend to stay in one area, with some seasonal migration occurring, mostly inshore in summer and offshore in winter.

Studies have shown that there is a population boundary from the northern Kattegat Sea across to the Danish island of Læsø. This means that harbour porpoise from the Swedish site Kosterfjorden-Väderöfjorden (SE0520170) are unlikely to frequent the Round 3 zone areas. Similarly, studies have also shown that there is no harbour porpoise population overlap in Danish Waters/Skagerrak Sea and the North Sea (apart from one or two tagged individuals). Therefore populations of harbour porpoises from coastal German and Danish sites are unlikely

to be adversely affected by Round 3 zones. The only exception to this are harbour porpoise in the German Doggerbank SAC, as this is close to Zone 3.

Studies have also shown that that it is likely that there is very little crossover between the northern North Sea and southern North Sea. Therefore it is highly unlikely that harbour porpoises from Dutch sites will be adversely affected by the Round 3 zones. However the Belgian sites are very close to Zone 5 and there is not enough scientific information on the migratory patterns of the harbour porpoises at these sites. Thus there is a potential for them to be adversely affected by the Round 3 zones. Avoidance and mitigation measures are available to minimise any adverse effect upon the population but more information will be needed to assess the extent of the impact as this is dependant on the type of construction activities of the windfarm and turbine operation. This, therefore, needs to be carried out at project level.

Sites with harbour porpoises off the west coast of Ireland, France and Spain are unlikely to be adversely affected by Round 3 zones as a result of the distance between the sites and the zones.

#### **4.3.4 *Phoca vitulina* – Common Seal**

Common seals are non-migratory, and widespread in the eastern Atlantic and North Sea. Common seals can be adversely impacted by offshore windfarms through noise and disturbance to their haul-out sites, and during foraging if the foraging area is close to an offshore windfarm. Even though common seals are notoriously shy and will move away from any unwanted noise or disturbance, they have been found to habituate to the noise and (if the noise is temporary) will re-establish themselves again.

Common seals travel, on average, 50km to foraging areas, with some tagged common seals having been found to forage up to 150km from their haul-out site (and a few tagged individuals foraging even further) for up to a couple days at a time. This means that all sites with common seals in the UK, except those at the north west coast of Scotland, could potentially be adversely affected by the Round 3 zones, although it remains to be established whether significant proportions of SAC populations from each site frequent the Round 3 zone areas. Avoidance and mitigation measures are available to minimise any adverse effect upon the population. It is recommended that the potential impacts upon these sites are examined further at project level.

There are no direct impacts from cable laying upon common seal haul-out sites. However there may be indirect impacts from vessel movement related to cable laying, construction and maintenance. This is especially true at The Wash, Firth of Tay, and Dornoch Firth. Studies have shown that the impacts upon seal colonies are not very large, with only a temporary disturbance in the immediate vicinity. Also most haul-out sites are regularly visited by tour boats, thus the seals are already habituated to a fairly high level of vessel movement.

As a result of the distances common seals travel whilst foraging, it is highly unlikely that common seal from transnational SACs will be adversely affected by the Round 3 zones. The only exception is the common seal at Doggerbank in German waters, which use the area as foraging grounds.

#### **4.3.5 *Halichoerus grypus* – Grey Seal**

In Europe, grey seals are generally coastal, with haul-out sites on isolated beaches and rocky ledges of outlying islands. Grey seals can forage up to several hundred miles offshore, on trips lasting several days. Grey seals can be adversely impacted by offshore windfarms through noise

and disturbance to their haul-out sites. Even though grey seals are notoriously shy and will move away from any unwanted noise or disturbance they have been found to habituate to the noise and, if the noise is temporary, will re-establish themselves again. This has been proven by tour boats repeatedly visiting haul-out sites.

As grey seals forage up to a few couple hundred kilometres from their haul-out sites, all sites with grey seals in the UK, except for those off the north west coast of Scotland and Isles of Scilly, could potentially be adversely affected by the Round 3 zones. The Saltee Islands in Ireland could also be indirectly affected by the Round 3 zones. Avoidance and mitigation measures are available to minimise any adverse effect upon the population and will need to be determined by reference to location and design of offshore windfarms. It is recommended that the potential impacts upon these sites are examined further at project level.

The Humber estuary in the UK is known as an important haul-out site for grey seals. There is the potential for the site to be directly affected by the connection cables running from zones three and four to the shore. This can be mitigated to an extent by avoiding cable-laying activity during the breeding months between late September and early March. Also the cables could be placed so that they avoid the haul-out sites on the estuary.

Owing to distance from the zones, it is considered that transnational sites will not be adversely affected by the Round 3 Plan.

#### **4.3.6 Avoidance and Mitigation Measures at Plan Level**

Based on the evidence presented in this chapter, it is considered that some Plan-level avoidance and mitigation measures are required for marine mammals in order to ensure that the Plan does not have adverse effects on the integrity of sites with qualifying marine mammal populations. .

Sensitivities of cetaceans are related to damage and disturbance resulting from noise, and loss of prey species. The evidence presented in this chapter indicates that the key issue requiring mitigation at Plan level is that of construction and decommissioning noise. For cetaceans which range widely, the cumulative effects of multiple projects within a zone and multiple zones may become significant in the absence of mitigation.

Evidence presented in this report indicates that the key issues for seals are damage and disturbance resulting from construction/decommissioning noise and at their haul-out sites (by physical damage to the site or by disturbance of animals using the sites).

*The Round 3 Plan must therefore be undertaken in such a way as to ensure that noise levels produced during the construction and decommissioning of Projects within a zone and between zones does not exceed the level at which there will be an adverse effect on the integrity of any European/Ramsar sites for which cetacean and/or seal populations are a qualifying feature.*

*Furthermore, the Round 3 Plan must be undertaken in such a way as to ensure that any physical damage to haul-out sites or disturbance of seals at haul-out sites does not result in an adverse effect on the integrity of any European/Ramsar sites for which seal populations are a qualifying feature.*

It is possible to implement these Plan-level avoidance and mitigation measures at project level, although the methods chosen for its implementation may vary considerably between projects as a result of the nature of those projects. Examples of possible project level mitigations are given

below. This is not intended to be an exhaustive list, and the effectiveness of the measures will vary considerably between projects.

- use of turbine bases which do not require piling;
- extension of the duration of the impact during pile-driving. This results in a decrease of 10-15 dB in mostly higher frequencies of greater than 2 kHz (although it also extends the total amount of time required for piling activities, thus increasing the period over which effects may occur, and may not, therefore, result in an overall mitigation of the effect for all projects);
- mantling of the ramming pile with acoustically-isolated material such as plastic or foam. This results in a decrease of 5 – 25 dB in the higher frequencies;
- air bubble curtain around the pile. This could result in a decrease of 10-20dB, depending on the frequency. This will not be possible at the deep offshore sites however the likelihood of piling at these sites is very low; it is more likely that pin-piling of jacket foundations or installation of gravity bases will be used instead, both of which result in less noise than pile-driving;
- soft start piling, which results in slowly increasing the energy of the emitted sound, giving the marine mammal a chance to leave the construction area;
- acoustic harassment devices (AHD) such as pingers and seal-scarers;
- seismic surveying only during daylight, and use of soft start seismic surveying methods<sup>63</sup>;
- cable laying close to pinniped haul-out sites only outside the breeding season; and
- management of construction schedules within zones (and between zones where necessary) to reduce the level and duration of noise produced.

Zone developers will be obliged to undertake Plan-level avoidance and mitigation measures where it is necessary to prevent adverse effects on the integrity of European/Ramsar sites. However, determination of the most appropriate way(s) of implementing Plan-level avoidance and mitigation measures at the level of individual projects will be undertaken by developers at project level, in consultation with regulators and statutory nature conservation agencies. Zone developers should also take into account the emerging environmental guidance relating to the Round 3 Plan when planning appropriate project-level mitigation measures. It may also be appropriate for developers to consider zone-wide mitigation strategies in addition to project-specific measures.

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<sup>63</sup> JNCC (2004) Guidelines for minimising acoustic disturbance to marine mammals from seismic surveys. Joint Nature Conservation Committee, Aberdeen, 9pp.

#### **4.3.7 Effects on Sites**

The Table 4.5 shows the outcome of AA on each of the sites with sensitive marine mammal species as interest features.

Table 4.5 Summary of Site Assessment for Marine Mammals where these are an Interest Feature

| Site Code | Site Name                                   | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                                                                                                                                                                                                                                |
|-----------|---------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030230 | Ascrib, Islay and Dunvegan                  | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | No in-combination effects identified       | No adverse effect on conservation status of the interest feature or on site integrity from Round 3 activity owing to distance.                                                                                                                                                                                                                                 |
| UK0017072 | Berwickshire and north Northumberland Coast | <i>Halichoerus grypus</i>                    | Yes                                            | No                                                                    | Scottish offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. The specific conservation objective for grey seal at the site only states that the breeding grounds at the Farne Islands are maintained and according to the Plan the connection cables will not be near the breeding habitat. |
| UK0012712 | Cardigan Bay / Bae Ceredigion               | <i>Halichoerus grypus</i>                    | Yes                                            | No                                                                    | No in-combination effects identified       | With Plan-level mitigation there will be no adverse effect on the conservation status of the interest feature or on site integrity; the site is not directly affected by the Plan and the Plan will not result in significant loss of foraging grounds for grey seals.                                                                                         |
|           |                                             | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | No in-combination effects identified       | With Plan-level mitigation there will be no adverse effect on the conservation status of the interest feature or on site integrity; site is not directly affected by the Plan and the Plan will not result in significant loss of foraging grounds for bottlenose dolphin.                                                                                     |

| Site Code | Site Name                      | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                     | Site Conclusion                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------|--------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0019806 | Dornoch Firth and Morrich More | <i>Phoca vitulina</i>                        | Yes                                            | No *                                                                  | Scottish offshore windfarms and oil and gas.                   | The conservation objective of the common seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |
| UK0030182 | Eileanan agus Sgeiran Lios mór | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | No in-combination effects identified                           | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                       |
| UK0017096 | Faray and Holm of Faray        | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | Pentland Firth strategic area and Scottish offshore windfarms. | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                       |
| UK0030311 | Firth of Tay and Eden Estuary  | <i>Phoca vitulina</i>                        | Yes                                            | No *                                                                  | Scottish offshore windfarms                                    | The conservation objective of the common seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |
| UK0030170 | Humber Estuary                 | <i>Halichoerus grypus</i>                    | Yes                                            | No *                                                                  | Round 2 windfarms, aggregates, and port and harbour activities | The conservation objective of the grey seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level.   |

| Site Code | Site Name               | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                                                                | Site Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------|-------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030172 | Isle of May             | <i>Halichoerus grypus</i>                    | Yes                                            | No *                                                                  | Scottish offshore windfarms                                                                               | The conservation objective of the grey seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level.          |
| UK0013694 | Isles of Scilly Complex | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | No in-combination effects identified                                                                      | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                              |
| UK0013114 | Lundy                   | <i>Halichoerus grypus</i>                    | Yes                                            | No *                                                                  | Aggregates                                                                                                | The conservation objective of the grey seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level.          |
| UK0012694 | Monach Islands          | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | No in-combination effects identified                                                                      | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                              |
| UK0019808 | Moray Firth             | <i>Tursiops truncatus</i>                    | Yes                                            | No *                                                                  | Scottish offshore windfarm, oil and gas, and the Beatrice wind demonstrator, Aberdeen harbour development | The conservation objective of the bottlenose dolphin at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |

| Site Code | Site Name                                           | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------|-----------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0012711 | Mousa                                               | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | No in-combination effects identified       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                     |
| UK0016612 | Murlough                                            | <i>Phoca vitulina</i>                        | Yes                                            | No                                                                    | No in-combination effects identified       | With Plan-level mitigation there will be no adverse effect on conservation objectives of the interest feature (maintaining the population numbers and distribution of common seal), or on site integrity.                                                                                                                                                                                                              |
| UK0012696 | North Rona                                          | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | No in-combination effects identified       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                                                                                                                                                                     |
| UK0013116 | Pembrokeshire Marine / Sir Benfro Forol             | <i>Halichoerus grypus</i>                    | Yes                                            | No *                                                                  | No in-combination effects identified       | The conservation objective of the grey seal at this site specifically states that there should be no significant disturbance of the species and no deterioration of the habitat supporting the species. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |
| UK0013117 | Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau | <i>Halichoerus grypus</i>                    | Yes                                            | No                                                                    | No in-combination effects identified       | The conservation objective for the grey seal at the site states that the range and distribution of the grey seal at the site and beyond should not be constrained or hindered. With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity.                                                                                                         |
|           |                                                     | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | No in-combination effects identified       | The conservation objective for the bottlenose dolphin at the site states that the population of dolphins should be maintained in the SAC and beyond. With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity.                                                                                                                                   |

| Site Code | Site Name                      | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                     | Site Conclusion                                                                                                                                                                                          |
|-----------|--------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030069 | Sanday                         | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | Pentland Firth strategic area and Scottish offshore windfarms. | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |
| UK0030067 | South-East Islay Skerries      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | Scottish offshore windfarms                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |
| UK0016618 | Strangford Lough               | <i>Phoca vitulina</i>                        | Yes                                            | No                                                                    | SeaGen tidal device in Strangford Narrows                      | With Plan-level mitigation there will be no adverse effect on conservation objectives of the interest feature (maintaining the population numbers and distribution of common seal) or on site integrity. |
| UK0017075 | The Wash & North Norfolk Coast | <i>Phoca vitulina</i>                        | Yes                                            | No                                                                    | Round 1 and 2 windfarms, oil and gas, and aggregates           | Foraging grounds for seals from this site could be affected by zone development. With Plan-level mitigation there will be no adverse effect on conservation objectives of the interest feature.          |
| UK0030289 | Treshnish Isles                | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | No in-combination effects identified                           | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |
| UK0012687 | Yell Sound Coast               | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | No in-combination effects identified                           | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |
| BEMNZ0001 | Trapegeer-Stroombank           | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |
|           |                                | <i>Phocoena phocoena</i>                     | Yes                                            | Insufficient information to assess at Plan level                      | European offshore windfarms                                    | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity.                                                                          |
| BEMNZ0002 | SBZ 1 / ZPS 1                  | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                       |

| Site Code | Site Name          | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|--------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|           |                    | <i>Phocoena phocoena</i>                     | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
|           |                    | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                    |                                              |                                                |                                                                       |                                            |                                                                                                                                 |
| BEMNZ0003 | SBZ 2 / ZPS 2      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                    | <i>Phocoena phocoena</i>                     | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
|           |                    | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| BEMNZ0004 | SBZ 3 / ZPS 3      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                    | <i>Phocoena phocoena</i>                     | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
|           |                    | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| BEMNZ0005 | Vlakte van de Raan | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

| Site Code | Site Name                                        | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects        | Site Conclusion                                                                                                                                                                                                                                                   |
|-----------|--------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |                                                  | <i>Phocoena phocoena</i>                     | Yes                                            | No                                                                    | European offshore windfarms                       | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity.                                                                                                                                   |
|           |                                                  | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                |
| DE0916391 | NTP S-H Wattenmeer und angrenzende Küstengebiete | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                |
|           |                                                  | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                |
|           |                                                  | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                                |
|           |                                                  | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                       | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity.                                                                                                                                   |
| DE1003301 | Doggerbank                                       | <i>Phoca vitulina</i>                        | Yes                                            | No *                                                                  | European offshore windfarms, oil and gas, fishing | Effects on seal foraging at this site could occur. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |

| Site Code | Site Name                            | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects        | Site Conclusion                                                                                                                                                                                                                                                  |
|-----------|--------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |                                      | <i>Phocoena phocoena</i>                     | Yes                                            | No *                                                                  | European offshore windfarms, oil and gas, fishing | Harbour porpoise from the site could be affected. Mitigation measures will be implemented to ensure that there is no adverse effect of the Plan but these cannot be defined until project details are known. HRA will be therefore be required at project level. |
| DE1011401 | SPA Östliche Deutsche Bucht          | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
|           |                                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
|           |                                      | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
| DE1115391 | Dünenlandschaft Süd-Sylt             | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
| DE1209301 | Sylter Außenriff                     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
|           |                                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
|           |                                      | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
| DE1315391 | Küsten- und Dünenlandschaften Amrums | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |
| DE1714391 | Steingrund                           | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                       | No adverse effect on the interest feature from Round 3 activity owing to distance.                                                                                                                                                                               |

| Site Code | Site Name                            | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                    |
|-----------|--------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|
| DE1813391 | Helgoland mit Helgoländer Felssockel | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      |                                              |                                                |                                                                       |                                            |                                                                                    |
| DE2016301 | Hamburgisches Wattenmeer             | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DE2104301 | Borkum-Riffgrund                     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                      | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DE2306301 | Nationalpark Niedersächsisches       | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |

| Site Code | Site Name                                                  | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                    |
|-----------|------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|
|           | Wattenmeer                                                 | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DE2323392 | Schleswig-Holsteinisches Elbästuar und angrenzende Flächen | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DE2507301 | Hund und Paapsand                                          | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DE2507331 | Unterems und Außenems                                      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DK00AY176 | Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                                            | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                                            | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DK00CY040 | Venø, Venø Sund                                            | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| DK00EY133 | Agger Tange, Nissum Bredning, Skibsted Fjord og Agerø      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES0000001 | Illas Cíes                                                 | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |

| Site Code | Site Name                           | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                    |
|-----------|-------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|
| ES0000254 | Illa de Ons                         | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                     | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES0000317 | Penarronda-Barayo                   | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                     | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES0000318 | Cabo Busto-Luanco                   | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                     | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES0000319 | Ría de Ribadesella-Ría de Tinamayor | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES1110005 | Costa da Morte                      | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                     | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| ES1110006 | Complejo húmido de Corrubedo        | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |
|           |                                     | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance. |

| Site Code | Site Name                                                  | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ES1140004 | Complexo Ons - O Grove                                     | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                            | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| ES1140010 | Costa da Vela                                              | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                            | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| ES1200047 | Yacimientos de Icnitas                                     | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                            | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR2200346 | Estuaires et Littoral Picards (Baies de Somme et d'Authie) | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR2300121 | Estuaire de la Seine                                       | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR2500077 | Baie du Mont Saint-Michel                                  | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                            | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| FR2500079 | Les Iles Chausey                                           | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

| Site Code | Site Name                                                                                                    | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|           |                                                                                                              | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| FR2500088 | Marais du Cotentin et du Bessin - Baie des Veys                                                              | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR3100474 | Dunes de la Plaine Maritime Flamande                                                                         | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR3100478 | Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant   | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                                                                              | <i>Phocoena phocoena</i>                     | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
|           |                                                                                                              | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR3100480 | Estuaire de la Canche, Dunes Picardes Plaquees sur l'Ancienne Falaise, Foret d'Hardelot et Falaise d'Equihen | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR5300009 | Cote de Granit Rose de Milliau a Tome, Archipel des Sept-Iles                                                | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

| Site Code | Site Name                                                              | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| FR5300011 | Cap d'Erquy, Cap Frehel                                                | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| FR5300012 | Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| FR5300018 | Archipel de Molene et Ile d'Ouessant                                   | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                                        | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR5300019 | Presqu'île de Crozon                                                   | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR5300020 | Cap Sizun, Ile de Sein                                                 | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                                                        | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR5300029 | Golfe du Morbihan, Cote Ouest de Rhuys                                 | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR5300033 | Archipel de Houat-Hoedic, Pointe du Conguel                            | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

| Site Code | Site Name                        | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|----------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| FR5300052 | Cote de Cancale a Parame         | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| FR5400469 | Pertuis Charentais               | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                  | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| FR7200679 | Bassin D'Arcachon                | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0000090 | Glengarriff Harbour and Woodland | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0000101 | Roaringwater Bay and Islands     | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                                  | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0000133 | Donegal Bay (Murvagh)            | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0000147 | Horn Head and Rinclevan          | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

| Site Code | Site Name                                    | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                    |
|-----------|----------------------------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|
| IE0000190 | Slieve Tooey/Tormore Island/Loughros Beg Bay | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000197 | West of Ardara/Maas Road                     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000204 | Lambay Island                                | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000268 | Galway Bay Complex                           | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000278 | Inishbofin and Inishshark                    | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000328 | Slyne Head Islands                           | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000458 | Killala Bay/Moy Estuary                      | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000495 | Duvillaun Islands                            | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000507 | Inishkea Islands                             | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000622 | Ballysadare Bay                              | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |
| IE0000627 | Cummeen Strand/Drumcliff Bay (Sligo Bay)     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance. |

| Site Code | Site Name                 | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|---------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| IE0000707 | Saltee Islands            | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0001482 | Clew Bay Complex          | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0002111 | Kilkieran Bay and Islands | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0002158 | Kenmare River             | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0002165 | Lower River Shannon       | <i>Tursiops truncatus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0002172 | Blasket Islands           | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                           | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| IE0002283 | Rutland Island and Sound  | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| NL1000001 | Waddenzee                 | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                           | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                           | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |

| Site Code | Site Name        | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| NL1000018 | Oosterschelde    | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| NL2003062 | Noordzeekustzone | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                  | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                  | <i>Halichoerus grypus</i>                    | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                  | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| NL2007001 | Eems-Dollard     | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| NL4000017 | Voordelta        | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                  | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |

| Site Code | Site Name                   | Qualifying features assessed in this chapter | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                                                 |
|-----------|-----------------------------|----------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| NL9801001 | Waddenzee                   | <i>Tursiops truncatus</i>                    | Yes                                            | No                                                                    | European offshore windfarms                | With Plan-level mitigation there will be no adverse effect on conservation status of the interest feature or on site integrity. |
| NL9803061 | Westerschelde               | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | European offshore windfarms                | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
| SE0520170 | Kosterfjorden-Väderöfjorden | <i>Phoca vitulina</i>                        | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |
|           |                             | <i>Phocoena phocoena</i>                     | No                                             | n/a                                                                   | Unknown                                    | No adverse effect on the interest feature from Round 3 activity owing to distance.                                              |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

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## 5. Potential for Adverse Effects on Habitat Interest Features

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### 5.1 Introduction

#### 5.1.1 Sites in this Chapter

Following the screening process, a number of SACs and Ramsar sites were identified where for some or all of the qualifying habitat features it was not possible to conclude that there would be no Likely Significant Effect of the Round 3 Plan. These sites have been brought through to the AA stage on the basis of these Annex I habitats:

- estuaries;
- large shallow inlets and bays;
- mudflats and sandflats not covered by seawater at low tide;
- reefs;
- *Salicornia* and other annuals colonising mud and sand;
- sandbanks which are slightly covered by sea water all the time; and
- submerged or partially submerged sea caves.

This chapter of the report sets out generic information regarding each of these habitats and their sensitivities and potential mitigations followed by an Appropriate Assessment on the habitat qualifying features for the sites for which it was not possible to conclude there would be no LSE in the HRA Screening of the Round 3 Plan.

The sites which contain habitat interest features where the HRA Screening Report could not conclude there would not be a LSE are listed in Table 5.1. Note that some of the sites also contained non-habitat features of interest, e.g. fish or marine mammals, for which it could not be concluded that there would be no LSE. These have been assessed in previous chapters, and conclusions for the whole site are presented in Chapter 7.

A number of sites and/or interest features at sites were identified at the screening stage in the Plan-level HRA as not likely to be significantly affected by the Round 3 Plan and, consequently, have not been taken forward for AA. In many cases, the sites/interest features were screened-out on the basis of the inclusion, as part of the Plan, of the general environmental measures which are set out in Table 1.1.

It has been identified in Section 1.3.2 that individual projects within the Round 3 Plan will require HRA, and that this assessment will be based on specific details of project proposals that are not available at the Plan stage. It is recognised that it may not be possible to incorporate all of the Plan-level environmental measures into each project. As a result of this or other

circumstances (see Section 1.3.2) it may be necessary, as part of the project-level HRA, to assess effects on sites or interest features that were screened out at Plan level. In order for this assessment to conclude that there will be no adverse effects on the integrity of the relevant sites, it may be necessary to implement additional mitigation measures <sup>64</sup>.

For example, saltmarsh, which could be affected by cable-laying works, was screened out of the Plan-level AA. However if it were to be screened back in at project level because it was not possible to avoid adverse effects through micro-siting of the cable or other Plan-level environmental measures, there might, for example, be a need to re-route the cable in order to avoid an effect on the relevant site's integrity.

**Table 5.1 Sites which contain Habitat Qualifying Features where the HRA Screening did not Conclude there would be no LSE as a Result of the Round 3 Plan**

| Site Name                                                  | Current Designation* | Estuaries | Large shallow inlets and bays | Mudflats and sandflats not covered by seawater at low tide. | Reefs | Salicornia and other annuals colonising mud and sand. | Sandbanks which are slightly covered by sea water all the time | Submerged or partially submerged sea caves. |
|------------------------------------------------------------|----------------------|-----------|-------------------------------|-------------------------------------------------------------|-------|-------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------|
| Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd | SAC                  | ✓         | ✓                             | ✓                                                           |       | ✓                                                     | ✓                                                              |                                             |
| Dee Estuary / Aber Dyfrdwy                                 | SCI                  | ✓         |                               | ✓                                                           |       |                                                       |                                                                |                                             |
| Dee Estuary                                                | Ramsar               | ✓         |                               | ✓                                                           |       |                                                       |                                                                |                                             |
| Dogger Bank                                                | dSAC                 |           |                               |                                                             |       |                                                       | ✓                                                              |                                             |
| Essex Estuaries                                            | SAC                  | ✓         |                               | ✓                                                           |       |                                                       | ✓                                                              |                                             |
| Flamborough Head                                           | SAC                  |           |                               |                                                             | ✓     |                                                       |                                                                | ✓                                           |
| Haisborough, Hammond and Winterton                         | dSAC                 |           |                               |                                                             |       |                                                       | ✓                                                              |                                             |
| Humber Estuary                                             | SCI                  | ✓         |                               | ✓                                                           |       |                                                       | ✓                                                              |                                             |
| Humber Estuary                                             | Ramsar               | ✓         |                               | ✓                                                           |       |                                                       |                                                                |                                             |
| Lundy                                                      | SAC                  |           |                               |                                                             | ✓     |                                                       | ✓                                                              |                                             |
| Poole Bay to Lyme Bay Reefs                                | dSAC                 |           |                               |                                                             | ✓     |                                                       |                                                                | ✓                                           |

<sup>64</sup> The potential to restrict windfarm development in any of the nine development zones means that there can be confidence at the Plan-level that, even if it is concluded that environmental/mitigation measures will not be effective in avoiding an adverse effect on integrity at the project level, there is the possibility of reducing the amount of development in any zone in order to ensure that there will be no adverse effect on integrity.

| Site Name                                        | Current Designation* | Estuaries | Large shallow inlets and bays | Mudflats and sandflats not covered by seawater at low tide. | Reefs | Salicornia and other annuals colonising mud and sand. | Sandbanks which are slightly covered by sea water all the time | Submerged or partially submerged sea caves. |
|--------------------------------------------------|----------------------|-----------|-------------------------------|-------------------------------------------------------------|-------|-------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------|
| Shell Flat and Lune Deep                         | dSAC                 |           |                               |                                                             | ✓     |                                                       | ✓                                                              |                                             |
| South Wight Maritime                             | SAC                  |           |                               |                                                             | ✓     |                                                       |                                                                |                                             |
| Y Fenai a Bae Conwy / Menai Strait and Conwy Bay | SAC                  |           | ✓                             | ✓                                                           | ✓     |                                                       | ✓                                                              | ✓                                           |

\* SAC: Special Area of Conservation, dSAC: draft SAC, pSAC: potential SAC, SCI: Site of Community Importance

Details of the conservation objectives and general sensitivities for each of these habitat types is set out in Section 5.1.2 of this report. A description of each of the qualifying feature habitat types found in the sites is set out in Section 5.2. Section 5.3 sets out specific information regarding the sites, and the sensitivities and activities associated with the Round 3 Plan which may have an adverse effect on the conservation objectives of the interest features. This section also includes a summary of the potential for adverse effects on a site by site basis. Plan-level mitigations are also included in this section.

Definitions of common terminology used in this chapter of the report are listed in Table 5.2.

**Table 5.2 Definitions of Terminology used to Describe Habitats**

| Term                | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Natural processes   | <p>Features may be subject to both natural processes and human influence. Human influence on the interest features is acceptable provided that it is proved to be / can be established to be compatible with the achievement of the conditions set out under the definition of favourable condition for each interest feature.</p> <p>For example, dynamic physical process within estuaries can stem from variable weather conditions including one off storm events, and result in changes in wave exposure, riverine floods or tidal surges. These events can move large quantities of sediments and alter channel morphology, which affect current patterns and sediment transport within the estuary. Because estuaries are dynamic systems it is expected that the amount and gross distribution of habitats will change in the future.</p> |
| Maintain or Restore | Maintain implies that the feature is in favourable condition and will, subject to natural change, remain at its condition at designation. Any existing activities are deemed to be sustainable and will not adversely affect the condition of the feature if current practices are continued at current levels. Restore implies that the feature is degraded to some degree. Restoration in the marine environment generally refers to natural recovery through the removal of unsustainable physical, chemical and biological pressures                                                                                                                                                                                                                                                                                                          |
| Extent              | The area covered by the habitat and communities. Note that maintenance of spatial distribution or extent of estuarine communities refers to the macro spatial pattern in which communities are distributed around the estuary and does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|                     |                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Diversity           | The number of different biological communities                                                                                                                        |
| Community structure | The structure of a community can include age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility |

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Source: Natural England various Regulation 33 advice for SACs

### 5.1.2 Conservation Objectives

Conservation objectives for individual sites are given in Section 5.3 where each site is discussed.

### 5.1.3 Sensitivities of Habitat Interest Features to Round 3 Activities

Sensitivities identified in the HRA Screening Report of the Round 3 Plan for each of the habitat qualifying features fell under four broad categories:

- toxic contamination (TC);
- physical loss/gain of habitat (PLG);
- physical damage to habitats or species (PD); and
- biological disturbance (BD).

Brief descriptions of each of these sensitivities are outlined in the following sections.

#### Toxic Contamination

Sensitivity to toxic contamination was identified in the HRA Screening Report for habitat qualifying features (including estuaries, large shallow inlets and bays, reefs and caves) as a result of the following Round 3 Plan activities:

- mobilisation of contaminated sediments during turbine or cable installation or decommissioning contaminating habitat qualifying features.

There is unlikely to be an adverse effect as a result of contaminated sediment if toxic contamination is not present in the area being excavated or disturbed for turbine installation. If contamination is present then the magnitude or extent of that contamination is dependent upon the hydrodynamic forcing conditions of the area (i.e. tidal current speeds and the grain size of sediment). Toxic contamination of sediments is only likely close to the coastline of industrial areas, or coastal areas where water and sediments have been contaminated by historical industrialisation. If activities are not taking place close to coastal sites associated with current or historical industrial contamination it is unlikely that there will be a significant adverse effect on habitat qualifying features. The Round 3 zones are likely to be far enough offshore that the risk of contaminated sediment disturbance through turbine construction is negligible.

There is potential for cable-laying activities to mobilise contaminated sediments which could cause an adverse effect on sites. The risk of mobilising contaminated sediments and the magnitude of the effect is dependant on whether toxic contamination is present, the hydrodynamic forcing conditions, whether the Plan activity is occurring in or close to a designated site, the type of activity that is occurring, how that activity is carried out and the particle size of the sediment that is being disturbed. A report by BERR (2008) (*Review of cabling techniques and environmental effects applicable to the offshore windfarm industry*) has

indicated that the settlement of sediment is most likely to occur within 20-200m of a cable however as contaminants are almost always associated with fine sediment there is potential that contaminants could travel further than this in some areas where there are large tidal excursions and high tidal speeds. Owing to the potential for contamination associated with these fine sediments it will not be possible to screen out sites which are within a tidal excursion of proposed works in estuary zones where there is likely contamination.

### **Physical Loss/Gain of Habitat**

Sensitivity to physical loss or gain of habitat was identified in the HRA Screening Report for habitat qualifying feature as a result of the following Round 3 Plan activities:

- installation or removal of cables within a habitat qualifying feature resulting in direct (potentially temporary) loss of the habitat as a result of excavation;
- installation, removal and presence of turbines within a habitat qualifying feature resulting in direct (temporary or permanent) loss of the habitat as a result of excavation;
- turbine or cable installation or removal resulting in direct damage by excavation/piling/structure placement or removal;
- presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring, turbines) resulting in modification of the hydrodynamics conditions leading to habitat loss through erosion (e.g. by scour) (this sensitivity also falls into the category of 'physical damage to habitats and species' - see next section);
- increased vessel activity in shallow areas leading to ship wash effects causing habitat loss through erosion in certain habitat qualifying features (this sensitivity also falls into the category of 'physical damage to habitats and species' - see next section);
- survey work using trawls resulting in loss of reef habitat (this sensitivity also falls into the category of 'physical damage to habitats and species' - see next section); and
- establishment of fishery exclusion zones/safety zones around turbines will protect habitat from effects of trawling and overfishing.

The risk and magnitude of effect of these activities is dependant on whether the Plan activity is occurring in or close to a designated site, the type of activity that is occurring and how that activity is carried out.

Direct damage to habitat qualifying features can only occur if an activity is located in a designated site for which the activity has been identified as potentially having an effect. The magnitude of the effect will depend on the extent of the area of the qualifying feature that is directly affected, e.g. the proportion/amount of seabed habitat lost owing to the presence of turbines, and whether the effect is temporary (e.g. buried cables) or long-term/permanent (e.g. turbines).

The risk and magnitude of adverse effects on habitat qualifying features as a result of scour eroding the habitat depends on the size, location and distance of structures from a qualifying feature and the hydrodynamic regime in operation.

The risk and magnitude of adverse effects on habitat qualifying features as a result of ship wash erosion is dependant on the amount of ship activity, the speed and size of the ships and the

distance that the ship activity is located from a habitat qualifying feature. If there will be no increase in ship activity in or near to a designated site there will be no adverse effect on the habitat qualifying feature.

The risk and magnitude of adverse effects on habitat qualifying features as a result of trawling during surveys is dependant on whether trawling will take place in a designated area resulting in direct loss of habitat, the area over which the trawling will take place and whether trawling already takes place within the site. If trawling activities do not take place at all, or are not increased within a designated site then no adverse effect will take place on the qualifying feature.

The establishment of fisheries exclusion zones/safety zones around wind turbines is likely to protect habitats in these areas. This is not an adverse effect on qualifying habitat features. The presence of solid turbines/turbine bases within a soft sediment environment provides a new type of habitat which may result in the introduction of new benthic communities. This may allow invasive non-native species to colonise new areas by 'stepping' from windfarm to windfarm.

### **Physical Damage to Habitats or Species**

Sensitivity to physical damage was identified in the HRA Screening Report for reefs as a result of the following Round 3 Plan activities:

- re-deposition of sediments mobilised during turbine or cable installation or decommissioning causing smothering; and
- re-deposition of sediments mobilised by scour around installed turbines causing smothering.

These sensitivities will also be taken to include the effects of mobilisation of sediments during turbine or cable installation and scour erosion around turbines causing reductions in water quality through increased turbidity.

The risk of mobilising sediments and the magnitude of the effect of reduced water quality or smothering on reefs is similar to that set out in the toxic contamination section previously set out in this chapter: i.e. it is dependant on whether the Plan activity is occurring in or close to a designated site, the type of activity that is occurring and how that activity is carried out.

The extent to which water quality is reduced depends upon whether the Plan activity is occurring in or close to a designated site, the hydrodynamic regime or forcing conditions of the area and the type of sediment available for mobilisation. Finer sediments with reduced particle size are capable of becoming mobilised over large distances in large amounts which may reduce water quality through increased turbidity both locally and over a wider area. Very fine particles such as muds and clays once mobilised can remain permanently in suspension.

Settlement of coarse sediment is most likely to occur within 20-200m of a cable (BERR 2008) therefore there is unlikely to be a significant risk of smothering of reefs as a result of cable laying (or removal) more than 200m from a designated site that has a reef qualifying feature.

There is a difference in the risk/magnitude of effect on different types of reefs dependent upon the stability or sensitivity of that reef. Some reefs are less adaptable and therefore may be more susceptible to changing external conditions such as water quality and current speeds while others are much more adaptable and/or transient in nature.

**Biological Disturbance**

Sensitivity to biological disturbance was identified in the HRA Screening Report for habitat qualifying features (estuaries and large shallow inlets and bays) as a result of the following Round 3 Plan activities:

- increased vessel activity to/from ports in estuaries and sheltered areas resulting in the introduction of non-native species.

The risk of introducing non-native species and the magnitude of any effect is dependant on where the vessel has travelled from, the magnitude of the increase in vessel activity, the distance from the vessel activity to designated sites, whether a non-native species is present on the vessels or not and the type of non-native species present.

Increased vessel activity as a result of Round 3 Plan activity may occur in or around sites if the routes of the vessels from ports to the Round 3 zones or areas where cables are being laid occur in or adjacent to a designated site. Similarly increased vessel activity in a designated site may occur if Round 3 zones or areas where cables are being laid occur in or adjacent to a designated site.

Turbines and other equipment needed for Round 3 Plan Zone activities are likely to be manufactured in Europe, e.g. the likeliest source of the turbines is Germany or Denmark. As a result of the high level of vessel activity between the UK and mainland Europe which already exists, additional vessel activity related to the Round 3 Plan is unlikely to cause a significant adverse effect on European/Ramsar sites in terms of the introduction of non-native species, as any non-native species that could be introduced from vessel activity related to the Round 3 Plan are already highly likely to be endemic in UK waters.

If vessels are to be used to deliver equipment associated with the Round 3 Plan to UK (or European) waters from outside Europe there is some potential that additional or new non-native species could be present in vessels ballast water, however without further details regarding vessel movement at the project level it is not possible to ascertain the risk associated with this. It seems reasonable, however, to conclude that there is unlikely to be an adverse effect on a qualifying feature as a result of the Round 3 Plan if there will be no increase in vessel activity in or adjacent to designated sites, i.e. if there are no cables or turbines to be located in or adjacent to a designated site and if there is no likely port or route in or adjacent to a designated site which will be used as a result of the Plan. Similarly if the increase in vessel activity as a result of the Round 3 Plan is insignificant compared to the existing traffic that goes through or adjacent to a designated site there is unlikely to be an adverse effect as a result of the Plan.

## 5.2 Habitat Qualifying Features and Sensitivities

### 5.2.1 Estuaries

#### Description

An *estuary* is defined<sup>65</sup> as the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where, unlike 'large shallow inlets and bays' there is generally a substantial freshwater influence. The mixing of freshwater and sea water and the reduced current flows in the shelter of the estuary lead to deposition of fine sediments, often forming extensive intertidal sand and mud flats. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary.

It is not always possible to ascertain the exact range of an estuary within a designated site although in most cases it was possible to obtain an indicative map of Annex I Habitats from the Regulation 33 advice (or equivalent).

#### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.3 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I estuary features.

**Table 5.3 Potential Sensitivities of Estuary Interest Features to Round 3 Activities**

| Sensitivities                                                       | Category | Relevant Round 3 activities                                                                    | Survey | Installation | Operation | Decomm -<br>issioning |
|---------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------------|
| Direct habitat loss due to excavation                               | PLG      | Installation or removal of cables within the estuary                                           |        | ◆            |           | ◆                     |
| Modification of hydrography leading to habitat loss through erosion | PLG      | Presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring)  |        |              | ◆         |                       |
| Ship wash causing habitat loss through erosion                      | PLG      | Increased vessel activity in shallow areas                                                     | ◆      | ◆            | ◆         | ◆                     |
| Toxic contamination                                                 | TC       | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning |        | ◆            |           | ◆                     |
| Introduction of non-native species                                  | BD       | Increased vessel activity to/from estuarine ports                                              | ◆      | ◆            | ◆         | ◆                     |

<sup>65</sup> European Commission DG Environment Nature and Biodiversity (2007) *Interpretation manual of European Union habitats (EUR27)*

## 5.2.2 Large Shallow Inlets and Bays

### Description

*Large shallow inlets and bays* are defined<sup>65</sup> as large indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited. These shallow indentations are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well developed zonation of benthic communities. These communities have generally a high biodiversity. The limit of shallow water is sometimes defined by the distribution of the *Zosteretea* and *Potametea* associations.

Several physiographic types may be included under this category providing the water is shallow over a major part of the area: embayments, fjords, rias and voes.

### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.4 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I large shallow inlets and bays.

**Table 5.4 Potential Sensitivities of Inlet/Bay Interest Features to Round 3 Activities**

| Sensitivities                                                       | Category | Relevant Round 3 zone activities                                                                                                                      | Survey | Installation | Operation | Decomm -<br>issioning |
|---------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------------|
| Direct habitat loss due to excavation                               | PLG      | Installation or removal of cables in the intertidal area                                                                                              |        | ◆            |           | ◆                     |
| Modification of hydrography leading to habitat loss through erosion | PLG      | Presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring), possibly presence of turbines in zones closer to shore |        |              | ◆         |                       |
| Ship wash causing habitat loss through erosion                      | PLG      | Increased vessel activity in shallow areas                                                                                                            | ◆      | ◆            | ◆         | ◆                     |
| Toxic contamination                                                 | TC       | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                        |        | ◆            |           | ◆                     |
| Introduction of non-native species                                  | BD       | Increased vessel activity to/from ports in sheltered areas                                                                                            | ◆      | ◆            | ◆         | ◆                     |

### 5.2.3 Mudflats and Sandflats Not Covered by Seawater at Low Tide.

#### Description

*Mudflats and sandflats not covered by seawater at low tide* are defined<sup>65</sup> as sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders.

#### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.5 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I mudflats and sandflats not covered by seawater at low tide.

**Table 5.5 Potential Sensitivities of Mudflat/Sandflat Interest Features to Round 3 Activities**

| Sensitivities                                                       | Category | Relevant Round 3 zone activities                                                                                                                      | Survey | Installation | Operation | Decommissioning |
|---------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------|
| Direct habitat loss due to excavation                               | PLG      | Installation or removal of cables across the shoreline                                                                                                |        | ◆            |           | ◆               |
| Modification of hydrography leading to habitat loss through erosion | PLG      | Presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring), possibly presence of turbines in zones closer to shore |        |              | ◆         |                 |
| Ship wash causing habitat loss through erosion                      | PLG      | Increased vessel activity in shallow areas                                                                                                            | ◆      | ◆            | ◆         | ◆               |

## 5.2.4 Reefs

### Description

Reefs are defined<sup>65</sup> as either biogenic concretions or of geogenic origin. They are hard compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions.

### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.6 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I reef features.

**Table 5.6 Potential Sensitivities of Reef Interest Features to Round 3 Activities**

| Sensitivities                                                     | Category | Relevant Round 3 zone activities                                                                                                                                      | Survey | Installation | Operation | Decomm -<br>issioning |
|-------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------------|
| Loss of habitat due to trawling                                   | PLG      | Survey work using trawls                                                                                                                                              | ◆      |              |           |                       |
| Increase in habitat due to reduction in trawling                  | PLG      | Establishment of fishery exclusion zones will protect reef habitat from effects of trawling                                                                           |        |              | ◆         |                       |
| Direct damage by excavation/piling/structure placement or removal | PLG      | Turbine or cable installation or removal                                                                                                                              |        | ◆            |           | ◆                     |
| Modification of hydrography leading to erosion of biogenic reefs  | PLG      | Presence of cable armouring or turbines leading to scour                                                                                                              |        |              | ◆         |                       |
| Smothering                                                        | PD       | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines |        | ◆            | ◆         | ◆                     |
| Toxic contamination to biogenic reefs                             | TC       | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                        |        | ◆            |           | ◆                     |

### 5.2.5 *Salicornia* and Other Annuals Colonising Mud and Sand

#### Description

*Salicornia* and other annuals colonising mud and sand are defined<sup>65</sup> as formations composed mostly or predominantly of annuals, in particular *Chenopodiaceae* of the genus *Salicornia* or grasses, colonising periodically inundated muds and sands of marine or interior salt marshes. *Thero-Salicornietea*, *Frankenietea pulverulenta*, *Saginetea maritima*.

#### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.7 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I *Salicornia* and other annuals colonising mud and sand features.

**Table 5.7 Potential Sensitivities of *Salicornia* Interest Features to Round 3 Activities**

| Sensitivities                                                       | Category | Relevant Round 3 zone activities                                                                                                                      | Survey | Installation | Operation | Decomm - issioning |
|---------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|--------------------|
| Direct habitat loss due to excavation                               | PLG      | Installation or removal of cables across the shoreline                                                                                                |        | ◆            |           | ◆                  |
| Modification of hydrography leading to habitat loss through erosion | PLG      | Presence of permanent nearshore structures protruding above the seabed (e.g. cable armouring), possibly presence of turbines in zones closer to shore |        |              | ◆         |                    |
| Ship wash causing habitat loss through erosion                      | PLG      | Increased vessel activity in shallow areas                                                                                                            | ◆      | ◆            | ◆         | ◆                  |

### 5.2.6 Sandbanks which are Slightly Covered by Sea Water All the Time

#### Description

*Sandbanks* are defined<sup>65</sup> as elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata.

*Slightly covered by sea water all the time* means that above a sandbank the water depth is seldom more than 20 m below chart datum. Sandbanks can, however, extend beneath 20 m below chart datum. It can, therefore, be appropriate to include in designations such areas where they are part of the feature and host its biological assemblages.

### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.8 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I sandbanks which are slightly covered by sea water all the time.

**Table 5.8 Potential Sensitivities of Sandbank Interest Features to Round 3 Activities**

| Sensitivities                                                       | Category | Relevant Round 3 zone activities                         | Survey | Installation | Operation | Decommissioning |
|---------------------------------------------------------------------|----------|----------------------------------------------------------|--------|--------------|-----------|-----------------|
| Direct habitat loss due to excavation                               | PLG      | Installation or removal of turbines or cables            |        | ◆            |           | ◆               |
| Loss of seabed habitat                                              | PLG      | Presence of turbines                                     |        |              | ◆         |                 |
| Modification of hydrography leading to habitat loss through erosion | PLG      | Presence of cable armouring or turbines leading to scour |        |              | ◆         |                 |

### 5.2.7 Submerged or Partially Submerged Sea Caves

#### Description

*Submerged or partially submerged sea caves* are defined<sup>65</sup> as caves situated under the sea or opened to it, at least at high tide, including partially submerged sea caves. Their bottom and sides harbour communities of marine invertebrates and algae.

### Potential Sensitivities and Threats from Round 3 Plan Activities

Table 5.9 shows the sensitivities identified in the HRA Screening Report resulting from Round 3 Plan activities which may affect Annex I submerged or partially submerged sea caves.

**Table 5.9 Potential Sensitivities of Sea Cave Interest Features to Round 3 Activities**

| Sensitivities       | Category | Relevant Round 3 zone activities                                                               | Survey | Installation | Operation | Decommissioning |
|---------------------|----------|------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------|
| Toxic contamination | TC       | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning |        | ◆            |           | ◆               |

## 5.3 Potential for Effects of the Round 3 Plan

### 5.3.1 Introduction

Sites have been assessed in the tables in the remainder of this section on the basis of the sensitivities of their qualifying features set out in Section 5.2. For clarity, some of the qualifying features in the site assessment tables have been abbreviated as follows:

- Inlets = large shallow inlets and bays;
- Mudflats = mudflats and sandflats not covered by seawater at low tide;
- Salicornia = Salicornia and other annuals colonising mud and sand;
- Caves = submerged or partially submerged sea caves; and
- Sandbanks = sandbanks which are slightly covered by sea water all the time.

### 5.3.2 Carmarthen Bay and Estuaries SAC

The Carmarthen Bay and Estuaries SAC is a large site on the south coast of Wales, which encompasses the estuaries of the Rivers Loughor, Tâf and Tywi (coastal plain estuaries) and the Gwendraeth (a bar-built estuary). There are extensive areas of intertidal mudflats and sandflats with large areas of these flats dominated by bivalves. There is a complete sequence of saltmarsh vegetation, from pioneer vegetation through to upper saltmarsh transitions and it is also important for transitions from saltmarsh to sand dune and other habitats. Carmarthen Bay is an extensive shallow bay with a wide variety of seabed types, including mud, sand and rock, although the majority of the seabed is sandy. The SAC includes Helwick Bank, a linear shallow subtidal sandbank that is unusual in being highly exposed to wave and tidal action. The Burry Inlet and three Rivers system provides a migratory route for salmonids, lampreys and shad.

The Carmarthen Bay and Estuaries SAC is a multiple interest site which has been selected for the presence of ten interest features that qualify under Annex I and Annex II of the Habitats Directive. In addition the site supports a significant presence of River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*) and Otter (*Lutra lutra*)<sup>66</sup>.

The Round 3 Plan was screened in for having the potential for LSE on the Carmarthen Bay and Estuaries SAC for five habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.10.

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<sup>66</sup> Carmarthen Bay and Estuaries Regulation 33 Advice package.

**Table 5.10 Carmarthen Bay and Estuaries SAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                             |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estuaries                                                      | Subject to natural processes, to achieve favourable conservation status and maintain in the long-term. If this objective is not met restoration measures will be needed to achieve favourable conservation status. |
| Large shallow inlets and bays                                  | Subject to natural processes, to achieve favourable conservation status and maintain in the long-term. If this objective is not met restoration measures will be needed to achieve favourable conservation status. |
| Mudflats and sandflats not covered by seawater at low tide     | Subject to natural processes, to achieve favourable conservation status and maintain in the long-term. If this objective is not met restoration measures will be needed to achieve favourable conservation status. |
| <i>Salicornia</i> and other annuals colonising mud and sand    | Subject to natural processes, to achieve favourable conservation status and maintain in the long-term. If this objective is not met restoration measures will be needed to achieve favourable conservation status. |
| Sandbanks which are slightly covered by sea water all the time | Subject to natural processes, to achieve favourable conservation status and maintain in the long-term. If this objective is not met restoration measures will be needed to achieve favourable conservation status. |

The features are distributed throughout the SAC with no single feature occupying the entire SAC and with features overlapping in some locations. The extent of most features is not known precisely and some, such as sandbanks, are dynamic and can be highly mobile. The area is formed of a large shallow bay and inlets with areas of intertidal mud and sandflats across much of the coastline. Estuaries flow into the bay creating tidal inlets from the north and the east and along the estuary banks Atlantic Salt Meadows are present in a number of locations with smaller pockets of *Salicornia* present in a few. Just offshore a tidal sandbank is present to the east of the bay area and to the west of Port Eynon. Two Special Protection Areas occur within the Carmarthen Bay and Estuaries SAC; Carmarthen Bay SPA, and Burry Inlet SPA and Ramsar site.

No zone or cable route is directly located within Carmarthen Bay, and therefore within any of the site's qualifying features. The nearest development zone (Zone 8 – Bristol Channel) is approximately 15km to the south. The nearest cable route will be located south of the site across the Bristol Channel reaching the coast at Braunton Burrows.

Table 5.11 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.11 Assessment of Effects of Round 3 Activities on Carmarthen Bay and Estuaries SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                | <b>Commentary</b>                                                                                                                                                                                                                                                                  | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Estuaries<br>Inlets       | Increased vessel activity to/from ports                                                        | Any increase in activity at the site is likely to consist of European vessels. These are unlikely to cause a significant adverse effect on the integrity of the site. Non-native species that could be introduced from increased vessel activity are likely to be present already. | No                                                    | n/a                                                                          | None identified                                   | No adverse effect on the integrity of the site as a result of the Plan |
| Estuaries<br>Inlets       | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the Severn Estuary as a result of cable or turbine installation.                                                                 | No                                                    | n/a                                                                          | Aggregates                                        | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature                                     | Activity                                                                                                                                                                                      | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                        |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------|
| Estuary<br>Inlet<br>Mudflat<br>Salicornia<br>Sandbanks | 1.Increased vessel activity<br><br>2.Installation or removal of cables or turbines<br><br>3. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour) | <p>1. Increased vessel activity in the site resulting in increased ship wash and subsequent erosion is unlikely as the site is located a minimum of 14.9km from the proposed cable route and 9.3km from the Round 3 Plan Zone. There are no ports in or near to Carmarthen Bay SAC suitable for use by vessels during the construction, operation or decommissioning phases of an offshore wind project in the Bristol Channel Zone.</p> <p>2. No direct loss of habitat will result from the installation or removal of cables or turbines as the site is located a minimum of 15km from the proposed cable route and 9km from the Round 3 Plan Zone.</p> <p>3. There will be no changes to the hydrography of the estuary qualifying feature due to nearshore structures as the proposed cable routes landfall is in North Devon, some 40km distant. No direct loss of habitat will result from turbines as the site is located a minimum of 9.3km from the Round 3 Plan Zone.</p> | No                                             | n/a                                                                   | None identified                            | No adverse effect on the integrity of the site as a result of the Plan |

### 5.3.3 Dee Estuary / Aber Dyfrdwy SCI and Dee Estuary Ramsar Site

The Dee Estuary is one of the largest estuaries in the UK, on the north Wales and north west England border with an area of over 14,000 ha, (38,765 acres). It is the largest macro-tidal coastal plain estuary along a long stretch of coast between the larger Severn estuary and the Solway Firth. The Dee Estuary is hyper-tidal with a mean spring tidal range of 7.7 m at the mouth. The Estuary supports a wide array of habitats and species of international importance for nature conservation. The Dee Estuary includes approximately 2,480 ha of saltmarsh and today the Dee Estuary saltmarsh is among the few estuarine saltmarshes in the UK showing a full transition from pioneer saltmarsh species through to non-tidal vegetation. The Dee Estuary also supports a number of migratory fish species including river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, Atlantic salmon *Salmo salmar*, sea trout *S. trutta*, Twaite shad *Alosa fallax*, smelt *Osmerus eperlanus*, and eels *Anguilla anguilla*. Dunes to the west of the estuary mouth include the early stages of dune formation (embryonic shifting dunes), mobile dunes with marram grass, and stable 'fixed' dunes, which have been colonised by a variety of grasses and other plants. On the English side of the estuary the sandstone Hilbre Islands and Red Rocks form low uneven cliffs and flat intertidal rock platforms. The cliffs support a range of plants, including common scurvy grass *Cochlearia officinalis*, thrift *Armeria maritima*, the scarce rock sea lavender *Limonium britannicum celticum* and sea spleenwort *Asplenium marinum*.

Ramsar criterion 1 for the Dee Estuary Ramsar site comprises the Annex I habitats of the Dee Estuary SAC; effects on the Ramsar site are therefore addressed concurrently with those on the Dee Estuary SAC.

The Round 3 Plan was screened in for having the potential for LSE on the Dee Estuary SCI for two habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.12.

**Table 5.12 Dee Estuary SCI habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                 | Conservation objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estuaries                                                  | <p>The estuaries feature will be considered to be in favourable condition when, subject to natural processes, each of the following conditions are met:</p> <ul style="list-style-type: none"> <li>i. the aggregate total extent of all estuarine communities within the site is maintained;</li> <li>ii. the spatial distribution of estuarine communities within the site is maintained;</li> <li>iii. the extent of individual estuarine habitat features<sup>4</sup> within the site is maintained;</li> <li>iv. the variety and relative proportions of sediment and rocky substrates within the estuary is maintained;</li> <li>v. the variety and extent of any notable subtidal sediment communities<sup>5</sup> is maintained;</li> <li>vi. the variety and extent of notable intertidal hard substrata communities<sup>6</sup> is maintained;</li> <li>vii. the spatial and temporal patterns of salinity, suspended sediments and nutrients concentrations are maintained within limits sufficient to satisfy the requirements of statements (i) to (vi) above.</li> </ul> |
| Mudflats and sandflats not covered by seawater at low tide | <p>The conservation objective for the mudflats and sandflats feature of the Dee Estuary pSAC is to maintain the feature in favourable condition. The mudflats and sandflats feature will be considered to be in favourable condition when, subject to natural processes, each of the following conditions are met:</p> <ul style="list-style-type: none"> <li>i. the total extent of mudflat and sandflat communities within the site is maintained;</li> <li>ii. the proportions of individual mudflat and sandflat communities within the site are maintained;</li> <li>iii. the topography of the intertidal flats and the dynamic processes of channel migration and sinuosity across the flats are maintained;</li> <li>iv. the abundance of typical species of the mudflat and sandflat feature within the site is maintained.</li> </ul>                                                                                                                                                                                                                                       |

Note: these conservation objectives are taken from the 2004 consultation draft of the Dee Estuary pSAC Regulation 33 advice. The assessment has been made on the basis of these conservation objectives, although it is possible that they may change as the site progresses through the designation process. The most up to date objectives should be used for any HRA at project level.

Mudflats and sandflats dominate the intertidal area of the estuary from the mouth inland between estuary channels with the most inland extent being largely saltmarsh. The extensive intertidal flats of the Dee Estuary form the fifth largest such area within an estuary in the UK. Where water movements are greatest towards the estuary mouth the sediments tend to be sandy while much of the mid-upper part of the estuary consists of fine muddy sand. Areas of muddy sand are also found in the outer estuary.

No Round 3 zones overlap with the Dee Estuary. The nearest development zone (Zone 9 – Irish Sea) is approximately 50 km to the north west. However it is expected that a cable route (approximately 40 km) will run directly through the Dee estuary from offshore, inshore and up into the estuary. The cable route has the potential to impact upon qualifying features of estuary, mudflats and sandflats depending upon the location of the route.

Table 5.13 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.13 Assessment of Effects of Round 3 Activities on Dee Estuary / Aber Dyfrdwy SCI**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b>                        | <b>Site Conclusion</b>                                                  |
|---------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Estuary                   | Increased vessel activity to/from estuarine ports                                              | Any increase in activity at the site is likely to consist of European vessels. These are unlikely to cause a significant adverse effect on the integrity of the site. Non-native species that could be introduced from increased vessel activity are likely to be present already                                                                                                                                                                                                                                                                                                                                                                                                             | No                                                    | n/a                                                                          | Oil and gas, Round 1 and 2 windfarms and possible extensions, Aggregates | No adverse effect on the integrity of the site as a result of the Plan. |
| Estuary                   | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning | There is some potential for contaminated settlement within the Dee Estuary as a result of industrial activities upstream. Contaminated sediment could be mobilised during the installation or removal of cables although this could be mitigated by minimising disturbance during installation and removal and/or containment of sediments. Contaminated sediments could also be avoided if the landfall of the cable was located on the open shore away from the estuary. Detailed investigations should be undertaken at the project level to ascertain whether contaminants are present and which mitigation techniques would be most appropriate to avoid adverse affects on the estuary. | Potentially                                           | No *                                                                         | Aggregates, navigational dredging within estuary                         | AA required at the project level.                                       |

| Qualifying feature  | Activity                                                                                                                                                                                               | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects       | Site Conclusion                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------|
| Estuary<br>Mudflats | <p>1. Increased vessel activity</p> <p>2. Installation or removal of cables or turbines</p> <p>3. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour)</p> | <p>1. Increased vessel activity in the site resulting in increased ship wash and subsequent erosion is possible as the cable will be laid directly through the qualifying feature. Simple mitigation measures such as limiting the maximum speed of vessels should mitigate this potential effect such that an adverse effect on site integrity is unlikely.</p> <p>2. There is some potential for direct habitat loss as an estimated 41km of cable will be installed or removed within the site. The route of the cable and therefore which habitats are most likely to be affected is not currently known but the effects of cabling installation can be minimised by using techniques such as using a narrow blade plough to minimise the loss of sediments or by microsinning the cable route and landfall to avoid sensitive features. Excavation and installation of cables is likely to be less sensitive in the outer estuary as the more dynamic water environment means there are more frequent changes to the habitats. Turbines will be located at least 47km from the qualifying feature and will not adversely affect the integrity of the site.</p> <p>3. Nearshore structures such as cable mountings where the cable comes ashore could, if constructed within or near the site, result in a modification of hydrography and lead to habitat loss through erosion. It should be possible to avoid adverse effects on the qualifying feature by microsinning the cable's landfall within the site or requiring landfall outside the site such that no adverse effects on the integrity of the site will occur.</p> | Potentially                                    | No *                                                                  | Aggregates, navigational dredging within estuary | AA required at the project level due to potential effects on estuary and mudflat habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.4 Dogger Bank dSAC

The Dogger Bank is the largest single continuous expanse of shallow sandbank in UK waters. It is located in the southern North Sea, approximately 150km north east of the Humber Estuary. Sediments range from fine sands containing many shell fragments on top of the bank to muddy sands at greater depths (Krönke & Knust, 1995) supporting invertebrate communities typical of such sediments, characterised by polychaete worms, amphipods and small clams within the sediments, and hermit crabs, flatfish, starfish and brittlestars on the seabed. The Dogger Bank region is also an important location for the North Sea population of harbour porpoise (although this is not currently included as a qualifying interest feature in the dSAC) and grey and common seals are also known to frequent the area.

The Round 3 Plan was screened in for having the potential for LSE on the Dogger Bank dSAC for one habitat qualifying feature. This is shown in Table 5.14 along with its conservation objectives.

**Table 5.14 Dogger Bank dSAC Habitat Qualifying Feature and Conservation Objective**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sandbanks which are slightly covered by sea water all the time | <p>The conservation objectives for the Dogger Bank 'Sandbanks which are slightly covered by seawater all the time' are:</p> <p>Subject to natural change, restore the feature to favourable condition such that:</p> <ul style="list-style-type: none"> <li>- The natural environmental quality is maintained</li> <li>- The natural environmental processes are maintained</li> <li>- The extent, diversity, community structure and typical species representative of sand and gravely sand sediments on sandy mounds characteristic of the southern North Sea are restored</li> </ul> |

Note: these conservation objectives are taken from the Nov 2008 draft of the Dogger Bank dSAC Regulation 33 advice. The assessment has been made on the basis of these conservation objectives, although it is possible that they may change as the site progresses through the designation process. The most up to date objectives should be used for any HRA at project level.

Sandbanks which are slightly covered by sea water all the time form a large part of the southern area of the bank where water depths are seldom deeper than 20m. Areas to the north of the bank are deeper with water depths from 20 to 30 m covering the mid and southern areas of the bank and depths greater than 30 m up to 50 m covering the northern edges of the bank. The entire bank is at least 110km by 135km in size in UK waters, before crossing into Dutch and German waters where the edges slope into waters greater than 50m deep.

In this Plan-level HRA, Dogger Bank dSAC is unique in the level of overlap between the European site and a Round 3 zone; whilst the boundaries of the dSAC have not yet been finalised it is clear that virtually the entire site lies within Zone 3 - Dogger Bank, and that several cable routes cross the sandbank feature. Based on the available dSAC boundary data, approximately 850,000 ha of the dSAC lies within Zone 3 area, comprising almost 56% of the sandbank area. The majority of Zone 3 overlaps with the north of the Dogger Bank in areas of

deeper water away from the shallow sandbank qualifying feature but this may be subject to change as the dSAC boundaries are revised, and the deeper areas of the dSAC may support important trough communities which are necessary for the integrity of the sandbank features. Multiple cable routes of approximately 1120 km in total length will run through the Dogger Bank dSAC. Routes are envisaged as running from the southern edge of the development zone across the sandbanks and travelling in a south west direction to meet the English coast between Flamborough Head and the shores of the Humber Estuary.

It is apparent from the scale of the overlap between Dogger Bank dSAC and Zone 3 that this zone will be very sensitive to development. It is likely that competent authorities and consenting bodies will consider a form of zone-level assessment necessary in order successfully to mitigate potential in-combination effects arising from the development of multiple projects within the zone. At this stage, the conclusion has been reached that with the avoidance and mitigation measures incorporated in the Plan, and with reliance on project level HRA to assess the effects on qualifying sites and their features once project details are known, the Plan itself will not have an adverse effect on the Dogger Bank dSAC.

Table 5.15 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.15 Assessment of Effects of Round 3 Activities on Dogger Bank dSAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                    | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------|
| Sandbanks                 | <p>1. Installation or removal of cables or turbines</p> <p>2. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour)</p> | <p>1. Both cables and turbines will be located within the qualifying feature as a result of the Round 3 Plan. It is estimated that approximately 1100km of cable may be laid in the site and turbine installations could extend to 56% of the site (although direct loss of habitat would be far less than this due to the gaps between turbines). In light of these factors adverse effects on the site cannot be ruled out during the installation and removal of cables and turbines without further assessment as to how such installations will be carried out. It is anticipated that adverse effects on the integrity of the site could be avoided provided detailed mitigation measures are put in place at the project level.</p> <p>2. The fixing of turbines to the sea bed will result in the long term loss of habitat. The amount of habitat lost as a direct result of fixing the turbines to the seabed will depend on the method by which the turbines are fixed, e.g. gravity bases are likely to result in the loss of more habitat than jacket/tripod bases. Scouring leading to habitat change is likely to occur as a result of the installation of turbines in the site. Detailed research into the extent of damage scour can cause to the habitat and whether this will result in an adverse effect on the integrity of the site will need to be investigated at the project level. It is anticipated that mitigation methods to reduce scour can be employed such that adverse effect on the site will be avoided.</p> | Potentially                                           | No *                                                                         | Oil and gas extraction, trawling                  | AA required at the project level. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.5 Essex Estuaries SAC

The Essex Estuaries European marine site is the second largest estuarine site on the east coast of England. It contributes to the essential range and variation of estuaries in the UK as the best example of a coastal plain estuary system on the British North Sea coast. Covering an area of 472 square kilometres, this relatively undeveloped estuary complex contains the major estuaries of the Colne, Blackwater, Crouch and Roach, as well as extensive open coast tidal flats at Foulness, Maplin and the Dengie. The intertidal mudflats and sandflats within the European marine site support a wide range of typical estuarine and marine communities on sediments ranging from the finer estuarine muds and muddy sands to coarser sands and gravels. One fifth of the total area of British saltmarshes occurs in East Anglia, with the Essex Estuaries European marine site containing approximately 8% of the UK saltmarsh resource (about 3,500 hectares).

The Essex Estuaries is a candidate Special Area of Conservation (cSAC) and the constituent estuaries and contiguous open coast areas are classified separately as five distinct Special Protection Areas (SPAs). The marine components of these sites each qualify as European marine sites but, for simplicity both the SAC and SPA components are treated as a single European marine site - the Essex Estuaries European marine site.

The Round 3 Plan was screened in for having the potential for LSE on the Essex Estuaries SAC for three habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.16.

**Table 5.16 Essex Estuaries SAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                 | Conservation objective                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estuaries                                                  | <p>Subject to natural change, maintain the estuaries in favourable condition, in particular:</p> <ul style="list-style-type: none"> <li>- Saltmarsh communities</li> <li>- Intertidal mudflat and sandflat communities</li> <li>- Rock communities</li> <li>- Subtidal mud communities</li> <li>- Subtidal muddy sand communities</li> <li>- Subtidal mixed sediment communities</li> </ul> |
| Mudflats and sandflats not covered by seawater at low tide | <p>Subject to natural change, maintain the mudflats and sandflats not covered by seawater at low tide in favourable condition , in particular:</p> <ul style="list-style-type: none"> <li>- Mud communities</li> <li>- Muddy sand communities</li> <li>- Sand and gravel communities</li> </ul>                                                                                             |

| Habitat qualifying feature                                              | Conservation objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sandbanks which are slightly covered by sea water all the time *</i> | <p><i>Subject to natural process to maintain the feature in favourable condition/to restore the feature to favourable condition, and in particular to:</i></p> <ul style="list-style-type: none"> <li><i>- maintain natural environmental processes</i></li> </ul> <p><i>maintain the extent, diversity, physical structure, community structure and typical species representative of the habitat (including sand and gravely sand sediments on sandy mounds characteristic of the southern North Sea; low diversity dynamic sand communities; moderate diversity stable sand communities; subtidal gravel and sands; subtidal muddy sands; and sand and muddy sand communities)</i></p> |

\* This conservation objective was derived from conservation objectives for sandbanks at other sites, as no conservation objective for sandbanks was included in Essex Estuaries SAC Regulation 33 advice.

The Essex estuarine site is a typical, undeveloped, coastal plain estuarine system with associated open coast mudflats and sandbanks. The shores of the lower estuarine areas contain boulders and cobbles that overlie mud and support a range of communities. The sandier sediments of Maplin sands, on the open coast, support extensive beds of eelgrass and cockles. The mudflats and sandflats along the intertidal stretches are a rich food source for over 182,000 waders and wildfowl. The subtidal areas exhibit a range of estuarine communities which grade into richer marine communities on more variable substrates. Mixed sediments on the sea bed of the open coast areas are populated by whiteweed (the hydroid *Sertularia cupressina*) and reef-building worm<sup>67</sup> and in the sheltered areas within the estuaries, the build up of sediments creates saltmarsh development. Saltmarshes border the upper shores and display a range of vegetation which varies according to tolerance to tidal flooding.

None of the Round 3 zones overlaps the Essex Estuary site. The nearest development zone (Zone 5 - Norfolk) is approximately 74 km to the north east. However it is expected that a cable route approximately 70 km in length will run directly through the Essex Estuary from offshore travelling south west inshore and up into the Crouch and Roach estuary channel. The cable will travel through the habitat qualifying features of estuary, mudflats and sandflats.

Table 5.17 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

<sup>67</sup> Species not specified in the Regulation 33 Advice for Essex Estuaries

**Table 5.17 Assessment of Effects of Round 3 Activities on Essex Estuaries SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                               | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Estuary                   | Increased vessel activity to/from estuarine ports                                              | Any increase in activity at the site is likely to consist of European vessels. These are unlikely to cause a significant adverse effect on the integrity of the site. Non-native species that could be introduced from increased vessel activity are likely to be present already, particularly as the presence of the port of Harwich accepts vessels from all over the world. | No                                                    | n/a                                                                          | Round 1 and 2 windfarms and possible extensions   | No adverse effect on the integrity of the site as a result of the Plan |
| Estuary                   | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning | TBT contamination occurred in the Crouch Estuary and although there has been a good recovery of marine life, sediment-bound TBT could be remobilised during cable laying. Appropriate cable-laying methodology should be employed to minimise sediment disturbance. This is covered by the general environmental measures already incorporated into the Plan.                   | No                                                    | n/a                                                                          | Round 1 and 2 windfarms and possible extensions   | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature              | Activity                                                                                                                                                                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects      | Site Conclusion                                                                                      |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Estuary<br>Mudflats<br>Sandbank | 1. Increased vessel activity<br><br>2. Installation or removal of cables or turbines<br><br>3. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour) | 1. Increased vessel activity in the site resulting in increased ship wash and subsequent erosion is possible as the cable will be laid directly through the qualifying feature. Simple mitigation measures such as limiting the maximum speed of vessels should mitigate this potential effect such that an adverse effect on site integrity is unlikely.<br><br>2. There is some potential for direct habitat loss as an estimated 70km of cable will be installed or removed within the site. The route of the cable and therefore which habitats are most likely to be affected is not currently known but the effects of cabling installation can be minimised by using techniques such as using a narrow blade plough to minimise the loss of sediments or by micro-siting the cable route and landfall to avoid sensitive features. Excavation and installation of cables is likely to be less sensitive in the outer estuary as the more dynamic water environment means there are more frequent changes to the habitats. Turbines will be located at least 70km from the qualifying feature and are unlikely to adversely affect the site.<br><br>3. Nearshore structures such as cable mountings where the cable comes ashore could, if constructed within or near the site, result in a modification of hydrography and lead to habitat loss through erosion. It should be possible to avoid adverse effects on the qualifying feature by micro-siting the cable's landfall within the site or requiring landfall outside the site such that no adverse effects on the integrity of the site will occur. | Potentially                                    | No *                                                                  | Round 1 and 2 windfarms and possible extensions | AA required at the project level due to potential effects on estuary, mudflat and sandbank habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.6 Flamborough Head SAC

Flamborough Head is a candidate Special Area of Conservation (SAC) and Flamborough Head and Bempton Cliffs is a Special Protection Area (SPA). The site is an outcrop of chalk cliffs found on the north east coast of England just north of Bridlington and south of Scarborough. The UK has 75% of the chalk reefs in Europe and Flamborough Head accounts for nearly 9% of European coastal chalk exposure (English Nature 1994). Flamborough Head also represents the most northerly outcrop of coastal chalk in the UK and the most southerly area of extensive bedrock in the North Sea. Flamborough Head is also located close to the biogeographical boundary between two North Sea water bodies and it supports a wide range of marine species.

The Round 3 Plan was screened in for having the potential for LSE on the Flamborough Head SAC for two habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.18.

**Table 5.18 Flamborough Head SAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                 | Conservation objective                                                                                                                                                                                                                                           |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reefs                                      | Subject to natural change, maintain the reefs in favourable condition, in particular: <ul style="list-style-type: none"> <li>- Rocky shore communities</li> <li>- Kelp forest communities</li> <li>- Subtidal faunal turf communities</li> </ul>                 |
| Submerged or partially submerged sea caves | Subject to natural change, maintain the submerged or partially submerged sea caves in favourable condition, in particular: <ul style="list-style-type: none"> <li>- Microalgal and lichen communities</li> <li>- Faunal cushion and crust communities</li> </ul> |

Source: English Nature (2000) *English Nature's advice for the Flamborough Head European marine site given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.*

The site is characterised by high chalk cliffs (covering a distance of about 16 km) along the coast and over 200 caves and numerous stack and arch formations exist within the cliffed landscape. Rich communities of seaweeds and invertebrates occur on the lower shores and on the chalk reefs offshore, some of them are not found on any similar chalk sites elsewhere in England. Offshore reefs includes bedrock and boulder reefs which extend further into deeper water than at other subtidal chalk sites in the UK, giving one of the most extensive areas of sublittoral chalk in Europe. The reefs and cliffs on the north side of the headland are very hard, resulting in, the presence of many overhangs and vertical faces, a feature uncommon in sublittoral chalk. These reefs support a different range of species from those on the slightly softer and more sheltered south side of the headland. There are larger numbers and a wider range of cave habitats at Flamborough than at any other chalk site in Britain. There are more than 200 caves within the site, particularly around the headland and on the north-facing cliffs. Some of these caves are partially submerged at all stages of the tide, others dry out at low tide,

and some lie above the high water mark but are heavily influenced by wave splash and salt spray from the sea. The largest caves are known to extend for more than 50 m from their entrance on the coast.

No development zones overlap the Flamborough Head SAC; the nearest development zone is Zone 4 (Hornsea), which lies approximately 30 km offshore to the east of the site. Based upon available information it is not anticipated that a cable route will be located directly within the Flamborough Head marine site. However the nearest cable routes will be very close to site lying only 0.2 km to the south east as they cross from Zone 3 (Dogger Bank) south west to reach the English coast just south of Bridlington. This cable route could pass through important chalk cobble reefs, which do not form part of the SAC, but which would require a level of nature conservation protection at project level.

Table 5.19 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.19 Assessment of Effects of Round 3 Activities on Flamborough Head SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                                                                                                         | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Caves<br>Reefs            | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                                                                                                          | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the site as a result of cable or turbine installation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | No                                                    | n/a                                                                          | None identified                                   | No adverse effect on the integrity of the site as a result of the Plan |
| Reefs                     | 1. Survey work using trawls<br><br>2. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>3. Turbine or cable installation or removal<br><br>4. Presence of cable armouring or turbines leading to scour | 1. As no cables or turbines will be located within the site there will be no need for survey work which could damage the reef.<br><br>2. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>3. As no cables or turbines will be located within the site there will be no direct loss of habitat.<br><br>4. A cable may be located within 200m of the site therefore there is some potential for scour adversely affecting the reef. Detailed research into the extent of damage scour can cause to the habitat and whether this will result in an adverse effect on the integrity of the site will need to be investigated at the project level. It is anticipated that mitigation methods to reduce scour can be employed such that adverse effect on the reef can be avoided or that the cable can be rerouted to avoid adverse effects if required. | Potentially                                           | No *                                                                         | None identified                                   | AA required at the project level.                                      |

| Qualifying feature | Activity                                                                                                                                                              | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------|
| Reefs              | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines | A cable may be located within 200m of the site therefore there is some potential that sediments may be deposited on the reef. Detailed research into the significance of the effect on the reef should be undertaken at the project level and if an adverse effect on the site integrity is predicted mitigation measures such as moving the location of the cable should be undertaken. The site is located over 30km from a Round 3 Plan Zone and is unlikely to adversely affect the feature. | Potentially                                    | No *                                                                  | None identified                            | AA required at the project level. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.7 Haisborough, Hammond and Winterton dSAC

The Haisborough, Hammond and Winterton marine site lies just off the north east coast of Norfolk, and contains a series of sandbanks which meet the Annex I habitat description Sandbanks slightly covered by sea water all the time.

The Round 3 Plan was screened in for having the potential for LSE on the Haisborough, Hammond and Winterton dSAC for one habitat qualifying feature. This is shown in Table 5.20 along with its conservation objectives.

**Table 5.20 Haisborough, Hammond and Winterton dSAC Habitat Qualifying Feature and Conservation Objective**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sandbanks which are slightly covered by sea water all the time | <p>Subject to natural change, maintain the feature in favourable condition, such that:</p> <ul style="list-style-type: none"> <li>- The natural environmental quality is maintained</li> <li>- The natural environmental processes are maintained</li> <li>- The extent, physical structure, diversity, community structure and typical species representative of low diversity dynamic sand communities are maintained</li> <li>- The extent, physical structure, diversity, community structure and typical species representative of moderate diversity stable sand communities are maintained</li> </ul> |

Note: these conservation objectives are taken from the Sept 2009 draft of the Haisborough Hammond and Winterton dSAC Regulation 33 advice. The assessment has been made on the basis of these conservation objectives, although it is possible that they may change as the site progresses through the designation process. The most up to date objectives should be used for any HRA at project level.

The main sandbank ridge across the centre of the site is aligned with the curve of the coast and is composed of alternating ridge headland associated sandbanks in a characteristic S-formation. This ridge is made up of Haisborough Sand, Haisborough Tail, Hammond Knoll, Winterton Ridge and Hearty Knoll. Hewett Ridge and Smiths Knoll form a ridge of sandbanks on the outer site boundary, and inshore there are additional banks including Winterton Shoal and the Newarp Banks.

Sandy sediments within the site are very mobile in the strong tidal currents which characterise the area. Large scale bank migration or movement appears to be slow, but within the sandbank system there is a level of sediment movement around and also across the banks, evidenced by megaripple and sandwave formations on the banks. Infauna of the sandy bank tops are consequently impoverished, and made up of small numbers of polychaetes and amphipods. On the flanks of the banks, and towards the troughs, where there is less water movement, sediments tend to be slightly more stable and gravelly. In these regions of the site, infaunal and epifaunal communities are much more diverse. There are a number of areas where sediment movements are reduced and these support an abundance of attached bryozoans, hydroids and sea anemones.

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Other tube-building worms such as *Pomatoceros sp.* and *Lanice conchilega* are also found in these areas, along with bivalves and crustaceans.

Haisborough, Hammond and Winterton dSAC has not yet been fully designated. Informal consultation undertaken as part of the site designation process indicates that *Sabellaria* reef may be present at the site; this habitat is not currently cited as a qualifying feature of the dSAC, and has not been assessed as part of the HRA process. Should it be added to the site as a qualifying feature in the future, it would need to be assessed as part of HRA for projects in Zone 5.

Zone 5 (Norfolk) and a number of its cable routes overlap the Haisborough, Hammond and Winterton dSAC. Approximately 25,500 ha of Zone 5 area will be located within the Haisborough, Hammond and Winterton site, covering just over 14% of the sand bank area. The Zone 5 area is located in the south east of the sandbank SAC, with the potential to impact upon Hewett Ridges, Smith's Knoll, Winterton Knoll and Hearty Ridges. In addition, multiple cable routes of approximately 101 km in total length may potentially be located through the sandbank area. Routes are envisaged as running from the north west of the development zone across the sandbanks, travelling in a south west direction to meet the English coast between Great Yarmouth and Lowestoft.

Table 5.21 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.21 Assessment of Effects of Round 3 Activities on Haisborough, Hammond and Winterton dSAC**

| Qualifying feature | Activity                                                                                                                                                           | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects           | Site Conclusion                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------|
| Sandbanks          | <p>1. Installation or removal of cables or turbines</p> <p>2. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour)</p> | <p>1. Both cables and turbines will be located within the qualifying feature as a result of the Round 3 Plan. It is estimated that approximately 100km of cable may be laid in the site and turbine installations could extend to 14% of the site (although direct loss of habitat would be far less than this due to the gaps between turbines). In light of these factors adverse effects on the site cannot be ruled out during the installation and removal of cables and turbines without further assessment as to how such installations will be carried out. It is anticipated that adverse effects on the integrity of the site could be avoided provided detailed mitigation measures are put in place at the project level.</p> <p>2. The fixing of turbines to the sea bed will result in the long term loss of habitat. The amount of habitat lost as a direct result of fixing the turbines to the seabed will depend on the method by which the turbines are fixed, e.g. gravity bases are likely to result in the loss of more habitat than jacket/tripod bases. Scouring leading to habitat loss is likely to occur as a result of the installation of turbines in the site. Detailed research into the extent of damage scour can cause to the habitat and whether this will result in an adverse effect on the integrity of the site will need to be investigated at the project level. It is anticipated that mitigation methods to reduce scour can be employed such that adverse effect on the site can be avoided.</p> | Potentially                                    | No *                                                                  | Round 1 windfarms and possible extension, aggregates | AA required at the project level. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.8 Humber Estuary SCI and Humber Estuary Ramsar Site

The Humber Estuary on the north east coast of England is one of the largest estuaries in the UK. At over 30,550 ha, (75,492 acres) and 14km at its widest point, it is the largest macro-tidal coastal plain estuary on the British North Sea, draining around 20% of the total land surface of England. It encompasses the outflow from the rivers Trent, Ouse and Hull and provides the largest single output of fresh water from Britain into the North Sea.

Ramsar criterion 1 for the Humber Estuary Ramsar site includes the estuary and mudflat elements of the site; effects on this site are addressed concurrently with the Humber Estuary SCI.

The Round 3 Plan was screened in for having the potential for LSE on the Humber Estuary SCI for three habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.22.

**Table 5.22 Humber Estuary SCI Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Estuaries                                                      | <p>Subject to natural change, maintain the estuary in favourable condition, in particular the:</p> <ul style="list-style-type: none"> <li>- Saltmarsh communities</li> <li>- Intertidal mudflat &amp; sandflat communities</li> <li>- Subtidal sediment communities</li> </ul>                                                                                          |
| Mudflats and sandflats not covered by seawater at low tide     | <p>Subject to natural change, maintain the mudflats and sandflats not covered by seawater at low tide in favourable condition, in particular the:</p> <ul style="list-style-type: none"> <li>- Intertidal gravel and sand communities</li> <li>- Intertidal muddy sand communities</li> <li>- Intertidal mud communities</li> <li>- Eelgrass bed communities</li> </ul> |
| Sandbanks which are slightly covered by sea water all the time | <p>Subject to natural change, maintain the sandbanks which are slightly covered by seawater all of the time in favourable condition, in particular the:</p> <ul style="list-style-type: none"> <li>- Subtidal gravel and sands</li> <li>- Subtidal muddy sands</li> </ul>                                                                                               |

Source: English Nature (2003) *The Humber Estuary European Marine Site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994 Interim Advice April 2003*

The average width of the estuary is 4.3km and the depth 6.5m (Allen *et al.*, 2003). The bed of the estuary is mostly sandy with some patches of gravel and glacial till, grading into silty clay in the intertidal areas. The exception is the outer part of the south bank where the higher energy environment and greater marine sediment component results in the intertidal area being predominantly sandy. There are no natural rocky outcrops, except where the Humber Bridge is situated on the chalk of the Lincolnshire and Yorkshire Wolds. Upstream from the Humber

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Bridge, the navigation channel undergoes major shifts from north to south banks, and this section of the estuary is noteworthy for extensive mud and sand bars, which in places form semi-permanent islands. A small chalk cliff is also present at South Ferriby on the south bank, and an area of cobble substratum is found at Skitterness. In the outer estuary, Spurn Peninsula, a conspicuous spit of land protrudes 8kms into the mouth of the estuary from the south-eastern extremity of Holderness. Inside this protective rim, sand dunes up to 15m high and extensive mudflats, known as Spurn Bight have formed. There are also dynamic interactions between the various bank systems in the inner and middle estuary releasing sediment which form mud and sand bars that create semi-permanent islands.

No Round 3 zone overlaps the Humber Estuary site. The nearest development zone (Zone 4 - Hornsea) is located approximately 33 km to the north east of the site at its closest point. However it is anticipated that potentially multiple cable routes (total length approximately 833 km) will be located within the Humber Estuary. The cable routes are envisaged as running from two development zones (Zone 3 - Dogger Bank and Zone 4 - Hornsea) from the south of Zone 3 and the south west of Zone 4, travelling inshore in a south west direction to meet the English coast and into the Humber Estuary itself. Potentially qualifying features of the estuary, mudflats and sandflats and sandbanks may all be affected depending upon the chosen location of the cable route.

Table 5.23 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

Table 5.23 Assessment of Effects of Round 3 Activities on Humber Estuary SCI

| Qualifying feature | Activity                                                                                       | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                           | Site Conclusion                                                        |
|--------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|
| Estuary            | Increased vessel activity to/from estuarine ports                                              | Any increase in activity at the site is likely to consist of European vessels. These are unlikely to cause a significant adverse effect on the integrity of the site. Non-native species that could be introduced from increased vessel activity are likely to be present already.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | No                                             | n/a                                                                   | Port activities, Round 2 windfarm and possible extension, aggregates | No adverse effect on the integrity of the site as a result of the Plan |
| Estuary            | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning | There is some potential for contaminated settlement within the Humber Estuary as a result of industrial activities. Settlement of contaminated sediment is most likely to occur within 20-200m of the installation route of a cable and this can be further mitigated by minimising disturbance during installation and removal and/or containment of sediments. Contaminated sediments could also be avoided if the landfall of the cable was located on the open shore away from the estuary. Detailed investigations should be undertaken at the project level to ascertain whether contaminants are present and which mitigation techniques would be most appropriate to avoid adverse affects on the estuary. Contaminated sediments are unlikely to be a factor during turbine installation or removal within the Homesea Round 3 Zone as it is not located within an industrialised estuary. | Potentially                                    | No *                                                                  | Navigational dredging, Round 2 windfarm and possible extension       | AA required at the project level.                                      |

| Qualifying feature               | Activity                                                                                                                                                                                      | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                                                  | Site Conclusion                                                              |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Estuary<br>Mudflats<br>Sandbanks | 1.Increased vessel activity<br><br>2.Installation or removal of cables or turbines<br><br>3. Presence of operational structures (e.g. turbines, cable armour) leading to erosion (e.g. scour) | 1. Increased vessel activity in the site resulting in increased ship wash and subsequent erosion is possible as the cable will be laid directly through the qualifying feature. Simple mitigation measures such as limiting the maximum speed of vessels should mitigate this potential effect such that an adverse effect on site integrity is unlikely.<br><br>2. An estimated 860km of cable will be installed or removed within the site. The route of the cable and therefore which habitats are most likely to be affected is not currently known but the effects of cabling installation can be minimised by using techniques such as using a narrow blade plough to minimise the loss of sediments or by microsites the cable route and landfall to avoid sensitive features.<br><br>3. Nearshore structures, such as cable mountings, if constructed within or near the site, could result in a modification of hydrography and lead to habitat loss through erosion. It should be possible to avoid adverse effects on the qualifying features by microsites the cable's landfall within the site or requiring landfall outside the site such that no adverse effects on the integrity of the site will occur. Turbines will be located at least 30km from the qualifying feature and are unlikely to have significant adverse effects on the site. | Potentially                                    | No *                                                                  | Port activities, navigational dredging, Round 2 windfarm and possible extension, aggregates | AA required at the project level for estuary, mudflat and sandbank habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.9 Lundy SAC

Lundy is a small rocky island in the outer Bristol Channel off north Devon. It is exposed to a very wide range of physical conditions as the result of different degrees of wave action and tidal streams on sheltered and exposed coasts and headlands. This range of physical conditions combined with its topographical variation has resulted in the presence of an unusual and highly diverse complex of internationally important marine habitats. The most important habitat feature at Lundy are the granite and slate reefs and sandbanks which are slightly covered by seawater all of the time. The sandbanks present around Lundy are present as a qualifying feature but are not the primary reason for the selection of the site.

The Round 3 Plan was screened in for having the potential for LSE on the Lundy SAC for two habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.24.

**Table 5.24 Lundy SAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reefs                                                          | Subject to natural change, maintain the reefs in favourable condition, in particular: <ul style="list-style-type: none"> <li>- Rocky shore communities</li> <li>- Kelp forest communities</li> <li>- Vertical and overhanging circalittoral rock communities</li> <li>- Circalittoral bedrock and stable boulder communities</li> </ul> |
| Sandbanks which are slightly covered by sea water all the time | Subject to natural change, restore/maintain in favourable condition in particular the subtidal gravel and sands, and the subtidal muddy sands.                                                                                                                                                                                          |

Source: English Nature (2000) *Lundy European marine site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994*

The granite reefs of Lundy exist across the whole island with small amounts of slate in the south, south-east and off the north coast. These reefs are very varied in nature, extend well over 1 km offshore, and drop steeply into deep water in some areas. Many are biologically extremely rich examples of their type, and the best in Britain. A wide variety of reef forms occur around Lundy. These range from vertical rock walls to horizontal ledges, broken rock and boulder fields. The common feature between these different reef forms is the type of animal and plant community that grows on the rock. On Lundy there is further variety associated with the diverse range of topographical features such as vertical rock walls, gully and canyon systems, outcrops from sediment and rock pools on the shore, further enhanced by a wide range of exposures to wave action and tidal streams.

No Round 3 zones or cable routes cross the Lundy marine site. The nearest development zone (Zone 8 – Bristol Channel) lies approximately 10 km to the north of the site. The nearest cable route is envisaged to run approximately 13 km to the east of the site at its closest extent.

Table 5.25 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.25 Assessment of Effects of Round 3 Activities on Lundy SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                          | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Reefs                     | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning.<br>Re-deposition of sediments mobilised by scour around installed turbines | Cables will be located at least 12km from the site and the zone is located 10km from the site therefore there is unlikely to be any effect on the reef due to the distance from mobilised sediments.<br><br>Any effects of the Round 3 Plan on reefs due to re-deposition are likely to be reduced as the cables and turbines will be located at least 10km from the site. Effects on the reef are likely to be further reduced due to its rocky nature. However due to the strong hydrodynamic conditions present in the Severn a more detailed study should be undertaken at the project level to ascertain the effects when more details are known. | Potentially                                           | No *                                                                         | None identified                                   | AA required at the project level.                                      |
| Reefs                     | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                           | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the site as a result of cable or turbine installation.                                                                                                                                                                                                                                                                                                                                                                                                                                               | No                                                    | n/a                                                                          | None identified                                   | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature | Activity                                                                                                                                                                                                                                                                                             | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------|
| Reefs<br>Sandbanks | 1. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>2. Installation or removal of turbines or cables<br><br>3. Presence of cable armouring or turbines leading to scour<br><br>4. Survey work using trawls<br><br>5. Turbine or cable installation | 1. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>2. As no cables or turbines will be located within the site there will be no direct loss of habitat.<br><br>3. Any effects of the Round 3 Plan on reefs or sandbanks due to scour caused by cable armouring or turbines are likely to be reduced as the cables and turbines will be located at least 10km from the site and the prevailing hydrodynamic conditions are south westerly. Effects on reefs in the site are likely to be further reduced due to their rocky nature. However due to the strong hydrodynamic conditions present in the Severn a more detailed study should be undertaken at the project level to ascertain the effects when more details are known.<br><br>4. As no cables or turbines will be located within the site there will be no need for survey work which could damage the reef.<br><br>5. No cables or turbines will be located within the site therefore there will be no direct loss of habitat during installation. | Potentially                                    | No *                                                                  | None identified                            | AA required at the project level due to potential for adverse effects on reef and sandbank habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.10 Poole Bay to Lyme Bay Reefs dSAC

The Poole Bay to Lyme Bay site lies off the south coast of England off the counties of Dorset and Devon. The site comprises a mosaic of four areas containing Annex I reef and sea cave habitat. The areas present are listed below (from east to west):

- Studland Bay to Ringstead Bay Reefs;
- Portland Reefs;
- Lyme Bay Reefs; and
- Watcombe to Dartmouth Reefs.

In addition a large number of infralittoral sea caves have been identified within Torbay and the surrounding coastline from Watcombe in the north, to Sharkham Point in the south. Examples of wave-eroded sea caves are found at all the sites. They occur in several different rock types, and at levels from above the high water mark of spring tides down to permanently flooded caves lying in the infralittoral zone.

The Round 3 Plan was screened in for having the potential for LSE on the Poole Bay to Lyme Bay Reefs dSAC for two habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.26.

**Table 5.26 Poole Bay to Lyme Bay Reefs dSAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                 | Conservation objective                                                                                                                                                                                                   |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reefs                                      | Subject to natural change, maintain or restore the Reefs in / to favourable condition, in particular: <ul style="list-style-type: none"> <li>- Bedrock reefs</li> <li>- Stony reefs</li> <li>- Biogenic reefs</li> </ul> |
| Submerged or partially submerged sea caves | Subject to natural change, maintain the Submerged or partially submerged sea caves in favourable condition.                                                                                                              |

Note: these conservation objectives are taken from the June 2009 draft of the Poole Bay to Lyme Bay Reefs dSAC Regulation 33 advice. The assessment has been made on the basis of these conservation objectives, although it is possible that they may change as the site progresses through the designation process. The most up to date objectives should be used for any HRA at project level.

Numerous areas of reef exist within the Studland Bay to Ringstead Bay area. The reefs exhibit a large amount of geological variety, ranging from exposed chalk bedrock east of Ringstead Bay, through to exposed shales and clays, limestone and cementstone ledges, and boulders around Kimmeridge to Durlston, and back to exposed chalk bedrock between Ballard Cliffs and Handfast Point in the east of the site.

The Portland Reefs area lies off the south, east and north-east coasts of Portland Bill and is characterised by flat bedrock, limestone ledges (Portland stone), large boulders and cobbles. *Mytilus* beds are found to occur in very high densities on bedrock associated with strong currents off Portland Bill. Acoustic sampling has shown extensive bedrock terraces extending off Portland Bill, these occur where the coastal cliffs extend underwater and are clearly visible as 20m drop offs.

The seabed in the Lyme Bay Reefs area is found to comprise a wide variety of reef features including outcropping bedrock and pebbles, cobbles and boulders. The reef features extend over a large area. Unlike other sites within the Poole Bay to Lyme Bay site, they do not extend directly out from the coast but occur as outcropping bedrock slightly offshore. The softer sediment habitats are commonly found between the bedrock or cobble / boulder areas.

The reefs in the Dartmouth to Watcombe area exhibit great geological variety. Between Dartmouth and Scabbacombe Head slate reef is present with occasional granite outcrop. The reefs present between Crabrook Point and Sharkham Point are formed from mud ledges which form 2m high rock ridges. The reef features surrounding Berry Head principally comprise limestone ridges, boulders and pinnacles. Within Torbay, the reefs comprise discrete areas associated with the many headlands and coves (and include from south to north; Brixham to Ivy Cove reefs, Churston Point, Armchair Rock, Roundham Head and Hollicombe rocks to Livermead sands). The reefs in Torbay have a more diverse composition with limestone outcrops recorded in the southern half of the bay, and sandstone in the upper half of the bay.

No Round 3 zones overlap the complex area of Poole Bay to Lyme Bay reef habitat. The nearest development zone (Zone 7 - West Isle of Wight) lies approximately 6.4 km to the south east of the site at its nearest extent. It is anticipated that a cable route will pass through the marine site but only over a very short distance (approximately 0.2 km total length). The cable is proposed to run through the very north east corner of the Portland Reef site where it travels inland reaching the south England coast at Weymouth. There is some potential for the reef habitat to be impacted depending upon the chosen location for the cable route.

Table 5.27 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.27 Assessment of Effects of Round 3 Activities on Poole Bay to Lyme Bay Reefs dSAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                       | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Reefs                     | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines | A cable route may be run through a small part of the site for approximately 600m therefore there is some potential that sediments may be deposited on the reef. Detailed research into the significance of the effect on the reef should be undertaken at the project level and if an adverse effect on the integrity of the site is predicted, mitigation measures such as moving the location of the cable should be undertaken. | Potentially                                           | No *                                                                         | None identified                                   | AA required at the project level.                                      |
| Caves<br>Reefs            | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                        | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the site as a result of cable or turbine installation.                                                                                                                                                                                                                           | No                                                    | n/a                                                                          | None identified                                   | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature | Activity                                                                                                                                                                                                                                     | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                   |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------|
| Reefs              | 1. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>2. Presence of cable armouring or turbines leading to scour<br><br>3. Survey work using trawls<br><br>4. Turbine or cable installation | 1. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>2. A cable route may be run through a small part of the site for approximately 600m therefore there is some potential for scour adversely affecting the reef. Detailed research into the extent of damage scour can cause to the habitat and whether this will result in an adverse effect on the integrity of the site will need to be investigated at the project level. It is anticipated that mitigation methods to reduce scour can be employed such than adverse effect on the reef can be avoided or that the cable can be rerouted to avoid adverse effects if required.<br><br>3. There is some potential for loss of habitat due to trawling during survey work as a cable will run through the site. The potential adverse effects of this will need to be determined during the project phase when the cable route is known however it is anticipated that the effects can be mitigated, principally by avoiding the reef elements of the site.<br><br>4. There is some potential for loss of habitat due to the installation of cables over the reef habitat. The potential adverse effects of this will need to be determined during the project phase when the cable route is known however it is anticipated that the effects can be mitigated, principally by avoiding the reef elements of the site. | Potentially                                    | No *                                                                  | None identified                            | AA required at the project level. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.11 Shell Flat and Lune Deep dSAC

Shell Flat and Lune Deep dSAC are located in the Irish Sea just off the north west coast of England to the south west of Morecambe Bay. The area is characterised by a deep water channel (Lune Deep) and a large sandbank feature (Shell Flat) at the mouth of Morecambe Bay surrounded by shallower areas to the north and south.

The Round 3 Plan was screened in for having the potential for LSE on the Shell Flat and Lune Deep dSAC for two habitat qualifying features. These habitats together with their conservation objectives are shown in Table 5.28.

**Table 5.28 Shell Flat and Lune Deep dSAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature                                     | Conservation objective                                                                                                                                                                                                  |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reefs                                                          | Subject to natural change, maintain the reefs in favourable condition, in particular: <ul style="list-style-type: none"> <li>- Bedrock reefs</li> <li>- Stony reefs</li> </ul>                                          |
| Sandbanks which are slightly covered by sea water all the time | Subject to natural change, maintain the sandbanks slightly covered by seawater all the time in favourable condition, in particular: <ul style="list-style-type: none"> <li>- Sand and muddy sand communities</li> </ul> |

Note: these conservation objectives are taken from the June 2009 draft of the Shell Flat and Lune Deep dSAC Regulation 33 advice. The assessment has been made on the basis of these conservation objectives, although it is possible that they may change as the site progresses through the designation process. The most up to date objectives should be used for any HRA at project level.

Lune Deep is located at the entrance to Morecambe Bay, and is simply a deep water channel. The reef habitat present in the area represents a good example of boulder and rock reef, with the largest proportions of rock found along the unique kettle hole feature known as Lune Deep. The northern edges of Lune Deep are characterised by heavily silted cobble and boulder slop, and the northern flanks are composed of exposed bedrock with a rugged seabed physiography. In contrast, the southern flank consists of a smooth seabed which is a sink for muddy sands.

Shell Flat sandbank runs northeast from the southern corner of the site in a blunt crescent to the south west. The bank is an example of a Banner Bank, which are generally only a few kilometres in length with an elongated pear/sickle-shaped form, located in water depths less than 20m below Chart Datum (CD). Generally there are slight sediment changes across the sandbank with the top of the bank being softer and smoother and sediment becoming rougher and harder on the northern and southern slopes.

No Round 3 zones overlap the Shell Flat and Lune Deep dSAC. The nearest development zone (Zone 9 – Irish Sea) lies approximately 41 km to the west of the site at its nearest extent. It is anticipated that a cable route will pass through the marine site but only over a very short distance (approximately 0.2 km total length). The cable is proposed to run through the very north of the dSAC travelling east inland and reaching the English coast just south of

Morecombe Bay at the Fleetwood Estuary. There is some potential for the reef and sandbank feature to be impacted depending upon the chosen location for the cable route.

Table 5.29 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.29 Assessment of Effects of Round 3 Activities on Shell Flat and Lune Deep dSAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                       | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b>           | <b>Site Conclusion</b>                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------|
| Reefs                     | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines | A cable route may be run through a small part of the site for approximately 2km therefore there is some potential that sediments may be deposited on the reef. Detailed research into the significance of the effect on the reef should be undertaken at the project level and if an adverse effect on the integrity of the site is predicted mitigation measures such as moving the location of the cable should be undertaken. | Potentially                                           | No *                                                                         | Round 1 and 2 windfarms and possible extensions, aggregates | AA required at the project level.                                      |
| Reefs                     | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                        | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the site as a result of cable or turbine installation.                                                                                                                                                                                                                         | No                                                    | n/a                                                                          | Round 1 and 2 windfarms and possible extensions, aggregates | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature | Activity                                                                                                                                                                                                                                                     | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                               | Site Conclusion                                                                               |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Reefs<br>Sandbanks | 1. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>2. Installation or removal of turbines or cables<br><br>3. Presence of cable armouring or turbines leading to scour<br><br>4. Survey work using trawls | 1. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>2. There is some potential for loss of habitat due if cables are installed over the reef and sandbank habitat. The potential adverse effects of this will need to be determined during the project phase when the cable route is known however it is anticipated that the effects can be mitigated, e.g. by avoiding the reef or sandbank habitats or by burying the cables in the sandbank.<br><br>3. A cable route may be run through a small part of the site for approximately 2km therefore there is some potential for scour adversely affecting the reef. Detailed research into the extent of damage scour can cause to the habitat and whether this will result in an adverse effect on the integrity of the site will need to be investigated at the project level. It is anticipated that mitigation methods to reduce scour can be employed such than adverse effect on the reef can be avoided or that the cable can be rerouted to avoid adverse effects if required.<br><br>4. There is some potential for loss of habitat due to trawling during survey work as a cable will run through the site. The potential adverse effects of this will need to be determined during the project phase when the cable route is known however it is anticipated that the effects can be mitigated, principally by avoiding the reef elements of the site. | Potentially                                    | No *                                                                  | Round 1 and 2 windfarms and possible extensions, oil and gas, aggregates | AA required at the project level for potential adverse effects on reef and sandbank habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### 5.3.12 South Wight Maritime SAC

The South Wight Maritime European marine site is a dynamic site encompassing a large range of different reef types and associated marine communities on the south coast of the Isle of Wight. The site includes some of the most important subtidal chalk reefs in Britain, representing 5% of Europe's coastal chalk exposures and supporting a diverse range of species both in the subtidal and intertidal areas. The coastline of the South Wight Maritime European marine site is naturally dynamic. Despite the many modifications to the coast form, these dynamic processes continue and are important in maintaining the site in favourable condition.

The Round 3 Plan was screened in for having the potential for LSE on the South Wight Maritime SAC for one habitat qualifying feature. This is shown in Table 5.30 along with its conservation objectives.

**Table 5.30 South Wight Maritime SAC Habitat Qualifying Features and Conservation Objectives**

| Habitat qualifying feature | Conservation objective                                                                                                                                                                                                                                                                                                            |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reefs                      | <p>Subject to natural change, maintain the reefs in favourable condition, in particular:</p> <ul style="list-style-type: none"> <li>- Rocky shore communities</li> <li>- Kelp forest communities</li> <li>- Subtidal red algae communities</li> <li>- Subtidal faunal turf communities</li> <li>- Sea cave communities</li> </ul> |

Source: English Nature (2001) *South Wight Maritime European marine site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994*

The South Wight Maritime SAC is located along the south coast of the Isle of Wight in the UK. Within the site the vertical and horizontal faces and crevices on the limestone reefs off Bembridge and Whitecliff Bay and areas of large boulders off the south coast of the island provide a range of habitats for a number of marine species. On much of the reefs the bedrock is extensively bored by bivalves and sponges which adds further to habitat diversity. Several species reach their eastern limit of distribution along the English Channel at the Isle of Wight, which represents a transition zone between warmer south-western and colder North Sea waters, particularly at St Catherine's Point or on the extensive limestone reefs at Bembridge Ledges.

No zones or cable routes are located directly within the South Wight Maritime SAC. The nearest development zone (Zone 7 - West Isle of Wight) lies approximately 10.3 km to the south west of the SAC. The nearest cable route is envisaged to run approximately 43 km to the west of the site at its closest extent.

Table 5.31 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.31 Assessment of Effects of Round 3 Activities on South Wight Maritime SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                       | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                                 | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b> | <b>Site Conclusion</b>                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|
| Reefs                     | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines | Any effects of the Round 3 Plan on reefs due to re-deposition are likely to be reduced as the cables will be located at least 40km and the turbines at least 10km from the site. However as the site is located within one tidal extent of the cables and Round 3 Plan Zone a more detailed study should be undertaken at the project level to ascertain the effects when more details are known. | Potentially                                           | No *                                                                         | Aggregates                                        | AA required at the project level.                                      |
| Reefs                     | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                        | Contaminated sediments are only likely to occur in industrialised estuaries therefore it is unlikely that toxic contamination will be a factor in the site as a result of cable or turbine installation.                                                                                                                                                                                          | No                                                    | n/a                                                                          | Aggregates                                        | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature | Activity                                                                                                                                                                                                                                                     | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects | Site Conclusion                   |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|-----------------------------------|
| Reefs              | 1. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>2. Installation or removal of turbines or cables<br><br>3. Presence of cable armouring or turbines leading to scour<br><br>4. Survey work using trawls | 1. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>2. No cables or turbines will be located within the site therefore there will be no direct loss of habitat.<br><br>3. Any effects of the Round 3 Plan on the reefs are likely to be reduced as the cables will be located over 40km from the site and the zone is some 10km from the site. However due to the potential for hydrodynamic modifications as a result of an array of wind turbines a more detailed study should be undertaken at the project level.<br><br>4. As no cables or turbines will be located within the site there will be no need for survey work which could damage habitats in the site. | Potentially                                    | No *                                                                  | Aggregates                                 | AA required at the project level. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

### **5.3.13 Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC**

The Menai Strait and Conwy Bay SAC is located along the north coast of Wales and has long been recognised as important for marine wildlife. The variation in physical and environmental conditions throughout the site, including rock and sediment type, aspect, water clarity and exposure to tidal currents and wave action result in a wide range of habitats and associated marine communities many of which are unusual in Wales. Of particular interest is the continuum of environmental and physical conditions and associated marine communities from the tide-swept, wave-sheltered narrows of the Menai Strait to the more open, less tide-swept waters of Conwy Bay and the moderately wave-exposed Great and Little Ormes. The Menai Strait and Conwy Bay SAC is a multiple interest site that has been selected for the presence of 5 marine habitat types and associated wildlife (Habitats Directive Annex I habitat types).

For the qualifying habitats the SAC is considered to be one of the best areas in the UK for:

- Mudflats and sandflats not covered by seawater at low tide;
- Reefs;
- Sandbanks which are slightly covered by seawater all the time.

and to support a significant presence of:

- Large shallow inlets and bays;
- Submerged or partially submerged sea caves.

The Round 3 Plan was screened in for having the potential for LSE on the Menai Strait and Conwy Bay SAC for five habitat qualifying features. The conservation objectives for the site are shown in Table 5.32.

**Table 5.32 Menai Strait and Conwy Bay SAC Habitat Qualifying Features and Conservation Objectives**

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**Conservation objectives for Menai Strait and Conwy Bay SAC**

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To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

The habitat features of the site are: Mudflats and sandflats not covered by seawater at low tide, Reefs, Sandbanks which are slightly covered by seawater all the time, Large shallow inlets and bays, and Submerged or partially submerged sea caves.

**Range** - The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the intertidal mudflats and sandflats feature these include muddy gravel communities, dwarf eelgrass (*Zostera noltii*) beds, and sediment communities at Traeth Lafan.

For the reef feature these include reef communities in high energy wave-sheltered, tide-swept conditions, under-boulder, overhang and crevice communities, limestone reef communities and clay outcrop reef communities.

For the large shallow bay feature these include organically enriched muddy sediment areas.

**Structure and Function** - The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include geology, sedimentology, geomorphology, hydrography and meteorology, water and sediment chemistry and biological interactions.

This includes a need for nutrient levels in the water column and sediments to be at or below existing statutory guideline concentrations, and within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be at or below existing statutory guideline concentrations, below levels that would potentially result in increase in contaminant concentrations within sediments or biota and below levels potentially detrimental to the long-term maintenance of the features species populations, their abundance or range.

**Restoration and recovery** - This includes the need for restoration of some reef features such as underboulder, overhang and crevice communities, and of some mudflat and sandflat features such as the muddy gravel habitats and sheltered muddy habitats. All of these habitats are also part of the large inlets and bays feature.

**Typical Species** - The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include species richness, population structure and dynamics, physiological health, reproductive capacity, recruitment, mobility and range.

As part of this objective it should be noted that populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term, and the management and control of activities or operations likely to adversely affect the habitat feature, is appropriate for maintaining it in favourable condition and is secure in the long term.

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Source: Countryside Council for Wales (2009) *Y Fenai a Bae Conwy / Menai Strait and Conwy Bay European Marine Site Advice provided by the Countryside Council for Wales in fulfilment of Regulation 33 of the Conservation (Natural Habitats, &c.) Regulations 1994 Issue 2 February 2009*

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The features are distributed throughout the SAC with no single feature occupying the entire SAC and with features overlapping in some locations. The extent of most features is not known precisely and some, such as sandbanks, are dynamic and can be highly mobile. In general the large shallow bay (Conwy Bay), occupies much of the area at the northern mouth of the Menai Strait. Subtidal sandbanks occupy large areas in both the east and west of Conwy Bay with the western banks being large in extent. Subtidal sandbanks are also present in the southern reaches of Menai Strait. Intertidal mudflats and sandflats occupy much of the southern area of Conwy

Bay with smaller areas located in the west of the Bay and in the southern reaches of Menai Strait. Reefs are present along areas of the coastline with more linear of reef along the coast to the west and larger pockets off the eastern coast of the Bay. A large extent of Reef is also present in the intermediate reaches of the Menai Strait.

None of the Round 3 zones are located within the Menai Strait and Conwy Bay SAC. The nearest development zone (Zone 9 - Irish Sea) lies approximately 23km to the north of the site at its closest extent. It is anticipated that a cable route will pass through the SAC over a total distance of approximately 70 km. The cable is proposed to run south from the development zone through the centre of Conwy Bay and into the Menai Strait eventually reaching the Welsh coast at Bangor. There is potential for the SAC features to be impacted depending upon the chosen location for the cable route.

It should be noted that sediments within the Menai Strait area have been affected by historical contamination. For example, Red Wharf Bay on Anglesey is affected by significant contamination from sludge dumping, and there is significant metal contamination within the sediments around Amlwch that originated from mining activities at Parys Mountain. Disturbance of such contaminated sediments by cabling activities has the potential to affect features within the Menai Strait and Conwy Bay SAC.

Table 5.33 outlines the effects of potential activities associated with the Round 3 Plan on the site's habitat qualifying features, and assesses whether there is likely to be an adverse effect on the integrity of the site in light of the conservation objectives for the qualifying features.

**Table 5.33 Assessment of Effects of Round 3 Activities on Menai Strait and Conwy Bay SAC**

| <b>Qualifying feature</b> | <b>Activity</b>                                                                                                                                                       | <b>Commentary</b>                                                                                                                                                                                                                                                                                                                                                                              | <b>Adverse effect on integrity with current Plan?</b> | <b>Adverse effect on integrity with additional mitigation at Plan level?</b> | <b>Possible sources of in-combination effects</b>            | <b>Site Conclusion</b>                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------|
| Inlets                    | Increased vessel activity to/from ports in sheltered areas                                                                                                            | Any increase in activity at the site is likely to consist of European vessels. These are unlikely to cause a significant adverse effect on the integrity of the site. Non-native species that could be introduced from increased vessel activity are likely to be present already                                                                                                              | No                                                    | n/a                                                                          | Round 1 and 2 windfarms and possible extensions, oil and gas | No adverse effect on the integrity of the site as a result of the Plan |
| Reefs                     | Re-deposition of sediments mobilised during turbine or cable installation or decommissioning. Re-deposition of sediments mobilised by scour around installed turbines | 70km of cable may be located within the site therefore there is some potential that sediments may be deposited on the reef. Detailed research into the significance of the effect on the reef should be undertaken at the project level and if an adverse effect on the integrity of the site is predicted, mitigation measures such as moving the location of the cable should be undertaken. | Potentially                                           | No *                                                                         | Round 1 and 2 windfarms and possible extensions, oil and gas | AA required at the project level.                                      |
| Caves<br>Inlets<br>Reefs  | Mobilisation of contaminated sediments during turbine or cable installation or decommissioning                                                                        | Contaminated sediments are present in some sections of the site as a result of historical industrial activity on land. These could be disturbed as a result of cable or turbine installation.                                                                                                                                                                                                  | Potentially                                           | No *                                                                         | Round 1 and 2 windfarms and possible extensions, oil and gas | No adverse effect on the integrity of the site as a result of the Plan |

| Qualifying feature                       | Activity                                                                                                                                                                                                                                                                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Adverse effect on integrity with current Plan? | Adverse effect on integrity with additional mitigation at Plan level? | Possible sources of in-combination effects                   | Site Conclusion                                                                                               |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Inlets<br>Mudflats<br>Reefs<br>Sandbanks | 1. Establishment of fishery exclusion zones will protect reef habitat from effects of trawling<br><br>2. Increased vessel activity<br><br>3 Installation or removal of turbines or cables<br><br>4. Presence of cable armouring or turbines leading to scour<br><br>5. Survey work using trawls | 1. The establishment of a fishery exclusion zone could have a positive effect on the reef.<br><br>2. Increased vessel activity in the site resulting in increased ship wash and subsequent erosion is possible as the cable will be laid directly through the qualifying feature. Simple mitigation measures such as limiting the maximum speed of vessels should mitigate this potential effect such that an adverse effect on site integrity is unlikely.<br><br>3. The route of the cable through the site is not currently known but an estimated 70km of cable will be installed or removed within the site which has potential for an adverse effect on the qualifying features due to excavation and subsequent loss of habitat. It should be possible to avoid adverse effects by microsinising the cable's landfall within the site or requiring landfall outside the site or by using techniques such as using a narrow blade conventional plough or otherwise backfilling displaced material could be employed. Turbines will be located at least 20km from the site and are unlikely to result in direct habitat loss.<br><br>4. Effects of scouring leading to habitat loss due to the Round 3 Plan could occur as approximately 70km cables will be located within the site, and a detailed study should be undertaken at project level . As the zone is some 23km from the site, effects of wind turbines are not likely to be significant.<br><br>5. As no cables or turbines will be located within the site there will be no need for survey work which could damage the reef. | Potentially                                    | No *                                                                  | Round 1 and 2 windfarms and possible extensions, oil and gas | AA required at the project level for potential adverse effects on inlet, mudflat, reef and sandbank habitats. |

\* Avoidance and mitigation measures to prevent adverse effects have been incorporated at Plan level. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known.

#### 5.3.14 Avoidance and Mitigation Measures at Plan Level

A number of general environmental measures pertinent to reducing the effects of Round 3 Plan activities have already been incorporated within the Round 3 Plan. It has been assumed in the Plan-level HRA that these measures will be employed, where, following consultation with regulators and statutory consultees, it has been concluded that a likely significant effect would arise in their absence, and on this basis it has been possible to exclude the possibility of a LSE and adverse effect on integrity of some European/Ramsar sites. The relevant general environmental measures which have already been incorporated into the Plan for habitats are:

- Micrositing of turbines to avoid sensitive habitats/species or areas of sediment contamination where sediment re-mobilisation could result in toxic effects;
- Use of Best Practicable Environmental Option (BPEO) vessel anchoring/ positioning methodology and implementation of an appropriate Pollution Event Contingency Plan;
- Where there is evidence that this would mitigate adverse effects on sensitive habitats, use of appropriately designed/located scour protection for turbine bases;
- Use of BPEO decommissioning methods/standards (in the light of information available at the time of decommissioning, and to the satisfaction of regulators and statutory consultees) (e.g. turbine bases cut off below seabed, gravity bases left *in situ*, re-use of structures where possible, removal of debris from the sea bed, e.g. leaving a safely buried de-energised cable *in situ*, leaving colonised scour protection *in situ*);
- Micrositing of cables to avoid particularly sensitive coastal / intertidal / subtidal habitats, areas particularly important for bird interest features, and areas of known contamination where sediment re-mobilisation could result in toxic effects;
- Careful planning of terrestrial site access to avoid sensitive habitats on the upper shore (e.g. vegetated shingle), and employment of appropriate mitigation measures to reduce impacts on these habitats;
- Use of appropriate turbine and cable installation techniques to avoid adverse impacts on intertidal/ coastal habitat features;
- Use of cable-laying techniques most appropriate to the nature of the intertidal / subtidal substrate to avoid excessive sediment mobilisation;
- Where cable trenching in the intertidal is unavoidable, backfilling of trenches to reduce the potential for sediment remobilisation and facilitate recovery of benthic communities;
- Where there is evidence that this would mitigate adverse effects on sensitive habitats, use of cable protection in the intertidal / subtidal area (e.g. burial, scour protection, pinning over bedrock) to reduce excessive scour.
- Where necessary to mitigate excessive sediment disturbance, intertidal cable installation/removal undertaken at low tide to reduce the level of re-suspension and transport of sediments.

Based on the evidence presented in this chapter, it is considered that some Plan-level avoidance and mitigation measures are required for habitats in order to ensure that the Plan does not have adverse effects on the integrity of European/Ramsar site with these qualifying interest features.

### **Reefs**

At Plan level, the following sites containing reef interest features which are considered potentially at risk from Round 3 activities have been identified:

- Flamborough Head SAC;
- Lundy SAC;
- Poole Bay to Lyme Bay Reefs dSAC;
- Shell Flat and Lune Deep dSAC;
- South Wight Maritime SAC; and
- Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC.

The main issues requiring mitigation at project level are those of habitat loss, scour, deposition and toxic contamination through the mobilisation of contaminated sediments.

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which reef habitats are a qualifying feature as a result of damage, disturbance or toxicity arising from the installation, operation and decommissioning of windfarm projects (including turbines, cables and all ancillary infrastructure).*

It should be noted that individual Round 3 projects (where the nature of the project deviates from the assumptions made at Plan level) will need to implement the Plan-level reef avoidance and mitigation measure where appropriate for any sites containing reef interest features where those features could potentially be adversely affected by the project. The requirement for this project level mitigation would be identified through HRA at the project level.

### **Mudflats and Sandflats Not Covered by Seawater at Low Tide**

At Plan level, the following sites containing mudflat/sandflat interest features which are considered potentially at risk from Round 3 activities have been identified:

- The Dee Estuary SCI;
- Essex Estuaries SAC;
- Humber Estuary SCI; and
- Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC.

Intertidal mudflats and sandflats, owing to their location, are primarily sensitive to the effects of cabling. The key sensitivities identified within the Round 3 Plan are erosion and habitat loss arising from cable installation.

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which intertidal mudflat/sandflat*

*habitats are a qualifying feature as a result of erosion and habitat loss arising from the installation and decommissioning of cables associated with windfarm projects.*

It should be noted that individual Round 3 projects (where the nature of the project deviates from the assumptions made at Plan level) will need to implement the Plan-level mudflat/sandflat avoidance and mitigation measure where appropriate for any sites containing mudflat/sandflat interest features where those features could potentially be adversely affected by the project. The requirement for this project level mitigation would be identified through HRA at the project level.

#### **Sandbanks which are Slightly Covered by Seawater All the Time**

At Plan level, the following sites containing sandbank interest features which are considered potentially at risk from Round 3 activities have been identified:

- Dogger Bank dSAC;
- Haisborough, Hammond and Winterton dSAC;
- Humber Estuary SCI; and
- Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC.

These habitats include subtidal sandbanks in shallow waters as well as offshore sandbanks in deeper waters. Both cable laying and turbine installation under the Round 3 Plan have the potential to affect sandbanks interest feature, primarily in terms of erosion and loss of habitat.

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which sandbank habitats are a qualifying feature as a result of erosion or habitat loss arising from the installation, operation and decommissioning of windfarm projects (including turbines, cables and all ancillary infrastructure).*

It should be noted that individual Round 3 projects (where the nature of the project deviates from the assumptions made at Plan level) will need to implement the Plan-level sandbank avoidance and mitigation measure where appropriate for any sites containing sandbank interest features where those features could potentially be adversely affected by the project. The requirement for this project level mitigation would be identified through HRA at the project level.

#### **Estuaries and Large Shallow Inlets and Bays**

At Plan level, the following sites containing estuary/inlet interest features which are considered potentially at risk from Round 3 activities have been identified:

- The Dee Estuary SCI;
- Essex Estuaries SAC;
- Humber Estuary SCI; and
- Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC.

The Annex I Estuary habitat is frequently defined within SAC descriptions in terms of the individual habitats present within the estuary (many of which have been addressed by Plan-level avoidance and mitigation measures for interest features above). However, in some cases there are additional elements included in the conservation objectives for estuary interest features (such as maintenance of physical and ecological processes), and so it is considered appropriate to also include a Plan-level avoidance and mitigation measure for this interest feature. Effects on estuaries identified within the Round 3 HRA are the same as those identified for the Annex I habitat Large Shallow Inlets and Bays. The main effects on these habitats arise from cabling activities through sites, primarily loss and/or erosion of habitat.

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which estuary or large shallow inlet/bay habitats are a qualifying feature as a result of erosion and habitat loss arising from the installation and decommissioning of cables associated with windfarm projects.*

It should be noted that individual Round 3 projects (where the nature of the project deviates from the assumptions made at Plan level) will need to implement the Plan-level estuary/inlet avoidance and mitigation measure where appropriate for any sites containing estuary/inlet interest features where those features could potentially be adversely affected by the project. The requirement for this project level mitigation would be identified through HRA at the project level.

### **Sea Caves**

At Plan level, the following sites containing sea cave interest features which are considered potentially at risk from Round 3 activities have been identified:

- Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC.

The Annex I sea cave habitat has the potential to be affected by contaminated sediments, and so it is considered appropriate to also include a Plan-level avoidance and mitigation measure for this interest feature.

*The Plan must therefore be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which sea cave habitats are a qualifying interest feature as a result of the mobilisation and resettlement of contaminated sediments arising from the installation and decommissioning of cables associated with windfarm projects.*

It should be noted that individual Round 3 projects (where the nature of the project deviates from the assumptions made at Plan level) will need to implement the Plan-level estuary/inlet avoidance and mitigation measure where appropriate for any sites containing sea cave interest features where those features could potentially be adversely affected by the project. The requirement for this project level mitigation would be identified through HRA at the project level.

### **5.3.15 Implementation of Plan-Level Avoidance and Mitigation Measures at Project Level**

It is possible to implement these Plan-level avoidance and mitigation measures at project level, although the methods chosen for their implementation may vary considerably between projects

as a result of the nature of those projects. Examples of possible project level mitigations over and above those already included within the Plan are given below. This is not intended to be an exhaustive list, and the effectiveness of the measures will vary considerably between projects.

- surveys for the presence of contaminated sediments, and avoidance of these areas where possible when micro-siting turbines/cable routes;
- modelling the potential sediment/hydrodynamic effects arising from the location of a project within a zone, based on the specific characteristics of that project;
- undertaking a risk assessment for the possibility of the introduction of non-native species from ship movements associated with specific projects; or
- ensuring that ships associated with the project installation and/or maintenance comply with IMO Guidelines on Ballast Water to reduce the opportunity for non-native species introduction from European vessels or international vessels.

Zone developers will be obliged to undertake Plan-level avoidance and mitigation measures where it is necessary to ensure that there are no adverse effects on the integrity of European/Ramsar sites. The requirement for the application of these Plan-level avoidance and mitigation measures at project level will need to be assessed during project level HRA, in light of the specific locations and design of individual projects, and consequently their potential to adversely affect European/Ramsar sites. Determination of the most appropriate way(s) of implementing Plan-level avoidance and mitigation measures at project level will also be undertaken at project level, in consultation with regulators and statutory nature conservation agencies. Zone developers should also take into account the emerging environmental guidance relating to the Round 3 Plan when planning appropriate project-level mitigation measures. It may also be appropriate for developers to consider zone-wide mitigation strategies in addition to project-specific measures.

### 5.3.16 Conclusions

A summary of the site conclusions by habitat qualifying feature is shown in Table 5.34.

**Table 5.34 Summary of AA Site Conclusions for Habitat Qualifying Features**

| Site Name                                                                | Sensitive Interest Features | Comments                                                                                                                                                                                           |
|--------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0020020 Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC | Salicornia                  | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                    |
|                                                                          | Mudflats                    | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                    |
|                                                                          | Inlets                      | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                    |
|                                                                          | Estuaries                   | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                    |
|                                                                          | Sandbanks                   | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                    |
| UK0030131 Dee Estuary / Aber Dyfrdwy SAC                                 | Mudflats                    | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when |

| Site Name                               | Sensitive Interest Features | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK11082 Dee Estuary Ramsar site         | Estuaries                   | <p>project details are known, particularly with regard to direct loss of habitat during cable installation and removal and erosion due to scour arising from installed structures.</p> <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and removal and erosion due to scour arising from installed structures.</p> |
| Dogger Bank dSAC                        | Sandbanks                   | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat from the installation of cables and turbines and erosion due to scour arising from installed structures.</p>                                                                                                                                                                                 |
| UK0013690 Essex Estuaries SAC           | Sandbanks                   | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.</p>                                                                                                                                                                                                    |
|                                         | Estuaries                   | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.</p>                                                                                                                                                                                                    |
|                                         | Mudflats                    | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.</p>                                                                                                                                                                                                    |
| UK0013036 Flamborough Head SAC          | Caves                       | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                         | Reefs                       | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to erosion due to scour arising from installed structures.</p>                                                                                                                                                                                                                                                         |
| Haisborough, Hammond and Winterton dSAC | Sandbanks                   | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat from the installation of cables and turbines and as a result of erosion caused by structures.</p>                                                                                                                                                                                            |
| UK0030170 Humber Estuary SCI            | Sandbanks                   | <p>Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.</p>                                                                                                                                                                                                    |
| UK11031 Humber Estuary Ramsar site      |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Site Name                          | Sensitive Interest Features | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | Mudflats                    | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.                                                                                                                                          |
|                                    | Estuaries                   | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to disturbance of contaminated sediments, loss of habitat during cable installation and erosion due to scour arising from installed structures.                                                                                                          |
| UK0013114 Lundy SAC                | Sandbanks                   | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to erosion due to scour arising from installed structures.                                                                                                                                                                                               |
|                                    | Reefs                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to smothering caused by re-deposition of sediments disturbed by turbine and cable installation and erosion due to scour arising from installed structures.                                                                                               |
| Poole Bay to Lyme Bay Reefs dSAC   | Reefs                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to smothering caused by re-deposition of sediments disturbed by turbine and cable installation, erosion due to scour arising from installed structures, and direct loss of reef through cable installation.                                              |
|                                    | Caves                       | AA completed at Plan level, no adverse effect on site integrity                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Shell Flat and Lune Deep dSAC      | Sandbanks                   | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct loss of habitat during cable installation and erosion due to scour arising from installed structures.                                                                                                                                          |
|                                    | Reefs                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to smothering caused by re-deposition of sediments disturbed by cable installation, direct loss of habitat during cable installation, erosion due to scour arising from installed structures, and loss of habitat caused by trawling during survey work. |
| UK0030061 South Wight Maritime SAC | Reefs                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to the effects of mobilised sediments.                                                                                                                                                                                                                   |

| Site Name                                                      | Sensitive Interest Features | Comments                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UK0030202 Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC | Caves                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct habitat loss, erosion/scour and possible mobilisation of contaminated sediments  |
|                                                                | Mudflats                    | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct habitat loss and erosion/scour.                                                  |
|                                                                | Reefs                       | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct habitat loss, erosion/scour and possible mobilisation of contaminated sediments  |
|                                                                | Sandbanks                   | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct habitat loss, erosion/scour and possible mobilisation of contaminated sediments. |
|                                                                | Inlets                      | Plan-level mitigation has been incorporated to prevent adverse effects on this feature. However, detailed definition of mitigation measures and further HRA will be required at project level when project details are known, particularly with regard to direct habitat loss and erosion/scour.                                                  |

## 6. Potential for Adverse Effects on Bird Interest of SPAs and Ramsar Sites

### 6.1 Introduction

#### 6.1.1 Sites in this Chapter

In the HRA Screening Report, 251 SPAs and 114 Ramsar sites<sup>68</sup> were identified, which have interest features that include migratory birds and seabirds that could be significantly affected by the Round 3 Plan. These sites need to be subject to AA. For a number of other sites it was concluded that there would be no LSEs as a result of the Plan because the sites are not located along the coast or offshore and their interest features are resident bird species. Some of the screened-in sites also support resident species that are unlikely to come into contact with associated onshore development; the potential for these species to be significantly affected by the Round 3 plan was also discounted at the screening stage.

#### 6.1.2 Conservation Objectives

The assessment of the effects on birds must be undertaken with regard to the relevant conservation objectives. In Scotland, all SPAs are covered by a generic set of conservation objectives, whilst sites in England and Wales above the low water mark rely on information in the citations for the relevant Sites of Special Scientific Interest (SSSI). Given the large number of sites involved in the AA of the Round 3 plan and the strategic level at which this assessment is being carried out, it has been decided to use the generic objectives outlined by SNH as the basis for the assessment. SNH's generic conservation objectives are as follows:

*“To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and*

*To ensure for the qualifying species that the following are maintained in the long term:*

- *population of the species as a viable component of the site;*
- *distribution of the species within site;*
- *distribution and extent of habitats supporting the species;*
- *structure, function and supporting processes of habitats supporting the species; and*
- *no significant disturbance of the species.”*

<sup>68</sup> NB: a further site, Cors Fochno & Dyfi Estuary Ramsar site, has been added to the list on the request of CCW.

### 6.1.3 Sensitivities of Birds to Round 3 Plan Activities

Potential effects on bird species are detailed in Table 6.1.

**Table 6.1 Sensitivities of Birds to Associated Round 3 Activities**

| Sensitivities                                                                                                | Relevant Round 3 zone activities                                                                                                                                                                  | Survey | Installation | Operation | Decommissioning | Information required for assessment                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Loss of intertidal foraging habitat                                                                       | Installation or removal of cables in the intertidal area                                                                                                                                          |        | ◆            |           | ◆               | Tidal excursion data; information about whether or not cables are armoured; bird data                                                                               |
| 2. Loss of intertidal foraging habitat                                                                       | Presence of cable armouring or turbines causing changes in hydrodynamics resulting in erosion of intertidal habitat                                                                               |        |              | ◆         |                 | Tidal excursion data; information about whether or not cables are armoured; bird data                                                                               |
| 3. Loss of subtidal foraging habitat                                                                         | Presence of cable armouring or turbines causing direct loss of seabed habitat or causing changes in hydrodynamics resulting in erosion of subtidal habitat                                        |        |              | ◆         |                 | Location of windfarms and turbines; turbine design; information about whether or not cables are armoured and whether armouring projects above the seabed; bird data |
| 4. Change in supply of prey for foraging birds in subtidal areas                                             | Establishment of fishery exclusion zones around windfarms may lead to increase in prey species but noise from turbines may decrease fish supply; fish could also be adversely affected by piling. |        | ◆            | ◆         |                 | Location of windfarms and turbines; exclusion zones; bird data                                                                                                      |
| 5. Change in supply or availability of prey for foraging birds in intertidal and subtidal areas              | Habitat changes, due to direct and indirect effects on intertidal and subtidal areas, may decrease or increase food supply or availability for birds                                              |        | ◆            | ◆         | ◆               | Tidal excursion data; bird data                                                                                                                                     |
| 6. Collision of migrating and foraging birds with turbine blades                                             | Turbine presence and operation                                                                                                                                                                    |        |              | ◆         |                 | Location of windfarms and turbines; bird data                                                                                                                       |
| 7. Barrier effects to the movement of migrating and foraging birds                                           | Turbine presence and blade movement                                                                                                                                                               |        |              | ◆         |                 | Location of windfarms and turbines; bird data                                                                                                                       |
| 8. Noise/visual disturbance and/or displacement from intertidal and onshore feeding/roosting/ breeding areas | Installation or removal of cables across the shoreline                                                                                                                                            |        | ◆            |           | ◆               | Location of windfarms and turbines; bird data                                                                                                                       |

| Sensitivities                                                                 | Relevant Round 3 zone activities                     |        |              |           |                 | Information required for assessment                         |
|-------------------------------------------------------------------------------|------------------------------------------------------|--------|--------------|-----------|-----------------|-------------------------------------------------------------|
|                                                                               |                                                      | Survey | Installation | Operation | Decommissioning |                                                             |
| 9. Noise/visual disturbance and/or displacement from offshore foraging areas  | Installation or removal of subsea cables or turbines |        | ◆            |           | ◆               | Location of windfarms and turbines; bird data               |
| 10. Noise/visual disturbance and/or displacement from offshore foraging areas | Turbine presence and operation                       |        |              | ◆         |                 | Location of windfarms and turbines; bird data               |
| 11. Noise/visual disturbance on shore or on offshore feeding grounds          | Increased vessel activity                            | ◆      | ◆            | ◆         | ◆               | Ports used by vessels; data on shipping activity; bird data |

## 6.2 Effects of the Round 3 Plan

### 6.2.1 Categorisation of Effects

For birds, the effects that need to be assessed have been divided into two categories, as outlined below.

- ‘Turbine effects’ - these are effects on species (and hence on the SPAs/Ramsar sites with which they are associated, whether in the UK or in other countries - which, for Ramsar sites, include non-EU countries) caused by: collision with turbines (sensitivity 6 in Table 6.1); displacement or disturbance associated with turbine construction, presence, operation or decommissioning (sensitivities 7, 9 10 and 11); changes in prey availability associated with turbine operation (sensitivities 4 and 5); and habitat loss caused by turbine construction and presence (sensitivities 2 and 3). Such effects may result where species currently forage within an area that has been zoned for development or pass through it whether on route to other foraging areas or on migration.
- ‘Cabling effects’ - these are effects on species (and hence on the SPAs/Ramsar sites with which they are associated) caused by disturbance (sensitivity 8, 9 and 11), habitat loss (sensitivities 1, 2 and 3) or habitat change (sensitivity 5) associated with the laying of cables.

The assessments of these effects are set out below. It should be noted that turbine effects have the potential to be of greatest concern.

### 6.2.2 Turbine Effects

Section 4.3.4 of the screening report explained that, in the absence of detailed information about windfarm projects within the nine development zones, the Plan-level AA of turbine effects on seabirds and migratory birds will need to rely upon project level HRA work. The information

needed to inform this assessment will include the locations of windfarms within zones and of turbines within windfarms, the types of turbine bases that are used, the routes taken into the zones by vessels involved in turbine installation etc.

There will be a need to obtain detailed bird survey data to inform the project level HRA. In advance of this project level assessment, it will be possible to use data that have been obtained by WWT and Hi Def (for COWRIE) to identify the seabird species that make extensive use of each of the nine zones. This will provide a preliminary indication of the effects that are most likely to be of greatest concern and will inform the scoping of further survey and research work that will be needed to inform the project level assessments.

Seabird data will need to be augmented by data on migratory species. Careful consideration will be needed in each zone to the migratory species that could be significantly affected by windfarm projects. To assist in this assessment, Table 6.2 lists 15 migratory species which, on the basis of information about, for example, their behaviour and interaction with windfarms, are less likely than other migratory species to be significantly affected. It may be possible to screen out these species from further assessment, although to do this will require information about the specific location of windfarms and their constituent turbines, as well as consideration of the population sizes of the species that could be affected. For example, the conservation status of species with small populations in the UK, such as dotterel, corncrake and stone-curlew, could be adversely affected if only small numbers of birds were to be killed through collisions with windfarms.

Once the migratory species that have the potential to be significantly affected have been identified in relation to each project, it will be necessary to define what survey and research work is needed to inform the assessment of effects.

**Table 6.2. Migratory Species that May Not be Adversely Affected by the Round 3 Plan**

| Species       | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marsh harrier | <p>360 females were present in the UK in 2005 (Eaton <i>et al.</i> 2006<sup>69</sup>). Assuming parity 720 adults would be present in the UK during the breeding season with the majority (and their offspring and any non-breeding individuals) leaving the UK during winter. There is no co-ordinated migration with individuals leaving for warmer climes sporadically. The migration atlas suggests that marsh harriers do not follow a single migration pathway, although the majority of pathways are across the Channel (Wernham <i>et al.</i> 2002). There is considered to be only limited influx of individuals from more northerly areas during winter.</p> <p>Given the migratory habits of this species it is reasonable to conclude that the risk of a significant proportion of the population moving through an offshore windfarm will be small (i.e. the migration front is broad and no flocking behaviour is noted). In addition marsh harrier is known to avoid moving through windfarms (Hötter <i>et al.</i> 2006<sup>70</sup>) evidenced by the operation of barrier effects and the low number of casualties reported (1 individual).</p> <p>It is therefore reasonable to conclude that the likely level of bird occupancy per unit area (and therefore the risk of collision) within any of the Development Zones is highly likely to be minimal.</p> |

<sup>69</sup> Eaton, M.A., Austin, G.E., Banks, A.N, Conway, G. & Douse, A. (2006) The State of the UK's Birds 2006. RSPB, Sandy.

| Species     | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hen harrier | <p>764 pairs were considered to be breeding in the UK in 2004 (Sim <i>et al.</i> 2007<sup>71</sup>). Many of these individuals and non-breeding birds winter within the UK. Further birds also arrive from the continent in winter. Movements of individuals to and from the UK occur on a broad front crossing the North Sea and English Channel with movements to/from Scandinavia, the Low countries, France, Spain and Portugal (Wernham <i>et al.</i> 2002<sup>72</sup>).</p> <p>This species is likely to be most at risk from disturbance and loss of foraging habitat in coastal areas. The risk of collision with operational turbines is low as the number of migrating individuals is relatively small, the pattern of movement is irregular and this species has been shown to maintain a stand-off distance whilst foraging/commuting close to onshore turbines (Whitfield &amp; Madders 2006); in addition very few hen harrier have been recorded as colliding with operational wind turbines (albeit onshore) despite considerable survey effort.</p> <p>Hen harrier are considered unlikely to be affected by coastal/terrestrial land-take as they will be hunting over a wide area making localised disturbances easily avoidable.</p>                                                                                                        |
| Peregrine   | <p>There are approximately 1,400 pairs of peregrine in the UK (Banks <i>et al.</i> 2003<sup>73</sup>). These birds are largely resident within the UK although there are often movements away from upland areas over-winter. Many peregrines are resident in coastal areas or move towards the coast in winter. A small number of individuals are thought to migrate from Scandinavia to spend the winter in the UK (Wernham <i>et al.</i> 2002).</p> <p>The risk of collision to peregrine is likely to be small as the level of activity within operational offshore windfarms will be low. Although two deaths of peregrine have been reported from onshore windfarms in Europe (Hötter <i>et al.</i> 2006) they are generally thought to be highly manoeuvrable and at relatively low risk of collision.</p> <p>Most individuals are unlikely to come into contact with any of the wind turbines constructed during the Round 3 process and instead could be disturbed by the construction and/or operation of onshore infrastructure and habitat loss. However given the habitats on which peregrines tend to breed and/or roost, their ability to resist disturbance and their wide prey selection and the abundance of it (notably feral pigeons) it is unlikely that they will be affected by onshore developments associated with the Round 3 plan.</p> |

<sup>70</sup> Hötter, H., Thomsen, K-M. & Jeromin, H. (2006) Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats - facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Michael-Otto-Institut im NABU, Bergenhusen

<sup>71</sup> Sim, I.M.W., Dillon, I.A., Eaton, M.A., Etheridge, B., Lindley, P., Riley, H., Saunders, R., Sharpe, C. & Tickner, M. (2007) Status of the hen harrier *Circus cyaneus* in the UK and Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys. *Bird Study* 54 (2): 256-267.

<sup>72</sup> Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M., Baillie, S.R. [Eds] (2002) *The Migration Atlas: Movements of the Birds of Britain and Ireland*. T & AD Poyser, London.

<sup>73</sup> Banks, A.N., Coombes, R.H. & Crick, H.Q.P. (2003) *The Peregrine Falcon breeding population of the UK & Isle of Man in 2002*. BTO Research Report 330, Thetford.

| Species       | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Merlin        | <p>There are approximately 1,500 pairs breeding within the UK (Rebecca &amp; Bainbridge 1998<sup>74</sup>). The majority of these birds move from the uplands to lower altitudes, often around the coast, in the winter. Some individuals move to the continent over winter but the majority remain within the UK (Wernham <i>et al.</i> 2002). The winter population is bolstered by migrants from Iceland; these birds mainly migrate individually.</p> <p>Any migrants moving across the sea (and therefore at risk of collision) are usually solitary and therefore the risk of collision is very low (i.e. bird occupancy per unit area is low). Merlin is also not thought to be at particular risk of collision with wind turbines (albeit from evidence from onshore windfarms, e.g. Hötter <i>et al.</i> 2006, Percival 2001). As with other raptors that move to lower altitudes during the winter, the potential disturbance and habitat loss implications of onshore infrastructure associated with the Round 3 plan is low due to both the extensive areas over which this species typically forages and diet.</p> |
| Osprey        | <p>It is estimated that there are 148 breeding pairs of osprey in the UK (Baker <i>et al.</i> 2006<sup>75</sup>). All of these birds, and any non-breeding individuals, migrate to and from the UK each year and therefore have the potential to fly through one or more offshore windfarms twice per year. This species migrates on a broad front. It flies strongly and therefore does not rely on narrow sea passages (Wenham <i>et al.</i> 2002). Ospreys are usually solitary migrants, although sometimes small groups are seen (Snow and Perrins 1998<sup>76</sup>). No references have been identified of an osprey being a victim of collision due to wind turbines and, given the small numbers of individuals and the loose pattern of migration the level of risk posed by operational turbines to these birds will be very low. It should be noted that any onshore infrastructure is unlikely to be in areas where this species may be affected.</p>                                                                                                                                                              |
| Honey buzzard | <p>It is estimated that there are 69 pairs breed in the UK (Batten 2001<sup>77</sup>). This species usually migrates in flocks of a few to hundreds of individuals in continental Europe, but in the UK (due to low breeding numbers) is usually observed migrating singly. It is a soaring species and as such tends to concentrate movements across narrow sea channels. Given the small numbers of birds and the likely movement pattern of this species it is considered that the level of exposure to wind turbines will be small and unlikely to represent a significant risk.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

<sup>74</sup> Rebecca, G.W. & Bainbridge, I.P. (1998) The breeding status of the Merlin *Falco columbarius* in Britain 1993-94. *Bird Study* 45: 172-187

<sup>75</sup> Baker, H., Stroud, D.A., Aebischer, N.J., Cranswick, P.A., Gregory, R.D., McSorley, C.A., Noble, D.G. & Rehfisch, M.M. (2006) Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 99(1): 25 – 44.

<sup>76</sup> Snow, D. W. & Perrins, C. M. (eds.) (1998) *The birds of the Western Palearctic*. CD-ROM edition. Oxford University Press

<sup>77</sup> Batten, L.A. (2001) European Honey-buzzard survey 2000 and 2001: preliminary results and request for further surveys. *British Birds* 94(3): 143 – 144.

| Species         | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short-eared owl | <p>The population of short-eared owl in the UK fluctuates markedly between years. In winter, many birds move to the continent with others arriving from Scandinavia. Individuals wintering in Britain mostly frequent coastal areas and downland (Wernham <i>et al.</i> 2002). Short-eared owl tend to migrate singly.</p> <p>Given their hunting habits localised habitat loss and disturbance in coastal areas is unlikely to affect this species. Migrating individuals will be vulnerable to the risk of collision from offshore wind turbines twice per year but given the broad front of movement and relatively small numbers of movements the collision risk is unlikely to be particularly high.</p>                                                                                                                                                                                                                                                                                                                             |
| Nightjar        | <p>The UK population is estimated to be between 3,700 to 5,500 calling males (Conway <i>et al.</i> 2007<sup>78</sup>). Assuming parity the population is therefore likely to be around 10,000. The majority of ringing recoveries (Wernham <i>et al.</i> 2002) suggest that most migratory movement is across the Channel with occasional movements eastwards to the low countries. The recoveries show that the nightjars migrate across a broad front. When this is allied with knowledge that this species usually migrates singly or in small groups it is unlikely that the bird occupancy per unit area (i.e. time spent within a given area such as an offshore windfarm) is high and therefore the risk of collision is low. This conclusion is further strengthened from the lack of European nightjar fatalities recorded at operational onshore windfarms (e.g. Hötter <i>et al.</i> 2006).</p>                                                                                                                                |
| Woodlark        | <p>The UK population of woodlark is estimated at approximately 1,500 pairs (Wotton &amp; Gillings 2000<sup>79</sup>). The majority of these birds are thought to winter in southern England with small numbers in East Anglia; others are known to move to the Low Countries and France (Wernham <i>et al.</i> 2002). This species is less gregarious than other larks and only forms small flocks (Snow &amp; Perrins 1993).</p> <p>The available information suggests that the majority of individuals are resident in the UK with any migrating individuals moving on broad fronts in small groups. Five individuals have been noted as colliding in Spain with onshore windfarms (Hötter <i>et al.</i> 2006). However as the population there is between 560,000 and 1.3 million pairs the proportion of collision is low (Snow &amp; Perrins 1998).</p> <p>Winter flocks will forage across large areas and are highly unlikely to be affected by disturbance or habitat loss associated with localised activities at land fall.</p> |
| Dotterel        | <p>Between 510 and 750 males breed in the UK each year (Whitfield 2002<sup>80</sup>). Assuming parity this equates with approximately 1,500 individuals occurring in the UK. Dotterels migrate in flocks moving between the UK and Africa; this pattern suggests that the majority of birds will cross the Channel.</p> <p>As this species does not breed in coastal areas the risk proposed by the Round 3 plan is due to collision with operational wind turbines. Given the recorded movements and general flight characteristics this risk is likely to be very low and unlikely to be significant.</p>                                                                                                                                                                                                                                                                                                                                                                                                                               |

<sup>78</sup> Conway, G., Wotton, S., Henderson, I., Langston, R., Drewitt, A. & Currie, F. (2007) Status and distribution of the European nightjar *Caprimulgus europaeus* in the UK in 2004. Bird Study 54(1): 98 – 111.

<sup>79</sup> Wotton, S.R. & Gillings, S. (2000) The status of breeding woodlarks *Lullula arborea* in Britain in 1997. Bird Study 47(2): 212 – 224.

<sup>80</sup> Whitfield, D.P. (2002) Status of breeding dotterel *Charadrius morinellus* in Britain in 1999. Bird Study 49(3): 237 – 249.

| Species         | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Corncrake       | <p>1,067 males were recorded in the UK in 2004 (O'Brien <i>et al.</i> 2006<sup>81</sup>), the majority being confined to North-west Scotland and Orkney. If parity is assumed the UK breeding population is therefore approximately 2,150 individuals. This species is generally solitary and migrates mainly singly or in pairs (Snow &amp; Perrins 1998). There is some evidence that this species flies at low altitudes when on migration, although this is recorded at land fall (at Trammel nets) and therefore is not necessarily indicative of flight behaviour. As birds migrate singly and are sighted across large areas (Gibbons <i>et al.</i> 1993) it is likely that migration pathways of individuals cover a broad front. This will result in the bird occupancy per unit area being low and therefore modelled collision risk being very low.</p> <p>Corncrake breed in areas of habitat that will not be affected by the construction of onshore infrastructure associated with the Round 3 plan.</p> |
| Spotted crane   | <p>Spotted crane numbers are low with around 75 – 80 pairs breeding in the UK (Gilbert 2002<sup>82</sup>). Birds tend to migrate individually and move to wintering grounds in southern Europe, Africa, the Middle East and southern Asia.</p> <p>Given the small numbers of birds and the their habit of moving along individual pathways it is unlikely that the bird occupancy per unit area within any windfarm development associated with the Round 3 plan will be high – therefore the risk of collision will be low.</p> <p>Spotted crane breed in areas of habitat that will not be affected by the construction of onshore infrastructure associated with the Round 3 plan.</p>                                                                                                                                                                                                                                                                                                                               |
| Aquatic warbler | <p>67 passage birds (based on 1997 figures) occur in the UK each year (Stroud <i>et al.</i> 2001<sup>83</sup>). These birds generally occur only in late summer (from July) and usually avoid the UK during the spring migration. They are drift migrants and therefore distribution is somewhat determined by weather patterns.</p> <p>This species occurs in very small numbers and is unlikely to move through any of the Round 3 turbine arrays more than once per year. It is considered that the collision risk for this species will be negligible. Given the habitat requirements for this species (i.e. reedbeds) no effects are associated with the onshore development required for the Round 3 plan.</p>                                                                                                                                                                                                                                                                                                    |
| Stone-curlew    | <p>The stone-curlew population numbers 307 pairs (Eaton <i>et al.</i> 2006) and is located, mainly, in distinct areas in Breckland and on Salisbury Plain. This species is gregarious and migrates in pairs and small flocks (Snow &amp; Perrins 1998). Due to the distribution of this species in the UK the migration pathway is fairly broad with movement covering the Channel.</p> <p>As stone-curlew will not come into contact with onshore infrastructure associated with the Round 3 plan, due to habitat preferences, it is the risk of collision which is of importance. As this species migrates on a relatively broad front, in small numbers the risk of collision is likely to be low and not great enough to result in a significant adverse effect on this species.</p>                                                                                                                                                                                                                                |

<sup>81</sup> O'Brien, M., Green, R.E. & Wilson, J. (2006) Partial recovery of the population of corncrakes *Crex crex* in Britain 1993 – 2004. *Bird Study* 53(3): 213 – 224.

<sup>82</sup> Gilbert, G. (2002) The status and habitat of spotted cranes *Porzana porzana* in Britain in 1999. *Bird Study* 49(1): 79 – 86.

<sup>83</sup> Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds). 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough.

| Species | Reasons for determination of no adverse effect on conservation status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Quail   | <p>The number of breeding quail fluctuate between years. Baker <i>et al.</i> (2006) estimated that a maximum of 315 males were present in the UK between 1998 and 2002. Assuming parity a breeding population of up to 630 individuals may be present. Quail migrate singly or in small flocks (Snow &amp; Perrins 1998) often at low altitudes; although this may be greater during darkness (Kane 1993 from Wernham <i>et al.</i> 2002).</p> <p>Due to the relatively wide distribution of this species it is likely that they migrate on a broad front. Given this broad front migration and the small numbers involved it is likely that the bird occupancy per unit area in any of the development zones will be very low as will be the risk of collision. Quail is likely to remain unaffected by associated onshore infrastructure due to the abundance of suitable breeding habitat.</p> |

### 6.2.3 Cabling Effects

#### Disturbance

One of the sources of disturbance to SPAs and Ramsar sites is the activity of cable-laying vessels. This involves transit to the cable route from the port of origin and then travel along the cable route. The latter can be assessed with the information that is available at the Plan level but assessment of the former relies upon information on ports to be used, which will influence any SPAs/Ramsar sites that the ships will travel through or close to on route to the cable alignment. The ports that will be used are not known and, for this reason, it is necessary for the Plan-level AA to rely upon project level HRA work in relation to the effects of vessel transit to the cable route. Reflecting the approach set out in section 1.3, it is concluded that there will be no adverse effects on the integrity of SPAs and Ramsar sites as a result of these transits, as it will be possible to avoid adverse effects by implementation of the Plan-level avoidance and mitigation measures at project level.

Other effects associated with cable construction can, though, be assessed as part of the Plan-level AA without needing to rely upon project-level HRA. These effects have been assessed based upon the cable routes and landfall locations that are shown on Figure 2.3 of the screening report. On a precautionary basis, it has been assumed that birds in SPAs/Ramsar sites could be significantly affected by disturbance associated with cable-laying activities up to 1km away, with the consequent potential for an adverse effect on the integrity of the site. The SPAs/Ramsar sites through which the cables run or that are within 1km of a cable route or landfall are:

- Crouch & Roach Estuary SPA and Ramsar site;
- Dengie SPA and Ramsar site;
- Foulness SPA and Ramsar site;
- Humber Estuary SPA and Ramsar site;
- Liverpool Bay / Bae Lerpwl pSPA;
- Minsmere-Walberswick SPA and Ramsar site;
- Morecambe Bay SPA and Ramsar site;
- Outer Thames Estuary pSPA;

- The Dee Estuary SPA and Ramsar site;
- Traeth Lafan/ Lavan Sands, Conway Bay SPA; and
- Ynys Seiriol / Puffin Island SPA.

In addition to these sites, there is the potential for other SPAs/Ramsar sites to be affected as a result of disturbance to breeding species that, although not breeding on sites located within 1km of the cable routes, could forage in areas that would be affected by disturbance associated with cabling. Terns are the species that are most likely to be affected in this way (other species such as gulls have a more catholic diet and can utilise a wider range of habitat types). Using the foraging radii identified in Langstone (2009)<sup>84</sup> (namely 5km for little tern and 30km for other species), the sites that support breeding terns that could be affected are:

- Alde-Ore Estuary SPA and Ramsar site;
- Breydon Water SPA and Ramsar site;
- *Duddon Estuary SPA and Ramsar;*
- Forth Islands SPA;
- Firth of Forth SPA and Ramsar site;
- Great Yarmouth North Denes SPA;
- *Medway Estuary & Marshes SPA and Ramsar;*
- *Northumbria Coast SPA and Ramsar;*
- *Poole Harbour SPA and Ramsar;*
- Ribble & Alt Estuaries SPA and Ramsar site; and
- Ynys Feurig, Cemlyn Bay and The Skerries SPA.

Of these sites, the four that are italicised are over 20km from the cable route. In view of this separation distance (and the energetic implications of foraging at this range), it is unlikely that there would be significant effects on the tern species that are features of these sites and hence these sites have been screened out of the need for further assessment in relation to disturbance effects.

The results of the assessment are set out in Table 6.3. In undertaking this assessment, use has been made of BTO Wetland Bird Survey (WeBS) data (peak and mean counts from WeBS count sectors including core counts, primarily undertaken at high tide, for the five most recent years of available data, and Low Tide Counts for the most recent winter). The location of colonies of seabirds within SPA/Ramsar sites has been determined through the use of Seabird 2000 data<sup>85</sup> that are available on the MAGIC website.

<sup>84</sup> Langston, R. (2009) Round 3 Offshore Windfarm Developments and Birds at Sea (draft, April 2009)

<sup>85</sup> Seabird 2000 was a national census of all seabird colonies in Britain and Ireland undertaken during 1998-2000.

It should be noted that all of the disturbance effects associated with cable laying are temporary, construction effects. Information about when this construction will take place is not available at the Plan level, with the consequence that it is not possible to undertake an assessment of these effects in combination with the effects of other plans or projects. Hence, as with the cable vessel transit movements described above, it is necessary to rely upon project level AA of in-combination effects.

### **Effects Caused by Loss/Change of Habitat or Change in Prey Availability**

Loss of habitat could occur as a result of the presence of the cable on or under the surface of intertidal or subtidal areas. On the surface, an area of existing habitat (which will be long and very narrow) would be covered by the cable. However, in soft sediments this cable, when unarmoured, will rapidly become submerged within the sediment and the former communities will re-establish. Clearly this will not happen on hard substrates, although in these areas, some benthic biota will establish on the cable itself; this is likely to include at least some of the mollusc species that are important prey for some birds. In view of this recolonisation and given the small area of the seabed that will be affected, there is no indication that cables that are laid on soft or hard sediment without additional armouring will have a sufficient effect on prey availability for birds for there to be any likelihood of an adverse effect on the conservation status of any species.

Across intertidal areas with soft sediments, cables will generally be laid under the surface. This will involve a greater width of sediment being disturbed as a result of trenching work. However, once the cable has been laid and the sediments have been backfilled into the trench, the intertidal biota is likely to re-establish itself. This process will generally be quicker in mobile substrates (e.g. sand) than in more stable sediments, given that intertidal species associated with mobile sediment are well adapted to this changes in sediment patterns. Given the narrow corridor of habitat that will be affected by cable works and that changes in prey availability are likely to be temporary, birds are unlikely to be affected to the extent that there could be adverse effect on the conservation status of any species.

The same conclusion cannot, however, be reached when the cable is armoured, which is usually carried out using stone placed over the cable along its route or by laying concrete mattresses over the cable. This will produce a change on seabed habitat over a slightly broader corridor and, if the armouring protrudes above the normal seabed level there is the potential for the armouring to cause hydrodynamic changes which may lead to erosion of nearby habitats. These potential effects will therefore require further assessment, although this can only be done at the project level, when the need for and nature of armouring will be determined. Consequently, it is necessary for the Plan-level AA to rely upon project level HRA work in relation to the potential effects on birds resulting from changes in the abundance of their prey caused by the presence of armoured cable on the seabed. Reflecting the approach set out in section 1.3, it is concluded that there will be no adverse effects on the integrity of SPAs and Ramsar sites as a result of these effects, as it will be possible to avoid adverse effects by implementation of the Plan-level mitigation at project level.

A further pathway through which birds could be affected by cable laying relates to the effect on prey availability as a result of increased turbidity caused by sediment mobilisation. This could involve prey species such as fish moving away from turbid water or turbidity making it more difficult for birds to locate their prey.

The sites that have been assessed for these effects are those within which cable laying is proposed and other sites that are located within one tidal excursion of the proposed cable route (see section 4.3.1 in the screening report); also assessed are sites, which are not in the latter two categories, with breeding terns that could be foraging in areas where the availability of their prey could be affected by changes in turbidity. In undertaking this assessment of the effects of sediment mobilisation on these sites, use has been made of WeBS data, as well as autecological information. The results of the assessment are set out in Table 6.3.

These results highlight that there is a possibility of in-combination effects but that these need to be assessed at the zone or project level. As with disturbance effects, this is because the effects that can be assessed at the Plan level are temporary, construction effects. Information about when this construction will take place is not available at the Plan level, with the consequence that it is not possible to undertake an assessment of these effects in combination with the effects of other plans or projects. Hence, as with the effects associated with cable armouring described above, it is necessary to rely upon project level AA of these effects.

### 6.3 Avoidance and Mitigation Measures at Plan Level

A number of general environmental measures pertinent to reducing the effects of Round 3 Plan activities have already been incorporated within the Round 3 Plan. It has been assumed in the Plan-level HRA that these measures will be employed, where, following consultation with regulators and statutory consultees, it has been concluded that a likely significant effect would arise in their absence, and on this basis it has been possible to exclude the possibility of a LSE and adverse effect on integrity of some European/Ramsar sites. The relevant general environmental measures which have already been incorporated into the Plan for birds are:

- survey plans to be designed to avoid excessive habitat/species disturbance to the satisfaction of statutory consultees;
- micro-siting of turbines to avoid sensitive habitats/species or areas of sediment contamination where sediment re-mobilisation could result in toxic effects;
- if required by statutory consultees, use methods to reduce piling noise to limit effects on fish upon which birds feed;
- micro-siting of cables to avoid particularly sensitive coastal/intertidal/subtidal habitats, areas particularly important for bird interest features, and areas of known contamination where sediment re-mobilisation could result in toxic effects;
- timing of cable installation activities to avoid sensitive life-cycle stages (e.g. bird breeding/overwintering periods), where there is evidence that this would mitigate adverse effects on sensitive species;
- intertidal cabling works undertaken at low tide (or the most appropriate state of the tide) to reduce the level of resuspension and transport of sediments;
- careful planning of terrestrial site access to avoid sensitive habitats on the upper shore and employment of appropriate mitigation measures to reduce effects on these habitats (e.g. avoiding any habitats that support breeding birds);

- 
- use of appropriate installation techniques to avoid adverse impacts on intertidal / coastal habitat features;
  - where cable trenching in the intertidal is unavoidable, backfilling of trenches to reduce the potential for sediment remobilisation and facilitate recovery of benthic communities;
  - use of cable-laying techniques most appropriate to the nature of the intertidal / subtidal substrate to avoid excessive sediment mobilisation;
  - cable protection in the intertidal/subtidal area (e.g. burial, scour protection, pinning over bedrock) to reduce excessive scour; and
  - where necessary to mitigate excessive sediment disturbance, intertidal cable removal undertaken at low tide (or at the most appropriate state of the tide) to reduce the level of resuspension and transport of sediments.

Through the process of undertaking the Plan-level AA, the following avoidance and mitigation measures have been identified in relation to turbine construction, presence, operation or decommissioning, and the effects of cables on sites listed in Table 6.3 for which it concluded that there would be an adverse effect on integrity without mitigation. The implementation of measures to achieve these objectives will enable projects to be undertaken in such a way that adverse effects on integrity can be avoided.

*The Round 3 Plan must be undertaken in such a way that cable laying, presence or decommissioning will avoid affecting overwintering and passage birds that are interest features of European/Ramsar sites to the extent that there could be an adverse effect on their conservation status or on site integrity.*

*Furthermore, the Round 3 Plan must be undertaken in such a way that cable laying, presence or decommissioning will avoid affecting breeding birds that are interest features of European/Ramsar sites to the extent that there could be an adverse effect on their conservation status or on site integrity.*

*Furthermore the Round 3 Plan must be undertaken in such a way as to ensure that turbine construction, presence, operation or decommissioning will have no adverse effect on populations of migrating or foraging birds that are interest features of European/Ramsar sites to the extent that there would be an adverse effect on their conservation status or on site integrity*

When undertaking project-level HRA work, zone developers should address these Plan-level avoidance and mitigation measures through the implementation of best practice or other demonstrably effective mitigation measures. The measures that are chosen may vary between projects dependent upon the detail of the project and up-to-date bird data, and be informed by consultation with regulators and relevant consultees. Examples of possible mitigation measures include:

- undertake cabling work during the summer months (June - August) which as well as avoiding the winter period is when the number of passage birds are generally low;
- undertake cabling works outside the breeding season (August – early April) where breeding species are likely to be significantly affected by cable works;

- where adverse effects on the conservation status of interest features cannot be avoided by careful timing of the works, it may be necessary to re-route the cable;
- modifying the location of windfarms within zones;
- use of different turbine bases;
- use of minimum lighting consistent with health and safety, and navigation requirements; and
- modifying routes taken into the zones by vessels involved in turbine installation.

## **6.4 Effects on sites**

For sites that could be significantly affected by cable laying (other than in relation to cable armouring, vessel transit from the port of origin and in-combination effects - see Section 6.2.3), Table 6.3 sets out the effects on European/Ramsar sites following the adoption of the Plan-level avoidance and mitigation measures set out in Section 6.3. For all of these sites, a conclusion is reached that the Round 3 Plan will have no adverse effects on the sites' integrity.

For effects, alone and in-combination, relating to turbine construction, operation, presence and decommissioning, as well as cable armouring and vessel transit from the port of origin, the Plan-level AA relies upon HRA at the project-level, which will be able to reach a conclusion that there will no adverse effects on the integrity of the sites that could be affected by these activities.

Table 6.3 Assessment of Potential Cable Effects<sup>86</sup>

| Site name and designation            | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                   | Sensitivity                                 | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Adverse effect without mitigation?                       | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Alde-Ore Estuary SPA and Ramsar site | <u>Avocet</u> (B/W), <u>lesser black-backed gull</u> (B), little tern (B), marsh harrier (B), <u>redshank</u> (W), ruff (W), Sandwich tern (B), waterfowl assemblage, breeding seabird assemblage - <i>supports a notable assemblage of breeding and wintering wetland birds</i> | Disturbance from cable installation/removal | The nearest cable landfall point is 6.7km from the boundary of the SPA/Ramsar site, which is the closest that the cable comes to this site. Given this separation distance, the only interest features that need to be assessed are Sandwich tern and the breeding seabird assemblage (see section 6.3.2). Sizewell outfall is located close to the landfall point and is an important foraging area for terns. On the basis of the foraging radii in Langston (2009), Sandwich tern from the Alde-Ore Estuary SPA/Ramsar site could therefore forage in the vicinity of the cable landfall and also elsewhere along the cable route. There is therefore the potential for disturbance to cause adverse effects on the conservation status of this interest feature and also the breeding seabird assemblage. | Yes - Sandwich terns and the breeding seabird assemblage | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

<sup>86</sup> For sites that are both SPAs and Ramsar sites, species/assemblages that are interest features under both designations are underlined; species/assemblages that are only features of the Ramsar site are italicised; normal text is used for species/assemblages that are solely SPA features.

<sup>87</sup> The list of features includes those identified through the SPA review (Stroud, 2001) and those noted on Ramsar citations as “*Species/populations identified subsequent to designation for possible future consideration under criterion 6.*” It should be noted that those species on Ramsar citations that are listed for potential inclusion only should not be included in project level HRAs if the data available determines criterion 6 is not met. The period for which the species’ population appears as a cited interest of the SPA/Ramsar site is indicated by (W) winter, (P) passage and (B) breeding season - italics and underlining are used as per the previous footnote.

| Site name and designation     | Species (period) <sup>87</sup>                        | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                          | Adverse effect without mitigation? | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|-------------------------------|-------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
|                               |                                                       | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for Sandwich tern.                                                                          | No                                 | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
| Benacre to Easton Barents SPA | Bittern (B/W), little tern (B) and marsh harrier (B). | Disturbance from cable installation/removal        | No assessment required as the nearest cable route is over 5km offshore and the nearest landfall point is 14km from the boundary of the SPA (hence there is therefore no likelihood of a significant disturbance effect).                                                                                                                                                                                                            | No                                 | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                               |                                                       | Habitat loss/change or change in prey availability | There will be no effects on bittern habitat, which is inland of the beach. Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for little tern. | No                                 | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation         | Species (period) <sup>87</sup>                                                                                                                                                                                                                                    | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Adverse effect without mitigation? | Adverse effect with mitigation? | Possible sources of in-combination effects?                 | Site Conclusion                                                        |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------|
| Breydon Water SPA and Ramsar site | Avocet (W), <u>Bewick's swan (W)</u> , common tern (B), <u>golden plover (W)</u> , <u>lapwing (W)</u> , ruff (P) and <u>waterfowl assemblage</u> - plus <i>black-tailed godwit (W)</i> , <i>wigeon (W)</i> , <i>shoveler (W)</i> and <i>pink-footed goose (W)</i> | Disturbance from cable installation/removal        | The nearest cable landfall point is 8.1km from the boundary of the SPA/Ramsar site, but elsewhere along its length the cable approaches to within 5.1km of this site. Given this separation distance, the only interest feature that needs to be assessed is common tern (see section 6.3.2). On the basis of the foraging radii in Langston (2009), common tern from the site could forage in the vicinity of the cable landfall and also elsewhere along the cable route. There is therefore the potential for disturbance to cause adverse effects on the conservation status of this interest feature. | Yes - common tern                  | No                              | No in-combination effects identified                        | No adverse effect on the integrity of the site as a result of the Plan |
|                                   |                                                                                                                                                                                                                                                                   | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for common tern.                                                                                                                                                                                                                                                   | No                                 | n/a                             | Round 1 and 2 windfarms and possible extensions, aggregates | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation                  | Species (period) <sup>87</sup>                                                        | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Adverse effect without mitigation?         | Adverse effect with mitigation? | Possible sources of in-combination effects?     | Site Conclusion                                                        |
|--------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------|-------------------------------------------------|------------------------------------------------------------------------|
| Crouch & Roach Estuary SPA and Ramsar site | <u>Brent goose (W)</u> ,<br><u>hen harrier (W)</u> and<br><u>waterfowl assemblage</u> | Disturbance from cable installation/ removal       | Most of the cable route is along the river channel in between the intertidal areas that are part of the SPA/Ramsar site; closer to the landfall point, the cable and the landfall point itself are located within the SPA/Ramsar site. WeBS data indicate that substantial numbers of brent goose and the waterfowl assemblage use the intertidal habitat within 1km of the cable route on a regular basis during the winter. There is therefore the possibility of adverse effects on the conservation status of brent goose and the waterfowl assemblage as a result of cable installation/ removal. Wintering hen harriers have large foraging ranges and a localised area of temporary disturbance within these areas would not affect the conservation status of this species.                                     | Yes – brent goose and waterfowl assemblage | No                              | No in-combination effects identified            | No adverse effect on the integrity of the site as a result of the Plan |
|                                            |                                                                                       | Habitat loss/change or change in prey availability | Most of the length of the cable along the River Crouch will be laid in the central channel which is not part of the SPA/Ramsar site. This will have no implications for the intertidal habitats within the SPA/Ramsar site that are used by brent geese and the waterfowl assemblage. Where the cable crosses the designated intertidal habitat there is the potential for algae and other plant material upon which brent geese and some waterfowl feed to be temporarily covered by sediment that is mobilised by cable laying, with the potential for adverse effects on conservation status. Estuarine invertebrates, which are preyed upon by numerous waterfowl species, are adapted to living in an environment where there can be a high rate of sediment deposition and are therefore unlikely to be affected. | Yes - brent goose and waterfowl assemblage | No                              | Round 1 and 2 windfarms and possible extensions | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation          | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                                                                                                              | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Adverse effect without mitigation?                                               | Adverse effect with mitigation? | Possible sources of in-combination effects?     | Site Conclusion                                                        |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------|------------------------------------------------------------------------|
| Dengie SPA and Ramsar site         | <u>Bar-tailed godwit (W)</u> , <u>brent goose (W)</u> , <u>grey plover (W)</u> , <u>hen harrier (W)</u> , <u>knot (W)</u> and <u>waterfowl assemblage</u>                                                                                                                                                                                                                                                   | Disturbance from cable installation/removal        | The cable route is along the river channel in between an intertidal area that is part of the SPA/Ramsar site and Foulness SPA/Ramsar site. Vessel activity along this channel could disturb birds using the nearby intertidal areas. There is therefore the possibility of adverse effects on the conservation status of the sites' interest features except for wintering hen harrier. Individuals of this species have large foraging ranges and a localised area of temporary disturbance within these areas would not affect the conservation status of this species.                                                                                                                                                                       | Yes - bar-tailed godwit, brent goose, grey plover, knot and waterfowl assemblage | No                              | No in-combination effects identified            | No adverse effect on the integrity of the site as a result of the Plan |
|                                    |                                                                                                                                                                                                                                                                                                                                                                                                             | Habitat loss/change or change in prey availability | Laying a short length of cable in the central channel of the Crouch, which is not part of the SPA/Ramsar site, will have no implications for the intertidal habitats within the SPA/Ramsar site that are used by the sites' interest features. Some waterfowl species are likely to roost or rest in the central channel, but there are unlikely to be any changes to the habitat that could affect this activity.                                                                                                                                                                                                                                                                                                                              | No                                                                               | n/a                             | Round 1 and 2 windfarms and possible extensions | No adverse effect on the integrity of the site as a result of the Plan |
| Firth of Forth SPA and Ramsar site | <u>Bar-tailed godwit (W)</u> , <u>golden plover (W)</u> , <u>knot (W)</u> , <u>oystercatcher (W)</u> , <u>pink-footed goose (P/W)</u> , <u>redshank (P/W)</u> , <u>red-throated diver (W)</u> , <u>Sandwich tern (P)</u> , <u>shelduck (P/W)</u> , <u>slavonian grebe (W)</u> , <u>turnstone (P/W)</u> and <u>waterfowl assemblage - plus common tern (B)</u> , <u>goldeneye (W)</u> , <u>goosander (P)</u> | Disturbance from cable installation/removal        | The nearest cable landfall point is 7.8km from the boundary of the SPA/Ramsar site, which is the closest that the cable comes to the site. Given this separation distance, the only interest feature that needs to be assessed (see section 6.2.3) is common tern (during Seabird 2000, the nearest colony of breeding common tern to the landfall point was 16km away at Aberlady NT609849, where 55 nests were counted in 1997). On the basis of the foraging radii in Langston (2009), common tern from the site could forage in the vicinity of the cable landfall and also elsewhere along the cable route. There is therefore the potential for disturbance to cause adverse effects on the conservation status of this interest feature. | Yes - common tern                                                                | No                              | No in-combination effects identified            | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation  | Species (period) <sup>87</sup>                                                                                                                                                                                                        | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Adverse effect without mitigation?                                        | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
|                            |                                                                                                                                                                                                                                       | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for common tern.                                                                                                                                                                                              | No                                                                        | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
| Firth of Forth Islands SPA | Arctic tern (B), black-legged kittiwake (B), common tern (B), cormorant (B), gannet (B), guillemot (B), lesser black-backed gull (B), puffin (B), razorbill (B), roseate tern (B), Sandwich tern (B), shag (B) and seabird assemblage | Disturbance from cable installation/removal        | The closest that the cable comes to this site is at the landfall point, which is located 18.5km from the boundary of the SPA. The only interest features that need to be assessed are the three tern species and the seabird assemblage (see section 6.2.3). Given the proximity of the cable route to the site, there is the potential for SPA important numbers of terns to occur in the vicinity of the cable landfall or elsewhere along the cable route, which could result in adverse effects on the conservation status of one or more species | Yes – Sandwich tern, common tern, roseate tern and the seabird assemblage | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                            |                                                                                                                                                                                                                                       | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for the tern species that are interest features of this site.                                                                                                                                                 | No                                                                        | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation    | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                 | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Adverse effect without mitigation?                                                                                                                                                       | Adverse effect with mitigation? | Possible sources of in-combination effects?     | Site Conclusion                                                        |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------|------------------------------------------------------------------------|
| Foulness SPA and Ramsar site | Avocet (B/W), <u>bar-tailed godwit (W)</u> , <u>brent goose (W)</u> , common tern (B), golden plover (W), <u>grey plover (W)</u> , hen harrier (W), <u>knot (W)</u> , little tern (B), <u>oystercatcher (W)</u> , <u>redshank (P/W)</u> , ringed plover (B), Sandwich tern (B) and <u>waterfowl assemblage</u> | Disturbance from cable installation/removal        | The cable route is along the river channel in between an intertidal area that forms part of the SPA/Ramsar site and Dengie SPA and Ramsar site. Vessel activity along this channel could disturb wintering and breeding birds using the nearby intertidal areas, and terns foraging offshore. There is therefore the possibility of adverse effects on the conservation status of the sites' interest features except for wintering hen harrier. Individuals of this species have large foraging ranges and a localised area of temporary disturbance within these areas would not affect the conservation status of this species.                                                                                                                                                                                                                 | Yes - avocet, bar-tailed godwit, brent goose, common tern, golden plover, grey plover, knot, little tern, oystercatcher, redshank, ringed plover, Sandwich tern and waterfowl assemblage | No                              | No in-combination effects identified            | No adverse effect on the integrity of the site as a result of the Plan |
|                              |                                                                                                                                                                                                                                                                                                                | Habitat loss/change or change in prey availability | Laying a short length of cable in the central channel of the Crouch, which is not part of the SPA/Ramsar site, will have no implications for the intertidal habitats within the SPA/Ramsar site that are used by the sites' interest features. Some waterfowl species are likely to roost or rest in the central channel, but there are unlikely to be any changes to the habitat that could affect this activity. Temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for breeding terns. The breeding sites of the terns, ringed plover and avocet will be unaffected. | No                                                                                                                                                                                       | n/a                             | Round 1 and 2 windfarms and possible extensions |                                                                        |

| Site name and designation      | Species (period) <sup>87</sup> | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                               | Adverse effect without mitigation? | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|--------------------------------|--------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Great Yarmouth North Denes SPA | Little tern (B)                | Disturbance from cable installation/removal        | The nearest cable landfall point is located 9.5km from the boundary of the SPA but the cable alignment passes as close as 3.8km to the site, which is within the foraging distance for this species defined by Langston (2009). There is therefore the potential for disturbance to cause adverse effects to the conservation status of little tern.     | Yes - little tern                  | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                                |                                | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for little tern. | No                                 | n/a                             | Round 1 windfarm and possible extension     | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation          | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                                   | Sensitivity                                 | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Adverse effect without mitigation?                                                                                                              | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Humber Estuary SPA and Ramsar site | Avocet (B/W), <u>bar-tailed godwit (W)</u> , bittern (B/W), <u>black-tailed godwit (P/W)</u> , <u>dunlin (P/W)</u> , <u>golden plover (P/W)</u> , hen harrier (W), <u>knot (P/W)</u> , little tern (B), marsh harrier (B), <u>redshank (P/W)</u> , ruff (P), sanderling (P), <u>shelduck (W)</u> and <u>waterfowl assemblage</u> | Disturbance from cable installation/removal | <p>Given the amount of shipping activity in the Estuary together with the Estuary's size (between 3km and 12 km wide seaward of Hull and generally at least 2km wide further inland), it is unlikely that cable-laying vessels would significantly affect populations of the site's interest features other than where they approach the shore at landfall points, where land-based activity could also disturb these species. WeBS data for the intertidal habitat within 1km of the cable landfall points indicate that this area is used by substantial numbers of shelduck, bar-tailed godwit, black tailed godwit , dunlin, knot, redshank, sanderling and golden plover, together with the waterfowl assemblage, during winter and (where relevant) on passage. There is therefore the possibility of adverse effects on the conservation status of these interest features.</p> <p>Although WeBS data provide no evidence to indicate that the inshore waters within 1km of cable landfall points 3, 7 and 9 are used by large numbers of foraging little tern on a regular basis, this provides insufficient evidence to be able to conclude that the conservation status of little tern will not be adversely affected by cable laying.</p> <p>There is no suitable breeding habitat for avocet, bittern or marsh harrier within 1km of the cable landfall points in the Estuary. They are therefore unlikely to be affected by landfall construction and, given their habitat requirements, will not be affected by cable laying further out into the Estuary. Wintering hen harriers have large foraging ranges and a localised area of temporary disturbance within these areas would not affect the conservation status of this species</p> | Yes – bar-tailed godwit, black-tailed godwit, dunlin, golden plover, knot, little tern, redshank, sanderling, shelduck and waterfowl assemblage | No                              | Port and harbour activities                 | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation       | Species (period) <sup>87</sup>               | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Adverse effect without mitigation?         | Adverse effect with mitigation? | Possible sources of in-combination effects?                                      | Site Conclusion                                                        |
|---------------------------------|----------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                 |                                              | Habitat loss/change or change in prey availability | Effects on habitat due to disturbance of sediment in the Humber Estuary to lay cables are unlikely to be detectable, bearing in mind that in the lower estuary dredging is practiced regularly, with dredging returned to the estuary off Grimsby, and that inland of the Humber Bridge the estuary naturally experiences some of the highest levels of turbidity of any UK estuary (up to 20g/l), due to the mobile nature of the sediment and strong tidal streams.                                                                                                                                                                                                                                                                                              | No                                         | n/a                             | Round 2 windfarm and possible extension, aggregates, port and harbour activities | No adverse effect on the integrity of the site as a result of the Plan |
| Liverpool Bay / Bae Lerpwl pSPA | Common scoter (W) and red-throated diver (W) | Disturbance from cable installation/removal        | The cable route passes through the pSPA. There is therefore the potential for common scoters and red-throated divers from the SPA populations to be disturbed by the cable-laying vessel (or by cable removal), with potential adverse effects on their conservation status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes - common scoter and red-throated diver | No                              | Round 2 windfarm and possible extension, aggregates, oil and gas                 | No adverse effect on the integrity of the site as a result of the Plan |
|                                 |                                              | Habitat loss/change or change in prey availability | An offshore, temporary increase in turbidity is likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out) and localised, is not likely to affect the overall prey availability for red-throated divers. Sediment may settle on molluscs upon which common scoter feed, but the quantities of sediment are likely to be sufficiently small that there will be no effects on the molluscs. There may, however, be temporary effects on detectability, which may reduce scoters' foraging success, with the potential for adverse effects on the species' conservation status within the SPA. | Yes - common scoter                        | No                              | Round 2 windfarm and possible extension, aggregates, oil and gas                 | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation                | Species (period) <sup>87</sup>                                                                                                                                                                                                          | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Adverse effect without mitigation? | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Minsmere-Walberswick SPA and Ramsar site | Avocet (B/W), bittern (B/W), gadwall (B/W), hen harrier (W), little tern (B), marsh harrier (B), nightjar (B), shoveler (B/W), teal (B), white-fronted goose (W), woodlark (B) and an assemblage of rare breeding wetland bird species. | Disturbance from cable installation/removal        | <p>The nearest cable landfall point is located 950m from the SPA/Ramsar site. There is very little if any suitable breeding habitat for avocet, bittern, marsh harrier, nightjar, woodlark, gadwall, shoveler, teal and rare breeding wetland birds within 1km of the landfall point. Habitat within 1km of the landfall point provides very limited feeding opportunities for wintering avocet, bittern, gadwall and shoveler. There is some suitable foraging habitat for white-fronted goose but this is partly screened from the cable landing point by dunes, scrub and the built area of Sizewell power stations. In view of this screening and the limited foraging habitat for other wintering species, it is unlikely that there will be an adverse effect on the integrity of these species.</p> <p>Wintering hen harriers have large foraging ranges and a localised area of temporary disturbance within these areas would not affect the conservation status of this species</p> <p>Sizewell outfall (adjacent to the landfall point) is a known foraging area for little terns, and is likely to be used by SPA important numbers of this species on a regular basis during the breeding season (April to August inclusive). There is therefore the potential for adverse effects on the conservation status of this interest feature.</p> | Yes – little tern                  | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                                          |                                                                                                                                                                                                                                         | Habitat loss/change or change in prey availability | An offshore, temporary increase in turbidity is likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for little tern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | No                                 | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation         | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Sensitivity                                 | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Adverse effect without mitigation?                                                                                                                                                                           | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Morecambe Bay SPA and Ramsar site | <u>Bar-tailed godwit (W)</u> , <u>curlew (P/W)</u> , <u>dunlin (W)</u> , <u>golden plover (W)</u> , <u>grey plover (P/W)</u> , <u>herring gull (B)</u> , <u>knot (W)</u> , <u>lesser black-backed gull (P/B)</u> , little tern (B), <u>oystercatcher (P/W)</u> , <u>pink-footed goose (W)</u> , <u>pintail (P/W)</u> , <u>redshank (P/W)</u> , <u>ringed plover (P)</u> , <u>sanderling (P)</u> , <u>Sandwich tern (B)</u> , <u>shelduck (P/W)</u> , <u>turnstone (P/W)</u> , <u>waterfowl assemblage</u> and breeding seabird assemblage - <i>plus cormorant (P)</i> , <i>eider (P)</i> , <i>goldeneye (W)</i> , <i>great crested grebe (W)</i> and <i>lapwing (W)</i> , <i>red-breasted merganser (W)</i> , <i>wigeon (W)</i> and <i>important staging area for wildfowl</i> | Disturbance from cable installation/removal | <p>A short section of the cable route, including the landfall point, is located within the SPA/Ramsar site. WeBS data indicates that substantial numbers of bar-tailed godwit, curlew, dunlin, knot, oystercatcher, redshank, turnstone, pink-footed goose, shelduck, red breasted merganser, wigeon, lapwing and cormorant, together with the assemblage of waterfowl, occur within 1km of the cable landfall point during winter and (where relevant) on passage. There is therefore the possibility of adverse effects on the conservation status of these species.</p> <p>The main breeding site for herring and lesser black-backed gulls within the SPA/Ramsar site is at Walney Island, which is located 22km to the northwest of the cable landfall point. These birds will not therefore be disturbed at the nest and given the localised extent of disturbance along the cable route and the species' extensive foraging ranges (40km was identified in Langston, 2009) there are not likely to be adverse effects on the their conservation status.</p> <p>The nearest breeding colony of little and Sandwich terns within the SPA is located at Hodbarrow Lagoon, 38km north-west of the cable works, well outside the mean foraging range for little tern of 5km (Langston, 2009). However, small numbers of Sandwich tern have been recorded within 1km of the cable landing point and there is insufficient evidence to be able to conclude that the conservation status of this species will not be adversely affected by cable laying.</p> | Yes – bar-tailed godwit, curlew, dunlin, knot, oystercatcher redshank, turnstone, pink-footed goose, Sandwich tern, shelduck, red breasted merganser, wigeon, lapwing and cormorant and waterfowl assemblage | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation | Species (period) <sup>87</sup> | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Adverse effect without mitigation?                                     | Adverse effect with mitigation? | Possible sources of in-combination effects?          | Site Conclusion                                                        |
|---------------------------|--------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------|------------------------------------------------------|------------------------------------------------------------------------|
| Morecambe Bay (cont'd)    |                                | Habitat loss/change or change in prey availability | Where the cable crosses the designated intertidal habitat there is the potential for algae and other plant material upon which some waterfowl feed to be temporarily covered by sediment that is mobilised by cable laying, with the potential for adverse effects on the conservation status of the affected species. Estuarine invertebrates, which are preyed upon by numerous waterfowl species and little tern, are adapted to living in an environment where there can be a high rate of sediment deposition and are therefore unlikely to be affected. In turbid conditions, especially within 200m of the cable route (see section 5.1.3).fish, upon which species such as cormorant and red-breasted merganser feed, may swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for birds. | Yes – notably shelduck and pintail, but also potentially other species | No                              | Oil and gas                                          | No adverse effect on the integrity of the site as a result of the Plan |
| Outer Thames Estuary pSPA | Red-throated diver (W)         | Disturbance from cable installation/removal        | The cable route passes through the pSPA. There is therefore the potential for red-throated divers from the SPA population to be disturbed by the cable-laying vessel (or by cable removal), with potential adverse effects on the species' conservation status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes – red-throated diver                                               | No                              | Round 1 windfarms and possible extension, aggregates | No adverse effect on the integrity of the site as a result of the Plan |
|                           |                                | Habitat loss/change or change in prey availability | An offshore, temporary increase in turbidity is likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out) and localised, is not likely to affect the overall prey availability for red-throated divers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | No                                                                     | No                              | Round 1 windfarms and possible extension, aggregates | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation                  | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sensitivity                                 | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Adverse effect without mitigation?             | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Ribble & Alt Estuaries SPA and Ramsar site | <u>Bar-tailed godwit</u> (W), <u>Bewick's swan</u> (W), black-headed gull (B), <u>black-tailed godwit</u> (P/W), common scoter (W), common tern (B), cormorant (W), curlew (W), <u>dunlin</u> (P/W), golden plover (W), <u>grey plover</u> (P/W), <u>knot</u> (P/W), lapwing (W), <u>lesser black-backed gull</u> (B), <u>oystercatcher</u> (W), <u>pink-footed goose</u> (W), <u>pintail</u> (W), <u>redshank</u> (P/W), <u>ringed plover</u> (P), ruff (B), <u>sanderling</u> (P/W), scaup (W), <u>shelduck</u> (W), teal (W), whimbrel (P), <u>whooper swan</u> (W), <u>wigeon</u> (W), <u>waterfowl assemblage</u> and breeding seabird assemblage. | Disturbance from cable installation/removal | The nearest cable landfall point is located 12.7km from the boundary of the Ribble and Alt Estuaries SPA within the Morecambe Bay SPA. Given this separation distance, the only interest features that need to be assessed are common tern and the breeding seabird assemblage (see section 6.3.2). On the basis of the foraging radii in Langston (2009), common tern from the site could forage in the vicinity of the cable landfall and also elsewhere along the cable route. There is therefore the potential for disturbance to cause adverse effects on the conservation status of this interest feature. There could also be adverse effects on the site's seabird breeding assemblage. | Yes - common tern, seabird breeding assemblage | No                              | Oil and gas                                 | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation           | Species (period) <sup>87</sup>                                                                                                                                                                                                                                                                                                                                                          | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Adverse effect without mitigation?                                                                                                                              | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
|                                     |                                                                                                                                                                                                                                                                                                                                                                                         | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for common tern.                                                                                                                                                                                                                                                                           | No                                                                                                                                                              | n/a                             | Oil and gas                                 | No adverse effect on the integrity of the site as a result of the Plan |
| The Dee Estuary SPA and Ramsar site | <u>Bar-tailed godwit (W)</u> , <u>black-tailed godwit (W)</u> , common tern (B), <u>curlew (P/W)</u> , <u>dunlin (W)</u> , <u>grey plover (W)</u> , <u>knot (W)</u> , little tern (B), <u>oystercatcher (P/W)</u> , <u>pintail (W)</u> , <u>redshank (P/W)</u> , Sandwich tern (P), <u>shelduck (P/W)</u> , <u>teal (W)</u> and <u>waterfowl assemblage</u> - plus <u>turnstone (W)</u> | Disturbance from cable installation/removal        | Laying the cable along the Estuary could disturb overwintering and passage birds, and foraging terns, particularly where the cable alignment crosses intertidal habitat close to the landfall point. WeBS data indicates that SPA/Ramsar site important numbers of black-tailed godwit, curlew, dunlin, knot, oystercatcher, pintail, redshank, shelduck, teal and turnstone together with the assemblage of waterfowl, occur within 1km of the cable landfall point during winter and (where relevant) on passage. These disturbance effects could result in adverse effects on the conservation status of some of these species. | Yes – black-tailed godwit, curlew, dunlin, knot, oystercatcher, pintail, redshank, shelduck, teal, turnstone, common tern, little tern and waterfowl assemblage | No                              | Oil and gas, port and harbour activities    | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation                 | Species (period) <sup>87</sup>                             | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Adverse effect without mitigation?                    | Adverse effect with mitigation? | Possible sources of in-combination effects?                                                           | Site Conclusion                                                        |
|-------------------------------------------|------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| The Dee Estuary (cont'd)                  |                                                            | Habitat loss/change or change in prey availability | There is the potential for algae and other plant material upon which some waterfowl feed to be temporarily covered by sediment that is mobilised by cable laying, with the potential for adverse effects on the conservation status of the affected species. Estuarine invertebrates, which are preyed upon by numerous waterfowl species, are adapted to living in an environment where there can be a high rate of sediment deposition and are therefore unlikely to be affected. In turbid conditions, especially within 200m of the cable route (see section 5.1.3). fish, upon which terns feed, may swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for birds. | Yes –pintail, shelduck, teal and waterfowl assemblage | No                              | Oil and gas, port and harbour activities, Round 1 and 2 windfarms and possible extensions, aggregates | No adverse effect on the integrity of the site as a result of the Plan |
| Traeth Lafan/ Lavan Sands, Conway Bay SPA | Curlew (W), great crested grebe (P) and oystercatcher (W). | Disturbance from cable installation/ removal       | The nearest cable landfall point is located 500m to the south-west of the SPA on the Bangor Flats. The cable passes alongside but not through the SPA. WeBS data indicates that substantial numbers of all of the bird species that are interest features of the SPA occur on a regular basis within 1km of landfall. Disturbance of these species could result in adverse effects on their conservation status                                                                                                                                                                                                                                                                                                                                                                        | Yes – curlew, great crested grebe and oystercatcher   | No                              | No in-combination effects identified                                                                  | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation                    | Species (period) <sup>87</sup>                                            | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Adverse effect without mitigation?                             | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|----------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
|                                              |                                                                           | Habitat loss/change or change in prey availability | Increased sediment mobilisation could result in an increased rate of deposition within the SPA. However estuarine invertebrates, which are preyed upon by curlew and oystercatcher, are adapted to living in an environment where there can be a high rate of sediment deposition and are therefore unlikely to be affected. An offshore, temporary increase in turbidity is likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out) and localised, is not likely to affect the overall prey availability for great crested grebe. There is unlikely to be an adverse effect as a result of habitat loss on the conservation status of any of the three species that are interest features of this site. | No                                                             | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
| Ynys Feurig, Cemlyn Bay and The Skerries SPA | Arctic tern (B), common tern (B), roseate tern (B) and Sandwich tern (B). | Disturbance from cable installation/removal        | The nearest cable landfall point is located 2.1km from the boundary of the SPA and therefore well within the regular foraging distance for all of the bird species that are interest features of the SPA; offshore the cable is at no point closer than 2km to the SPA. Given the proximity of the cable route to the site, there is the potential for terns to occur in the vicinity of the cable landfall or elsewhere along the cable route, which could result in adverse effects on the conservation status of one or more species                                                                                                                                                                                                                                                                                                                                            | Yes – Arctic tern, common tern, roseate tern and Sandwich tern | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                                              |                                                                           | Habitat loss/change or change in prey availability | Offshore, temporary increases in turbidity are likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out), is not likely to affect the overall prey availability for the tern species that are interest features of this site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No                                                             | n/a                             | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

| Site name and designation        | Species (period) <sup>87</sup> | Sensitivity                                        | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Adverse effect without mitigation? | Adverse effect with mitigation? | Possible sources of in-combination effects? | Site Conclusion                                                        |
|----------------------------------|--------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|---------------------------------------------|------------------------------------------------------------------------|
| Ynys Seiriol / Puffin Island SPA | Cormorant (B)                  | Disturbance from cable installation/removal        | The nearest cable route is 900m from the closest part of the SPA.                                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes - cormorant                    | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |
|                                  |                                | Habitat loss/change or change in prey availability | An offshore, temporary increase in turbidity is likely, especially within 200m of the cable route (see section 5.1.3). This may cause fish within the affected area to swim into less turbid water but this effect, which will only be temporary (until the sediment settles out) and localised, is not likely to affect the overall prey availability for cormorant. There is therefore unlikely to be an adverse effect on the conservation status of cormorant at this site as a result of habitat loss. | No                                 | No                              | No in-combination effects identified        | No adverse effect on the integrity of the site as a result of the Plan |

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## 7. Conclusions

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### 7.1 Outcomes of the HRA of the Round 3 Plan

#### 7.1.1 Plan-level assessment

This report sets out an assessment of the effects of the Round 3 Plan on European and Ramsar sites, as a result of the Plan both alone and in combination with other plans and projects. Drawing upon the findings of the assessment, it is concluded that the Plan will not have an adverse effect on the integrity of any European or Ramsar sites. It is therefore recommended to The Crown Estate that, as competent authority for the AA, it reflects this report's conclusion when undertaking its AA of the Round 3 Plan.

The conclusion of this report is contingent upon windfarm projects in the nine development zones that form part of the Plan being designed to meet a series of avoidance and mitigation measures, as well as incorporating a series of general environmental measures that have been built into the Round 3 Plan. These general environmental measures are set out in Table 1.1, and the Plan-level avoidance and mitigation measures (as set out in Chapters 2-6) are listed below.

#### **Avoidance and Mitigation Measures Relating to Bat Interest Features**

*The Round 3 Plan must be undertaken in such a way as to ensure that onshore laying of cables and any associated construction works and subsequent operational activity avoid adversely affecting the conservation status of qualifying bat populations, such that there will be no adverse effect on the integrity of any European/Ramsar sites for which these bat populations are a qualifying feature.*

#### **Avoidance and Mitigation Measures Relating to Diadromous Fish Interest Features**

*The Round 3 Plan must be undertaken in such a way as to ensure that cable installation or decommissioning works within an estuary do not impede migration of diadromous fish which are interest features of a European/Ramsar site in that estuary or in a river draining to it to an extent which would have an adverse effect on the conservation status of the interest feature or the integrity of the site.*

*The Round 3 Plan must be undertaken in such a way as to ensure that cable installation or decommissioning works within an estuary do not damage freshwater habitat of diadromous fish which are interest features of a European/Ramsar site in that estuary or in a river draining to it to an extent which would have an adverse effect on the conservation status of the interest feature or the integrity of the site.*

#### **Avoidance and Mitigation Measures Relating to Marine Mammal Interest Features**

*The Round 3 Plan must be undertaken in such a way as to ensure that noise levels produced during the construction and decommissioning of Projects within a zone and between zones does not exceed the level at which there will be an adverse effect on the integrity of any European/Ramsar sites for which cetacean and/or seal populations are a qualifying feature.*

*The Round 3 Plan must be undertaken in such a way as to ensure that any physical damage to haul-out sites or disturbance of seals at haul-out sites does not result in an adverse effect on the integrity of any European/Ramsar sites for which seal populations are a qualifying feature.*

#### **Avoidance and Mitigation Measures Relating to Habitat Interest Features**

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which reef habitats are a qualifying feature as a result of damage, disturbance or toxicity arising from the installation, operation and decommissioning of windfarm projects (including turbines, cables and all ancillary infrastructure).*

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which intertidal mudflat/sandflat habitats are a qualifying feature as a result of erosion and habitat loss arising from the installation and decommissioning of cables associated with windfarm projects.*

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which sandbank habitats are a qualifying feature as a result of erosion or habitat loss arising from the installation, operation and decommissioning of windfarm projects (including turbines, cables and all ancillary infrastructure).*

*The Round 3 Plan must be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which estuary or large shallow inlet/bay habitats are a qualifying feature as a result of erosion and habitat loss arising from the installation and decommissioning of cables associated with windfarm projects.*

*The Plan must therefore be undertaken in such a way as to ensure that there will be no adverse effect on the integrity of any European/Ramsar sites for which sea cave habitats are a qualifying interest feature as a result of the mobilisation and resettlement of contaminated sediments arising from the installation and decommissioning of cables associated with windfarm projects.*

#### **Avoidance and Mitigation Measures Relating to Bird Interest Features**

*The Round 3 Plan must be undertaken in such a way that cable laying, presence or decommissioning will avoid affecting overwintering and passage birds that are interest features of European/Ramsar sites to the extent that there could be an adverse effect on their conservation status or on site integrity.*

*The Round 3 Plan must be undertaken in such a way that cable laying, presence or decommissioning will avoid affecting breeding birds that are interest features of European/Ramsar sites to the extent that there could be an adverse effect on their conservation status or on site integrity.*

*The Round 3 Plan must be undertaken in such a way as to ensure that turbine construction, presence, operation or decommissioning will have no adverse effect on populations of migrating or foraging birds that are interest features of European/Ramsar sites to the extent that there would be an adverse effect on their conservation status or on site integrity*

### 7.1.2 Requirement for Project-level HRA

As detailed in Section 1.3, undertaking HRA at Plan level does not obviate the need for zone developers to undertake project-specific HRA work based on their detailed project proposals. It will be the developer's responsibility to show that the project(s) proposed for each zone, in combination with Round 3 projects in the same or other zones, and other plans and projects, will not result in adverse effects on the integrity of European/Ramsar sites. In order to reach this conclusion it will be necessary for developers to design their wind farm projects in such a way as to address the avoidance and mitigation measures that are set out above.

For some of the larger zones, it may be appropriate for developers to undertake a zone level appraisal of the environmental characteristics and sensitivities of the zone; this appraisal could in part be informed by the conclusions of the Plan-level HRA, and may help to inform the scope of project-level HRAs (including aspects of in-combination assessment). Zone-scale survey work could go some way to providing the detailed level of data which would be required to support HRA at project level.

## 7.2 Summary of HRA Outcomes for Sites

### Key to colour coding of the following tables

Interest feature on which the Round 3 Plan (as defined in the Screening Report) would have no Likely Significant Effect, determined through the screening process.

AA of the effects of the Round 3 Plan at Plan level demonstrates that the Round 3 Plan (as defined in the Screening Report), without the need for additional mitigation, will not result in an adverse effect on the conservation status of this interest feature at this site.

AA of the effects of the Round 3 Plan at Plan level demonstrates that there will be no adverse effect on the integrity of the site supporting this interest feature at this site provided that additional Plan-level avoidance and mitigation measures are met.

AA of the effects of the Round 3 Plan cannot reasonably be assessed at Plan level; the Plan-level HRA is reliant, at least in part, upon project-level HRA, which can reach a conclusion that there will be no adverse effect on the integrity of the site that supports this interest feature.

**Table 7.1 Summary of the HRA for the Round 3 Plan HRA - UK SPAs Assessed at Screening Stage and in AA**

| Site Code | Site Name          | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|--------------------|-----------|--------------------|----------------------------------------------------------|
| UK9009141 | Abberton Reservoir | SPA       |                    |                                                          |
| UK9002561 | Abernethy Forest   | SPA       |                    |                                                          |
| UK9001701 | Achanalt Marshes   | SPA       |                    |                                                          |
| UK9003091 | Ailsa Craig        | SPA       |                    |                                                          |

| Site Code | Site Name                                    | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|----------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9001751 | Aird and Borge, Benbecula                    | SPA       |                    |                                                          |
| UK9009112 | Alde-Ore Estuary                             | SPA       |                    | Z5                                                       |
| UK9020301 | Antrim Hills                                 | SPA       |                    |                                                          |
| UK9003341 | Arran Moors                                  | SPA       |                    |                                                          |
| UK9020281 | Arun Valley                                  | SPA       |                    |                                                          |
| UK9012181 | Ashdown Forest                               | SPA       |                    |                                                          |
| UK9001591 | Assynt Lochs                                 | SPA       |                    |                                                          |
| UK9002381 | Auskerry                                     | SPA       |                    |                                                          |
| UK9011091 | Avon Valley                                  | SPA       |                    |                                                          |
| UK9014091 | Bae Caerfyrddin / Carmarthen Bay             | SPA       |                    |                                                          |
| UK9001631 | Beinn Dearg                                  | SPA       |                    |                                                          |
| UK9020101 | Belfast Lough                                | SPA       |                    |                                                          |
| UK9020290 | Belfast Lough Open Water                     | SPA       |                    |                                                          |
| UK9002551 | Ben Alder                                    | SPA       |                    |                                                          |
| UK9001641 | Ben Wyvis                                    | SPA       |                    |                                                          |
| UK9009291 | Benacre to Easton Bavents                    | SPA       |                    | Z5                                                       |
| UK9009171 | Benfleet and Southend Marshes                | SPA       |                    |                                                          |
| UK9013111 | Berwyn                                       | SPA       |                    |                                                          |
| UK9003221 | Black Cart                                   | SPA       |                    |                                                          |
| UK9009245 | Blackwater Estuary (Mid-Essex Coast Phase 4) | SPA       |                    |                                                          |
| UK9005151 | Bowland Fells                                | SPA       |                    |                                                          |
| UK9009201 | Breckland                                    | SPA       |                    |                                                          |
| UK9009181 | Breydon Water                                | SPA       |                    | Z5                                                       |
| UK9003052 | Bridgend Flats, Islay                        | SPA       |                    |                                                          |
| UK9009253 | Broadland                                    | SPA       |                    |                                                          |
| UK9002491 | Buchan Ness to Collieston Coast              | SPA       |                    |                                                          |
| UK9015011 | Burry Inlet                                  | SPA       |                    |                                                          |
| UK9004011 | Caenlochan                                   | SPA       |                    |                                                          |
| UK9002241 | Cairngorms                                   | SPA       |                    |                                                          |
| UK9001151 | Caithness and Sutherland Peatlands           | SPA       |                    |                                                          |
| UK9001171 | Caithness Lochs                              | SPA       |                    |                                                          |

| Site Code | Site Name                                        | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|--------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9002431 | Calf of Eday                                     | SPA       |                    |                                                          |
| UK9004131 | Cameron Reservoir                                | SPA       |                    |                                                          |
| UK9001431 | Canna and Sanday                                 | SPA       |                    |                                                          |
| UK9001231 | Cape Wrath                                       | SPA       |                    |                                                          |
| UK9020161 | Carlingford Lough                                | SPA       |                    |                                                          |
| UK9003191 | Castle Loch, Lochmaben                           | SPA       |                    |                                                          |
| UK9010091 | Chesil Beach and The Fleet                       | SPA       |                    |                                                          |
| UK9010041 | Chew Valley Lake                                 | SPA       |                    |                                                          |
| UK9011011 | Chichester and Langstone Harbours                | SPA       |                    |                                                          |
| UK9003031 | Coll                                             | SPA       |                    |                                                          |
| UK9003033 | Coll (corncrake)                                 | SPA       |                    |                                                          |
| UK9009243 | Colne Estuary (Mid-Essex Coast Phase 2)          | SPA       |                    |                                                          |
| UK9020291 | Copeland Islands                                 | SPA       |                    |                                                          |
| UK9002151 | Copinsay                                         | SPA       |                    |                                                          |
| UK9006031 | Coquet Island                                    | SPA       |                    |                                                          |
| UK9002161 | Creag Meagaidh                                   | SPA       |                    |                                                          |
| UK9001623 | Cromarty Firth                                   | SPA       |                    |                                                          |
| UK9009244 | Crouch & Roach Estuary (Mid-Essex Coast Phase 3) | SPA       |                    | Z5                                                       |
| UK9009261 | Deben Estuary                                    | SPA       |                    |                                                          |
| UK9009242 | Dengie (Mid-Essex Coast Phase 1)                 | SPA       |                    | Z5                                                       |
| UK9004291 | Din Moss – Hoselaw Loch                          | SPA       |                    |                                                          |
| UK9001622 | Dornoch Firth and Loch Fleet                     | SPA       |                    |                                                          |
| UK9010101 | Dorset Heathlands                                | SPA       |                    |                                                          |
| UK9002301 | Drumochter Hills                                 | SPA       |                    |                                                          |
| UK9005031 | Duddon Estuary                                   | SPA       |                    |                                                          |
| UK9012091 | Dungeness to Pett Level                          | SPA       |                    |                                                          |
| UK9020284 | Dyfi Estuary / Aber Dyfi                         | SPA       |                    |                                                          |
| UK9001182 | East Caithness Cliffs                            | SPA       |                    |                                                          |
| UK9010121 | East Devon Heaths                                | SPA       |                    |                                                          |
| UK9002331 | East Sanday Coast                                | SPA       |                    |                                                          |
| UK9003054 | Eilean na Muice Duibhe (Duich Moss), Islay       | SPA       |                    |                                                          |

| Site Code | Site Name                                                             | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|-----------------------------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9014111 | Elenydd – Mallaen                                                     | SPA       |                    |                                                          |
| UK9001761 | Eoligarry, Barra                                                      | SPA       |                    |                                                          |
| UK9010081 | Exe Estuary                                                           | SPA       |                    |                                                          |
| UK9002091 | Fair Isle                                                             | SPA       |                    |                                                          |
| UK9004241 | Fala Flow                                                             | SPA       |                    |                                                          |
| UK9006021 | Farne Islands                                                         | SPA       |                    |                                                          |
| UK9002031 | Fetlar                                                                | SPA       |                    |                                                          |
| UK9004411 | Firth of Forth                                                        | SPA       |                    |                                                          |
| UK9004121 | Firth of Tay & Eden Estuary                                           | SPA       |                    |                                                          |
| UK9006101 | Flamborough Head and Bempton Cliffs                                   | SPA       |                    |                                                          |
| UK9001021 | Flannan Isles                                                         | SPA       |                    |                                                          |
| UK9004381 | Forest of Clunie                                                      | SPA       |                    |                                                          |
| UK9004171 | Forth Islands                                                         | SPA       |                    | Z2                                                       |
| UK9002061 | Foula                                                                 | SPA       |                    |                                                          |
| UK9009246 | Foulness (Mid-Essex Coast Phase 5)                                    | SPA       |                    | Z5                                                       |
| UK9002271 | Fowlsheugh                                                            | SPA       |                    |                                                          |
| UK9008022 | Gibraltar Point                                                       | SPA       |                    |                                                          |
| UK9004231 | Gladhouse Reservoir                                                   | SPA       |                    |                                                          |
| UK9013121 | Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island | SPA       |                    |                                                          |
| UK9003211 | Glas Eileanan                                                         | SPA       |                    |                                                          |
| UK9003351 | Glen App and Galloway Moors                                           | SPA       |                    |                                                          |
| UK9002771 | Glen Tanar                                                            | SPA       |                    |                                                          |
| UK9014041 | Grassholm                                                             | SPA       |                    |                                                          |
| UK9009271 | Great Yarmouth North Denes                                            | SPA       |                    | Z5                                                       |
| UK9004281 | Greenlaw Moor                                                         | SPA       |                    |                                                          |
| UK9003051 | Gruinart Flats, Islay                                                 | SPA       |                    |                                                          |
| UK9009131 | Hamford Water                                                         | SPA       |                    |                                                          |
| UK9001241 | Handa                                                                 | SPA       |                    |                                                          |
| UK9002011 | Hermaness, Saxa Vord and Valla Field                                  | SPA       |                    |                                                          |
| UK9006041 | Holburn Lake and Moss                                                 | SPA       |                    |                                                          |
| UK9006171 | Hornsea Mere                                                          | SPA       |                    |                                                          |

| Site Code  | Site Name                                 | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|------------|-------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9002141  | Hoy                                       | SPA       |                    |                                                          |
| UK9006111  | Humber Estuary                            | SPA       |                    | Z3 and Z4                                                |
| UK9004451  | Imperial Dock Lock, Leith                 | SPA       |                    |                                                          |
| UK9003061  | Inner Clyde Estuary                       | SPA       |                    |                                                          |
| n/a - pSPA | Inner Firth of Forth                      | SPA       |                    |                                                          |
| UK9001624  | Inner Moray Firth                         | SPA       |                    |                                                          |
| UK9001511  | Inverpolly, Loch Urigill and Nearby Lochs | SPA       |                    |                                                          |
| UK9020288  | Isles of Scilly                           | SPA       |                    |                                                          |
| UK9020221  | Killough Bay                              | SPA       |                    |                                                          |
| UK9001083  | Kilpheder to Smerclate, South Uist        | SPA       |                    |                                                          |
| UK9003071  | Kintyre Goose Roosts                      | SPA       |                    |                                                          |
| UK9003301  | Knapdale Lochs                            | SPA       |                    |                                                          |
| UK9002951  | Ladder Hills                              | SPA       |                    |                                                          |
| UK9003053  | Laggan, Islay                             | SPA       |                    |                                                          |
| UK9001611  | Lairg and Strathbrora Lochs               | SPA       |                    |                                                          |
| UK9003271  | Langholm – Newcastleton Hills             | SPA       |                    |                                                          |
| UK9020042  | Larne Lough                               | SPA       |                    |                                                          |
| UK9012111  | Lee Valley                                | SPA       |                    |                                                          |
| UK9005091  | Leighton Moss                             | SPA       |                    |                                                          |
| UK9001571  | Lewis Peatlands                           | SPA       |                    |                                                          |
| UK9006011  | Lindisfarne                               | SPA       |                    |                                                          |
| UK9020294  | Liverpool Bay / Bae Lerpwl                | SPA       |                    | Z9                                                       |
| UK9001554  | Loch Ashie                                | SPA       |                    |                                                          |
| UK9001621  | Loch Eye                                  | SPA       |                    |                                                          |
| UK9001691  | Loch Flemington                           | SPA       |                    |                                                          |
| UK9003111  | Loch Ken and River Dee Marshes            | SPA       |                    |                                                          |
| UK9001552  | Loch Knockie and Nearby Lochs             | SPA       |                    |                                                          |
| UK9004111  | Loch Leven                                | SPA       |                    |                                                          |
| UK9003021  | Loch Lomond                               | SPA       |                    |                                                          |
| UK9001531  | Loch Maree                                | SPA       |                    |                                                          |
| UK9003121  | Loch of Inch and Torrs Warren             | SPA       |                    |                                                          |
| UK9004051  | Loch of Kinnordy                          | SPA       |                    |                                                          |

| Site Code  | Site Name                                 | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|------------|-------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9004061  | Loch of Lintrathen                        | SPA       |                    |                                                          |
| UK9002261  | Loch of Skene                             | SPA       |                    |                                                          |
| UK9002211  | Loch of Strathbeg                         | SPA       |                    |                                                          |
| UK9001551  | Loch Ruthven                              | SPA       |                    |                                                          |
| UK9001721  | Loch Shiel                                | SPA       |                    |                                                          |
| UK9002201  | Loch Spynie                               | SPA       |                    |                                                          |
| UK9002751  | Loch Vaa                                  | SPA       |                    |                                                          |
| UK9002281  | Lochnagar                                 | SPA       |                    |                                                          |
| UK9002651  | Lochs of Spiggie and Brow                 | SPA       |                    |                                                          |
| UK9020031  | Lough Foyle                               | SPA       |                    |                                                          |
| UK9020091  | Lough Neagh and Lough Beg                 | SPA       |                    |                                                          |
| UK9006092  | Lower Derwent Valley                      | SPA       |                    |                                                          |
| UK9020289  | Marazion Marsh                            | SPA       |                    |                                                          |
| UK9005111  | Martin Mere                               | SPA       |                    |                                                          |
| UK9002121  | Marwick Head                              | SPA       |                    |                                                          |
| UK9012031  | Medway Estuary and Marshes                | SPA       |                    |                                                          |
| UK9005131  | Mersey Estuary                            | SPA       |                    |                                                          |
| UK9020287  | Mersey Narrows and North Wirral Foreshore | SPA       |                    |                                                          |
| UK9013131  | Migneint – Arenig – Dduallt               | SPA       |                    |                                                          |
| UK9001121  | Mingulay and Berneray                     | SPA       |                    |                                                          |
| UK9009101  | Minsmere-Walberswick                      | SPA       |                    | Z5                                                       |
| UK9001501  | Mointeach Scadabhaigh                     | SPA       |                    |                                                          |
| UK9001071  | Monach Isles                              | SPA       |                    |                                                          |
| UK9004031  | Montrose Basin                            | SPA       |                    |                                                          |
| UK9001625  | Moray and Nairn Coast                     | SPA       |                    |                                                          |
| n/a - pSPA | Moray Firth                               | SPA       |                    |                                                          |
| UK9005081  | Morecambe Bay                             | SPA       |                    | Z9                                                       |
| UK9002361  | Mousa                                     | SPA       |                    |                                                          |
| UK9002791  | Muir of Dinnet                            | SPA       |                    |                                                          |
| UK9003261  | Muirkirk and North Lowther Uplands        | SPA       |                    |                                                          |
| UK9008031  | Nene Washes                               | SPA       |                    |                                                          |

| Site Code  | Site Name                                         | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|------------|---------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9001741  | Ness & Barvas, Lewis                              | SPA       |                    |                                                          |
| UK9011031  | New Forest                                        | SPA       |                    |                                                          |
| n/a pSPA   | North & West of Shetland                          | SPA       |                    |                                                          |
| UK9001181  | North Caithness Cliffs                            | SPA       |                    |                                                          |
| UK9003171  | North Colonsay and Wester Cliffs                  | SPA       |                    |                                                          |
| UK9001553  | North Inverness Lochs                             | SPA       |                    |                                                          |
| UK9009031  | North Norfolk Coast                               | SPA       |                    |                                                          |
| UK9006272  | North Pennine Moors                               | SPA       |                    |                                                          |
| UK9001011  | North Rona and Sula Sgeir                         | SPA       |                    |                                                          |
| UK9001211  | North Sutherland Coastal Islands                  | SPA       |                    |                                                          |
| UK9001051  | North Uist Machair and Islands                    | SPA       |                    |                                                          |
| UK9006161  | North York Moors                                  | SPA       |                    |                                                          |
| UK9006131  | Northumbria Coast                                 | SPA       |                    |                                                          |
| UK9002081  | Noss                                              | SPA       |                    |                                                          |
| UK9002311  | Orkney Mainland Moors                             | SPA       |                    |                                                          |
| UK9020299  | Oronsay and South Colonsay                        | SPA       |                    |                                                          |
| UK9002941  | Otterswick and Graveland                          | SPA       |                    |                                                          |
| UK9008041  | Ouse Washes                                       | SPA       |                    |                                                          |
| UK9020271  | Outer Ards                                        | SPA       |                    |                                                          |
| n/a - pSPA | Outer Firth of Forth                              | SPA       |                    |                                                          |
| n/a - pSPA | Outer Thames Estuary                              | SPA       |                    | Z5                                                       |
| UK9012041  | Pagham Harbour                                    | SPA       |                    |                                                          |
| UK9002051  | Papa Stour                                        | SPA       |                    |                                                          |
| UK9002111  | Papa Westray (North Hill and Holm)                | SPA       |                    |                                                          |
| UK9007021  | Peak District Moors (South Pennine Moors Phase 1) | SPA       |                    |                                                          |
| UK9001131  | Pentland Firth Islands                            | SPA       |                    |                                                          |
| UK9020051  | Pettigoe Plateau                                  | SPA       |                    |                                                          |
| UK9010111  | Poole Harbour                                     | SPA       |                    |                                                          |
| UK9011101  | Porton Down                                       | SPA       |                    |                                                          |
| UK9011051  | Portsmouth Harbour                                | SPA       |                    |                                                          |
| UK9001261  | Priest Island (Summer Isles)                      | SPA       |                    |                                                          |

| Site Code | Site Name                                                   | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|-------------------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9002021 | Ramna Stacks and Gruney                                     | SPA       |                    |                                                          |
| UK9004021 | Rannoch Lochs                                               | SPA       |                    |                                                          |
| UK9020011 | Rathlin Island                                              | SPA       |                    |                                                          |
| UK9020295 | Renfrewshire Heights                                        | SPA       |                    |                                                          |
| UK9005103 | Ribble and Alt Estuaries                                    | SPA       |                    | Z9                                                       |
| UK9003057 | Rinns of Islay                                              | SPA       |                    |                                                          |
| UK9002231 | River Spey – Insh Marshes                                   | SPA       |                    |                                                          |
| UK9002041 | Ronas Hill – North Roe and Tingon                           | SPA       |                    |                                                          |
| UK9002371 | Rousay                                                      | SPA       |                    |                                                          |
| UK9001341 | Rum                                                         | SPA       |                    |                                                          |
| UK9008051 | Rutland Water                                               | SPA       |                    |                                                          |
| UK9011102 | Salisbury Plain                                             | SPA       |                    |                                                          |
| UK9020286 | Sandlings                                                   | SPA       |                    |                                                          |
| UK9015022 | Severn Estuary / Môr Hafren                                 | SPA       |                    |                                                          |
| UK9020021 | Sheep Island                                                | SPA       |                    |                                                          |
| UK9001041 | Shiant Isles                                                | SPA       |                    |                                                          |
| UK9014051 | Skokholm and Skomer                                         | SPA       |                    |                                                          |
| UK9004441 | Slamannan Plateau                                           | SPA       |                    |                                                          |
| UK9003032 | Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) | SPA       |                    |                                                          |
| UK9020302 | Slieve Beagh – Mullaghfad – Lisnaskea                       | SPA       |                    |                                                          |
| UK9011061 | Solent and Southampton Water                                | SPA       |                    |                                                          |
| UK9010031 | Somerset Levels and Moors                                   | SPA       |                    |                                                          |
| UK9007022 | South Pennine Moors Phase 2                                 | SPA       |                    |                                                          |
| UK9004401 | South Tayside Goose Roosts                                  | SPA       |                    |                                                          |
| UK9001082 | South Uist Machair and Lochs                                | SPA       |                    |                                                          |
| UK9012171 | South West London Waterbodies                               | SPA       |                    |                                                          |
| UK9004271 | St Abb's Head to Fast Castle                                | SPA       |                    |                                                          |
| UK9001031 | St Kilda                                                    | SPA       |                    |                                                          |
| UK9012121 | Stodmarsh                                                   | SPA       |                    |                                                          |
| UK9009121 | Stour and Orwell Estuaries                                  | SPA       |                    |                                                          |
| UK9020111 | Strangford Lough                                            | SPA       |                    |                                                          |

| Site Code | Site Name                                                       | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|-----------------------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9020300 | Strath Carnaig and Strath Fleet Moors                           | SPA       |                    |                                                          |
| UK9002181 | Sule Skerry and Sule Stack                                      | SPA       |                    |                                                          |
| UK9002511 | Sumburgh Head                                                   | SPA       |                    |                                                          |
| UK9002891 | Switha                                                          | SPA       |                    |                                                          |
| UK9010141 | Tamar Estuaries Complex                                         | SPA       |                    |                                                          |
| UK9006061 | Teesmouth and Cleveland Coast                                   | SPA       |                    |                                                          |
| UK9012141 | Thames Basin Heaths                                             | SPA       |                    |                                                          |
| UK9012021 | Thames Estuary and Marshes                                      | SPA       |                    |                                                          |
| UK9012071 | Thanet Coast and Sandwich Bay                                   | SPA       |                    |                                                          |
| UK9013011 | The Dee Estuary / Aber Afon Dyfrdwy                             | SPA       |                    | Z9                                                       |
| UK9012011 | The Swale                                                       | SPA       |                    |                                                          |
| UK9008021 | The Wash                                                        | SPA       |                    |                                                          |
| UK9005171 | Thorne and Hatfield Moors                                       | SPA       |                    |                                                          |
| UK9012131 | Thursley, Hankley and Frensham Commons (Wealden Heaths Phase 1) | SPA       |                    |                                                          |
| UK9002811 | Tips of Corsemaul and Tom Mór                                   | SPA       |                    |                                                          |
| UK9003034 | Tiree (corncrake)                                               | SPA       |                    |                                                          |
| UK9013031 | Traeth Lafan / Lavan Sands, Conway Bay                          | SPA       |                    | Z9                                                       |
| UK9003041 | Treshnish Isles                                                 | SPA       |                    |                                                          |
| UK9002471 | Troup, Pennan and Lion's Heads                                  | SPA       |                    |                                                          |
| UK9020071 | Upper Lough Erne                                                | SPA       |                    |                                                          |
| UK9020296 | Upper Nene Valley Gravel Pits                                   | SPA       |                    |                                                          |
| UK9005012 | Upper Solway Flats and Marshes                                  | SPA       |                    |                                                          |
| UK9007051 | Walmore Common                                                  | SPA       |                    |                                                          |
| UK9012132 | Wealden Heaths Phase 2                                          | SPA       |                    |                                                          |
| UK9020298 | West Inverness-shire Lochs                                      | SPA       |                    |                                                          |
| UK9002101 | West Westray                                                    | SPA       |                    |                                                          |
| UK9001711 | Wester Ross Lochs                                               | SPA       |                    |                                                          |
| UK9004251 | Westwater                                                       | SPA       |                    |                                                          |
| UK9013061 | Ynys Feurig, Cemlyn Bay and The Skerries                        | SPA       |                    | Z9                                                       |
| UK9020285 | Ynys Seiriol / Puffin Island                                    | SPA       |                    | Z9                                                       |

| Site Code | Site Name                                          | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|----------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK9002221 | Ythan Estuary, Sands of Forvie and Meikle Loch     | SPA       |                    |                                                          |
| UK11001   | Abberton Reservoir                                 | Ramsar    |                    |                                                          |
| UK11002   | Alde-Ore Estuary                                   | Ramsar    |                    |                                                          |
| UK22002   | Alderney West Coast and the Burhou Islands         | Ramsar    |                    |                                                          |
| UK11004   | Arun Valley                                        | Ramsar    |                    |                                                          |
| UK11005   | Avon Valley                                        | Ramsar    |                    |                                                          |
| UK12002   | Belfast Lough                                      | Ramsar    |                    |                                                          |
| UK11006   | Benfleet and Southend Marshes                      | Ramsar    |                    |                                                          |
| UK11007   | Blackwater Estuary (Mid-Essex Coast Phase 4)       | Ramsar    |                    |                                                          |
| UK11008   | Breydon Water                                      | Ramsar    |                    |                                                          |
| UK13001   | Bridgend Flats, Islay                              | Ramsar    |                    |                                                          |
| UK11010   | Broadland                                          | Ramsar    |                    |                                                          |
| UK14001   | Burry Inlet                                        | Ramsar    |                    |                                                          |
| UK13003   | Caithness and Sutherland Peatlands                 | Ramsar    |                    |                                                          |
| UK13004   | Caithness Lochs                                    | Ramsar    |                    |                                                          |
| UK13005   | Cameron Reservoir                                  | Ramsar    |                    |                                                          |
| UK12004   | Carlingford Lough                                  | Ramsar    |                    |                                                          |
| UK13006   | Castle Loch, Lochmaben                             | Ramsar    |                    |                                                          |
| UK11012   | Chesil Beach and The Fleet                         | Ramsar    |                    |                                                          |
| UK11013   | Chichester and Langstone Harbours                  | Ramsar    |                    |                                                          |
| UK13008   | Coll                                               | Ramsar    |                    |                                                          |
| UK11015   | Colne Estuary (Mid-Essex Coast Phase 2)            | Ramsar    |                    |                                                          |
| UK14003   | Cors Caron                                         | Ramsar    |                    |                                                          |
| UK14004   | Cors Forchno                                       | Ramsar    |                    |                                                          |
| UK13009   | Cromarty Firth                                     | Ramsar    |                    |                                                          |
| UK11058   | Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) | Ramsar    |                    | Z5                                                       |
| UK11017   | Deben Estuary                                      | Ramsar    |                    |                                                          |
| UK11018   | Dengie (Mid-Essex Coast Phase 1)                   | Ramsar    |                    | Z5                                                       |
| UK12006   | Derryleckagh                                       | Ramsar    |                    |                                                          |
| UK13010   | Din Moss – Hoselaw Loch                            | Ramsar    |                    |                                                          |

| Site Code | Site Name                                  | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|--------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK13011   | Dornoch Firth and Loch Fleet               | Ramsar    |                    |                                                          |
| UK11022   | Duddon Estuary                             | Ramsar    |                    |                                                          |
| UK12007   | Dundrum Bay                                | Ramsar    |                    |                                                          |
| UK11023   | Dungeness to Pett Level                    | Ramsar    |                    |                                                          |
| UK13013   | East Sanday Coast                          | Ramsar    |                    |                                                          |
| UK13014   | Eilean na Muice Duibhe (Duich Moss), Islay | Ramsar    |                    |                                                          |
| UK11025   | Exe Estuary                                | Ramsar    |                    |                                                          |
| UK13015   | Fala Flow                                  | Ramsar    |                    |                                                          |
| UK13017   | Firth of Forth                             | Ramsar    |                    |                                                          |
| UK13018   | Firth of Tay & Eden Estuary                | Ramsar    |                    |                                                          |
| UK11026   | Foulness (Mid-Essex Coast Phase 5)         | Ramsar    |                    | Z5                                                       |
| UK11027   | Gibraltar Point                            | Ramsar    |                    |                                                          |
| UK13021   | Gladhouse Reservoir                        | Ramsar    |                    |                                                          |
| UK13022   | Greenlaw Moor                              | Ramsar    |                    |                                                          |
| UK13023   | Gruinart Flats, Islay                      | Ramsar    |                    |                                                          |
| UK11028   | Hamford Water                              | Ramsar    |                    |                                                          |
| UK11030   | Holburn Lake and Moss                      | Ramsar    |                    |                                                          |
| UK11031   | Humber Estuary                             | Ramsar    |                    | Z3 and Z4                                                |
| UK13024   | Inner Clyde Estuary                        | Ramsar    |                    |                                                          |
| UK13025   | Inner Moray Firth                          | Ramsar    |                    |                                                          |
| UK11033   | Isles of Scilly                            | Ramsar    |                    |                                                          |
| UK12012   | Killough Bay                               | Ramsar    |                    |                                                          |
| UK13027   | Kintyre Goose Roosts                       | Ramsar    |                    |                                                          |
| UK12013   | Larne Lough                                | Ramsar    |                    |                                                          |
| UK11034   | Lee Valley                                 | Ramsar    |                    |                                                          |
| UK13028   | Lewis Peatlands                            | Ramsar    |                    |                                                          |
| UK11036   | Lindisfarne                                | Ramsar    |                    |                                                          |
| UK13029   | Loch an Duin                               | Ramsar    |                    |                                                          |
| UK13031   | Loch Eye                                   | Ramsar    |                    |                                                          |
| UK13032   | Loch Ken and River Dee Marshes             | Ramsar    |                    |                                                          |
| UK13033   | Loch Leven                                 | Ramsar    |                    |                                                          |

| Site Code | Site Name                                 | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|-------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK13034   | Loch Lomond                               | Ramsar    |                    |                                                          |
| UK13037   | Loch of Inch and Torrs Warren             | Ramsar    |                    |                                                          |
| UK13038   | Loch of Kinnordy                          | Ramsar    |                    |                                                          |
| UK13039   | Loch of Lintrathen                        | Ramsar    |                    |                                                          |
| UK13040   | Loch of Skene                             | Ramsar    |                    |                                                          |
| UK13041   | Loch of Strathbeg                         | Ramsar    |                    |                                                          |
| UK13043   | Loch Spynie                               | Ramsar    |                    |                                                          |
| UK12014   | Lough Foyle                               | Ramsar    |                    |                                                          |
| UK12016   | Lough Neagh and Lough Beg                 | Ramsar    |                    |                                                          |
| UK11037   | Lower Derwent Valley                      | Ramsar    |                    |                                                          |
| UK11039   | Martin Mere                               | Ramsar    |                    |                                                          |
| UK11040   | Medway Estuary and Marshes                | Ramsar    |                    |                                                          |
| UK11041   | Mersey Estuary                            | Ramsar    |                    |                                                          |
| UK11042   | Mersey Narrows and North Wirral Foreshore | Ramsar    |                    |                                                          |
| UK11044   | Minsmere-Walberswick                      | Ramsar    |                    |                                                          |
| UK13046   | Montrose Basin                            | Ramsar    |                    |                                                          |
| UK13048   | Moray and Nairn Coast                     | Ramsar    |                    |                                                          |
| UK11045   | Morecambe Bay                             | Ramsar    |                    | Z9                                                       |
| UK13049   | Muir of Dinnet                            | Ramsar    |                    |                                                          |
| UK11046   | Nene Washes                               | Ramsar    |                    |                                                          |
| UK11048   | North Norfolk Coast                       | Ramsar    |                    |                                                          |
| UK13050   | North Uist Machair and Islands            | Ramsar    |                    |                                                          |
| UK11049   | Northumbria Coast                         | Ramsar    |                    |                                                          |
| UK11051   | Ouse Washes                               | Ramsar    |                    |                                                          |
| UK12018   | Outer Ards                                | Ramsar    |                    |                                                          |
| UK11052   | Pagham Harbour                            | Ramsar    |                    |                                                          |
| UK11054   | Poole Harbour                             | Ramsar    |                    |                                                          |
| UK11055   | Portsmouth Harbour                        | Ramsar    |                    |                                                          |
| UK11057   | Ribble and Alt Estuaries                  | Ramsar    |                    |                                                          |
| UK13052   | Rinns of Islay                            | Ramsar    |                    |                                                          |
| UK13053   | River Spey - Insh Marshes                 | Ramsar    |                    |                                                          |

| Site Code | Site Name                                                  | Site Type | Effect of turbines | Effect of cabling<br>(relevant Round 3 zones also shown) |
|-----------|------------------------------------------------------------|-----------|--------------------|----------------------------------------------------------|
| UK11062   | Rutland Water                                              | Ramsar    |                    |                                                          |
| UK11081   | Severn Estuary                                             | Ramsar    |                    |                                                          |
| UK13056   | Sléibhteán agus Cladach Thriodh (Tiree Wetlands and Coast) | Ramsar    |                    |                                                          |
| UK11063   | Solent and Southampton Water                               | Ramsar    |                    |                                                          |
| UK11064   | Somerset Levels and Moors                                  | Ramsar    |                    |                                                          |
| UK13057   | South Tayside Goose Roosts                                 | Ramsar    |                    |                                                          |
| UK13058   | South Uist Machair and Lochs                               | Ramsar    |                    |                                                          |
| UK11065   | South West London Waterbodies                              | Ramsar    |                    |                                                          |
| UK11066   | Stodmarsh                                                  | Ramsar    |                    |                                                          |
| UK11067   | Stour and Orwell Estuaries                                 | Ramsar    |                    |                                                          |
| UK12021   | Strangford Lough                                           | Ramsar    |                    |                                                          |
| UK12022   | Teal Lough                                                 | Ramsar    |                    |                                                          |
| UK11068   | Teesmouth and Cleveland Coast                              | Ramsar    |                    |                                                          |
| UK11069   | Thames Estuary and Marshes                                 | Ramsar    |                    |                                                          |
| UK11070   | Thanet Coast and Sandwich Bay                              | Ramsar    |                    |                                                          |
| UK11082   | The Dee Estuary / Aber Afon Dyfrdwy                        | Ramsar    |                    | Z9                                                       |
| UK11071   | The Swale                                                  | Ramsar    |                    |                                                          |
| UK11072   | The Wash                                                   | Ramsar    |                    |                                                          |
| UK12024   | Upper Lough Erne                                           | Ramsar    |                    |                                                          |
| UK11083   | Upper Nene Valley Gravel Pits                              | Ramsar    |                    |                                                          |
| UK11079   | Upper Solway Flats and Marshes                             | Ramsar    |                    |                                                          |
| UK11076   | Walmore Common                                             | Ramsar    |                    |                                                          |
| UK13060   | Westwater                                                  | Ramsar    |                    |                                                          |
| UK13061   | Ythan Estuary and Meikle Loch                              | Ramsar    |                    |                                                          |

**Table 7.2 Summary of the HRA for the Round 3 Plan HRA - UK SACs Assessed at Screening Stage and in AA**

| Site Code | SAC Site Name                               | Sensitive Interest Features                                                                           | Possible sources of In-Combination Effects                                                                | Relevant Zones          |
|-----------|---------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------|
| UK0013010 | Afon Tywi / River Tywi                      | <i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i> | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures | Z8                      |
| UK0030076 | Alde-Ore and Butley Estuaries               | Estuaries<br>Mudflats and sandflats not covered by seawater at low tide                               | Round 1 and 2 windfarms and possible extensions, aggregates                                               | Z5                      |
| UK0030230 | Ascrib, Islay and Dunvegan                  | <i>Phoca vitulina</i>                                                                                 | None identified                                                                                           | Primarily Z9            |
| UK0030114 | Bae Cemlyn/ Cemlyn Bay                      | Coastal Lagoons                                                                                       | None identified                                                                                           | Z9                      |
| UK0012584 | Bath and Bradford-on-Avon Bats              | <i>Myotis bechsteini</i><br><i>Rhinolophus ferrumequinum</i><br><i>Rhinolophus hipposideros</i>       | None identified                                                                                           | Z8                      |
| UK0012585 | Beer Quarry and Caves                       | <i>Myotis bechsteini</i><br><i>Rhinolophus ferrumequinum</i><br><i>Rhinolophus hipposideros</i>       | None identified                                                                                           | Z7                      |
| UK0013104 | Benacre to Easton Bavents Lagoons           | Coastal lagoons                                                                                       | Round 1 and 2 windfarms and possible extensions, aggregates                                               | Z5                      |
| UK0030088 | Berriedale and Langwell Waters              | <i>Salmo salar</i>                                                                                    | Scottish Territorial Waters windfarm, Beatrice Demonstrator, oil and gas                                  | Z1                      |
| UK0017072 | Berwickshire and North Northumberland Coast | <i>Halichoerus grypus</i>                                                                             | Scottish offshore windfarms                                                                               | Primarily Z2, Z3 and Z4 |

| Site Code | SAC Site Name                                              | Sensitive Interest Features                                                                                                                                                                                                                                                                                                                                                                                                                    | Possible sources of In-Combination Effects                                  | Relevant Zones      |
|-----------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------|
| UK0030095 | Bracket's Coppice                                          | <i>Myotis bechsteini</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | None identified                                                             | Z7                  |
| UK0012570 | Braunton Burrows                                           | <i>Petalophyllum ralfsii</i><br>Mudflats and sandflats not covered by seawater at low tide<br>Shifting dunes along the shoreline with <i>Ammophila arenaria</i><br>Fixed dunes with herbaceous vegetation ("grey dunes")<br>Dunes with <i>Salix repens</i> ssp. <i>argentea</i> ( <i>Salicion arenariae</i> )<br>Humid dune slacks                                                                                                             | None identified                                                             | Z8                  |
| UK0030328 | Briddlesford Copses                                        | <i>Myotis bechsteini</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | None identified                                                             | Z7 & Z6             |
| UK0012712 | Cardigan Bay / Bae Ceredigion                              | <i>Tursiops truncatus</i><br><i>Halichoerus grypus</i>                                                                                                                                                                                                                                                                                                                                                                                         | None identified                                                             | Primarily Z8 and Z9 |
| UK0020020 | Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd | <i>Salicornia</i> and other annuals colonising mud and sand<br>Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )<br>Mudflats and sandflats not covered by seawater at low tide<br>Large shallow inlets and bays<br>Estuaries<br>Sandbanks which are slightly covered by sea water all the time<br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br><i>Alosa alosa</i><br><i>Alosa fallax</i><br><i>Lutra lutra</i> | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary | Z8                  |

| Site Code  | SAC Site Name                                                                   | Sensitive Interest Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Possible sources of In-Combination Effects                                                      | Relevant Zones |
|------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------|
| UK0016373  | Chilmark Quarries                                                               | <i>Myotis bechsteini</i><br><i>Rhinolophus ferrumequinum</i><br><i>Rhinolophus hipposideros</i><br><i>Barbastella barbastellus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | None identified                                                                                 | Z7 & Z8        |
| UK0014789  | Coedydd Derw a Safleoedd Ystumod Meirion/<br>Meirionnydd Oakwoods and Bat Sites | <i>Rhinolophus hipposideros</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | None identified                                                                                 | Z9             |
| UK0030131  | Dee Estuary / Aber Dyfrdwy                                                      | Embryonic shifting dunes<br>Shifting dunes along the shoreline with <i>Ammophila arenaria</i><br><i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br>Mudflats and sandflats not covered by seawater at low tide<br>Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )<br><i>Salicornia</i> and other annuals colonising mud and sand<br>Fixed dunes with herbaceous vegetation ("grey dunes")<br>Vegetated sea cliffs of the Atlantic and Baltic coasts<br>Annual vegetation of drift lines<br>Estuaries<br>Humid dune slacks<br><i>Petalophyllum ralfsii</i> | Oil and gas, Round 1 and 2 windfarms and possible extensions, navigational dredging, aggregates | Z9             |
| n/a - dSAC | Dogger Bank                                                                     | Sandbanks which are slightly covered by seawater all the time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Oil and gas extraction, trawling                                                                | Z3             |
| UK0019806  | Dornoch Firth and Morrich More                                                  | <i>Phoca vitulina</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Scottish offshore windfarms and oil and gas.                                                    | Primarily Z1   |

| Site Code | SAC Site Name                        | Sensitive Interest Features                                                                                                                                                                                                                                                                                                                                                                                                  | Possible sources of In-Combination Effects                    | Relevant Zones |
|-----------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------|
| UK0012715 | Ebernoe Common                       | <i>Barbastella barbastellus</i><br><i>Myotis bechsteini</i>                                                                                                                                                                                                                                                                                                                                                                  | None identified                                               | Z6             |
| UK0030182 | Eileanan agus Sgeiran Lios mór       | <i>Phoca vitulina</i>                                                                                                                                                                                                                                                                                                                                                                                                        | None identified                                               | Primarily Z9   |
| UK0013690 | Essex Estuaries                      | <i>Salicornia</i> and other annuals colonising mud and sand<br>Sandbanks which are slightly covered by sea water all the time<br>Spartina swards ( <i>Spartinion maritimae</i> )<br>Estuaries<br>Mudflats and sandflats not covered by seawater at low tide<br>Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )<br>Mediterranean and thermo-Atlantic halophilous scrubs ( <i>Sarcocornetea fruticosi</i> ) | Round 1 and 2 windfarms and possible extensions               | Z5             |
| UK0030331 | Eversden and Wimpole Woods           | <i>Barbastella barbastellus</i>                                                                                                                                                                                                                                                                                                                                                                                              | None identified                                               | -              |
| UK0030148 | Exmoor and Quantock Oakwoods         | <i>Myotis bechsteini</i><br><i>Barbastella barbastellus</i>                                                                                                                                                                                                                                                                                                                                                                  | None identified                                               | Z8             |
| UK0017096 | Faray and Holm of Faray              | <i>Halichoerus grypus</i>                                                                                                                                                                                                                                                                                                                                                                                                    | Pentland Firth strategic area and Scottish offshore windfarms | Primarily Z1   |
| UK0030311 | Firth of Tay and Eden Estuary        | <i>Phoca vitulina</i>                                                                                                                                                                                                                                                                                                                                                                                                        | Scottish offshore windfarms                                   | Primarily Z2   |
| UK0013036 | Flamborough Head                     | Submerged or partially submerged sea caves<br>Reefs                                                                                                                                                                                                                                                                                                                                                                          | None identified                                               | Z3             |
| UK0013046 | Glannau Ynys Gybi/ Holy Island Coast | No sensitive interest features identified at screening stage                                                                                                                                                                                                                                                                                                                                                                 | None identified                                               | Z9             |
| UK0012661 | Glynllifon                           | <i>Rhinolophus hipposideros</i>                                                                                                                                                                                                                                                                                                                                                                                              | None identified                                               | Z9             |

| Site Code  | SAC Site Name                                  | Sensitive Interest Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Possible sources of In-Combination Effects                                                  | Relevant Zones                             |
|------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------|
| n/a - dSAC | Haisborough, Hammond and Winterton             | Sandbanks which are slightly covered by seawater all the time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Round 1 windfarm and possible extension, aggregates                                         | Z5                                         |
| UK0030168  | Hestercombe House                              | <i>Rhinolophus hipposideros</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | None identified                                                                             | Z8                                         |
| UK0030170  | Humber Estuary                                 | <i>Halichoerus grypus</i><br>Shifting dunes along the shoreline with <i>Ammophila arenaria</i><br><i>Lampetra fluviatilis</i><br><i>Petromyzon marinus</i><br>Fixed dunes with herbaceous vegetation ("grey dunes")<br>Coastal lagoons<br>Embryonic shifting dunes<br>Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )<br>Sandbanks which are slightly covered by sea water all the time<br><i>Salicornia</i> and other annuals colonising mud and sand<br>Mudflats and sandflats not covered by seawater at low tide<br>Dunes with <i>Hippophae rhamnoides</i><br>Estuaries | Port activities, navigational dredging, Round 2 windfarm and possible extension, aggregates | Z3 & Z4, primarily Z3 and Z4 for grey seal |
| UK0030172  | Isle of May                                    | <i>Halichoerus grypus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Scottish offshore windfarms                                                                 | Primarily Z2                               |
| UK0019861  | Isle of Portland to Studland Cliffs            | Annual Vegetation of drift lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | None identified                                                                             | Z7                                         |
| UK0013694  | Isles of Scilly Complex                        | <i>Halichoerus grypus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | None identified                                                                             | Primarily Z7 and Z8                        |
| UK0012566  | Kenfig/ Cynffig                                | No sensitive interest features identified at screening stage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | None identified                                                                             | Z8                                         |
| UK0014787  | Limestone Coast of South West Wales / Arfordir | Submerged or partially submerged sea caves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Aggregates/dredging                                                                         | Z8                                         |

| Site Code | SAC Site Name                            | Sensitive Interest Features                                                                                                                                                                                                         | Possible sources of In-Combination Effects                                                        | Relevant Zones                    |
|-----------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------|
|           | Calchfaen De Orllewin Cymru              | <i>Rhinolophus ferrumequinum</i>                                                                                                                                                                                                    |                                                                                                   |                                   |
| UK0019978 | Lower River Spey- Spey Bay               | No sensitive interest features identified at screening stage                                                                                                                                                                        | None identified                                                                                   | Z1                                |
| UK0013114 | Lundy                                    | <i>Halichoerus grypus</i><br>Sandbanks which are slightly covered by sea water all the time<br>Submerged or partially submerged sea caves<br>Reefs                                                                                  | None identified                                                                                   | Z8, primarily<br>Z8 for grey seal |
| UK0012658 | Mells Valley                             | <i>Rhinolophus ferrumequinum</i>                                                                                                                                                                                                    | None identified                                                                                   | Z7 & Z8                           |
| UK0030203 | Mendip Limestone Grasslands              | <i>Rhinolophus ferrumequinum</i>                                                                                                                                                                                                    | None identified                                                                                   | Z7 & Z8                           |
| UK0012809 | Minsmere to Walberswick Heaths & Marshes | Annual vegetation of drift lines                                                                                                                                                                                                    | Round 1 and 2 windfarms and possible extensions, aggregates                                       | Z5                                |
| UK0012804 | Mole Gap to Reigate Escarpment           | <i>Myotis bechsteini</i>                                                                                                                                                                                                            | None identified                                                                                   | Z6                                |
| UK0012694 | Monach Islands                           | <i>Halichoerus grypus</i>                                                                                                                                                                                                           | None identified                                                                                   | Primarily Z1 and Z9               |
| UK0019808 | Moray Firth                              | <i>Tursiops truncatus</i>                                                                                                                                                                                                           | Scottish offshore windfarm, oil and gas, Beatrice wind demonstrator, Aberdeen harbour development | Primarily Z1 and Z2               |
| UK0013027 | Morecambe Bay                            | <i>Triturus cristatus</i><br>Sandbanks which are slightly covered by sea water all the time<br>Estuaries<br>Mudflats and sandflats not covered by seawater at low tide<br>Coastal lagoons<br>Large shallow inlets and bays<br>Reefs | Round 1 and 2 windfarms and possible extensions, oil and gas, aggregates                          | Z9                                |

| Site Code | SAC Site Name                                             | Sensitive Interest Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Possible sources of In-Combination Effects                       | Relevant Zones      |
|-----------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------|
|           |                                                           | Perennial vegetation of stony banks<br><i>Salicornia</i> and other annuals colonising mud and sand<br>Spartina swards ( <i>Spartinion maritimae</i> )<br>Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )<br>Embryonic shifting dunes<br>Shifting dunes along the shoreline with <i>Ammophila arenaria</i><br>Fixed dunes with herbaceous vegetation ("grey dunes")<br>Atlantic decalcified fixed dunes ( <i>Calluno-Ulicetea</i> )<br>Dunes with <i>Salix repens</i> ssp. <i>argentea</i> ( <i>Salicion arenariae</i> )<br>Humid dune slacks |                                                                  |                     |
| UK0030334 | Mottisfont Bats                                           | <i>Barbastella barbastellus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | None identified                                                  | Z6 & Z7             |
| UK0012711 | Mousa                                                     | <i>Phoca vitulina</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | None identified                                                  | Primarily Z1        |
| UK0016612 | Murlough                                                  | <i>Phoca vitulina</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | None identified                                                  | Primarily Z9        |
| UK0030161 | Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines          | <i>Rhinolophus hipposideros</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | None identified                                                  | Z9                  |
| UK0030358 | North Norfolk Sandbanks & Saturn Reef                     | Sandbanks which are slightly covered by sea water all the time<br>Reefs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Round 2 windfarm and possible extension, oil and gas, aggregates | Z4 & Z5             |
| UK0030227 | North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro | <i>Barbastella barbastellus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | None identified                                                  | Z8                  |
| UK0012696 | North Rona                                                | <i>Halichoerus grypus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | None identified                                                  | Primarily Z1 and Z9 |
| UK0030052 | North Somerset and Mendip Bats                            | <i>Rhinolophus ferrumequinum</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | None identified                                                  | Z8 & Z7             |

| Site Code  | SAC Site Name                                                                                        | Sensitive Interest Features                                                    | Possible sources of In-Combination Effects                                                                                           | Relevant Zones         |
|------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------|
|            |                                                                                                      | <i>Rhinolophus hipposideros</i>                                                |                                                                                                                                      |                        |
| UK0014780  | Orfordness- Shingle Street                                                                           | Coastal Lagoons<br>Annual vegetation of drift lines                            | None identified                                                                                                                      | Z5                     |
| UK0030235  | Paston Great Barn                                                                                    | <i>Barbastella barbastellus</i>                                                | None identified                                                                                                                      | Z5                     |
| UK0014793  | Pembrokeshire Bat Sites and Bosherton Lakes/<br>Safleoedd Ystlum Sir Benfro a Llynnoedd<br>Bosherton | <i>Rhinolophus ferrumequinum</i><br><i>Rhinolophus hipposideros</i>            | None identified                                                                                                                      | Z8                     |
| UK0013116  | Pembrokeshire Marine / Sir Benfro Forol                                                              | <i>Halichoerus grypus</i>                                                      | None identified                                                                                                                      | Primarily Z8<br>and Z9 |
| UK0013117  | Pen Llyn a'r Sarnau / Llyn Peninsula and the<br>Sarnau                                               | <i>Halichoerus grypus</i><br><i>Tursiops truncatus</i>                         | None identified                                                                                                                      | Primarily Z8<br>and Z9 |
| n/a - dSAC | Poole Bay to Lyme Bay Reefs                                                                          | Reefs<br>Submerged or partially submerged sea caves                            | None identified                                                                                                                      | Z7                     |
| UK0030252  | River Dee and Bala Lake/ Afon Dyfrdwy a Llyn<br>Tegid                                                | <i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i><br><i>Salmo salar</i> | Oil and gas, Round 1 and 2 windfarms<br>and possible extensions, navigational<br>dredging, aggregates (outside or in<br>Dee Estuary) | Z9                     |
| UK0030253  | River Derwent                                                                                        | <i>Petromyzon marinus</i><br><i>Lampetra fluviatilis</i>                       | Round 2 windfarm and possible<br>extension, aggregates, port activities<br>(all in Humber Estuary)                                   | Z3 and Z4              |
| UK0030261  | River Oykel                                                                                          | <i>Salmo salar</i><br><i>Margaritifera margaritifera</i>                       | Beatrice Demonstrator (estuary)                                                                                                      | Z1                     |
| UK0030262  | River South Esk                                                                                      | <i>Salmo salar</i>                                                             | Scottish Territorial Waters windfarm                                                                                                 | Z2                     |

| Site Code | SAC Site Name         | Sensitive Interest Features        | Possible sources of In-Combination Effects                                                                | Relevant Zones |
|-----------|-----------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------|
| UK0019811 | River Spey            | <i>Margaritifera margaritifera</i> | (outside estuary)                                                                                         | Z1             |
|           |                       | <i>Salmo salar</i>                 | None identified                                                                                           |                |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
|           |                       | <i>Margaritifera margaritifera</i> |                                                                                                           |                |
| UK0030312 | River Tay             | <i>Salmo salar</i>                 | Scottish Territorial Waters windfarm (outside estuary)                                                    | Z2             |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
|           |                       | <i>Lampetra fluviatilis</i>        |                                                                                                           |                |
| UK0030263 | River Teith           | <i>Lampetra fluviatilis</i>        | Scottish Territorial Waters windfarm (outside estuary)                                                    | Z2             |
|           |                       | <i>Salmo salar</i>                 |                                                                                                           |                |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
| UK0012691 | River Tweed           | <i>Salmo salar</i>                 | None identified                                                                                           | Z2             |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
|           |                       | <i>Lampetra fluviatilis</i>        |                                                                                                           |                |
| UK0013007 | River Usk / Afon Wysg | <i>Lampetra fluviatilis</i>        | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures | Z8             |
|           |                       | <i>Alosa fallax</i>                |                                                                                                           |                |
|           |                       | <i>Alosa alosa</i>                 |                                                                                                           |                |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
|           |                       | <i>Salmo salar</i>                 |                                                                                                           |                |
| UK0012642 | River Wye / Afon Gwy  | <i>Alosa fallax</i>                | Aggregates in Severn Estuary, possible tidal power scheme in Severn Estuary, possible up-river structures | Z8             |
|           |                       | <i>Petromyzon marinus</i>          |                                                                                                           |                |
|           |                       | <i>Lampetra fluviatilis</i>        |                                                                                                           |                |
|           |                       | <i>Alosa alosa</i>                 |                                                                                                           |                |
|           |                       | <i>Salmo salar</i>                 |                                                                                                           |                |

| Site Code  | SAC Site Name                                                   | Sensitive Interest Features                                                     | Possible sources of In-Combination Effects                                   | Relevant Zones      |
|------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------|
| UK0030069  | Sanday                                                          | <i>Phoca vitulina</i>                                                           | Pentland Firth strategic area and Scottish offshore windfarms                | Primarily Z1        |
| UK0013030  | Severn Estuary / Môr Hafren                                     | <i>Lampetra fluviatilis</i><br><i>Alosa fallax</i><br><i>Petromyzon marinus</i> | Aggregates, possible tidal power scheme                                      | Z8                  |
| n/a - dSAC | Shell Flat and Lune Deep                                        | Sandbanks which are slightly covered by sea water all the time<br>Reefs         | Round 1 and 2 windfarms and possible extensions, oil and gas, aggregates     | Z9                  |
| UK0030337  | Singleton and Cocking Tunnels                                   | <i>Myotis bechsteini</i><br><i>Barbastella barbastellus</i>                     | None identified                                                              | Z6                  |
| UK0012650  | South Hams                                                      | <i>Rhinolophus ferrumequinum</i>                                                | None identified                                                              | Z7                  |
| UK0030061  | South Wight Maritime                                            | Reefs<br>Submerged or partially submerged sea caves                             | Aggregates                                                                   | Z7                  |
| UK0030067  | South-East Islay Skerries                                       | <i>Phoca vitulina</i>                                                           | Scottish offshore windfarms                                                  | Primarily Z9        |
| UK0019863  | St Albans Head to Durlston Head                                 | <i>Rhinolophus ferrumequinum</i>                                                | None identified                                                              | Z7                  |
| UK0016618  | Strangford Lough                                                | <i>Phoca vitulina</i>                                                           | SeaGen tidal device                                                          | Primarily Z9        |
| UK0014783  | Tanat and Vyrnwy Bat Sites/ Safleoedd Ystlumod Tanat ac Efyrrwy | <i>Rhinolophus hipposideros</i>                                                 | None identified                                                              | Z9                  |
| UK0012716  | The Mens                                                        | <i>Barbastella barbastellus</i>                                                 | None identified                                                              | Z6                  |
| UK0017075  | The Wash & North Norfolk Coast                                  | <i>Phoca vitulina</i>                                                           | Round 1 and 2 windfarms and possible extensions, oil and gas, and aggregates | Primarily Z4 and Z5 |
| UK0013047  | Tintagel-Marsland-Covelly Coast                                 | No sensitive interest features identified at screening stage                    |                                                                              | Z8                  |

| Site Code | SAC Site Name                                                                             | Sensitive Interest Features                                                                                                                                                                                          | Possible sources of In-Combination Effects                   | Relevant Zones |
|-----------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------|
| UK0030289 | Treshnish Isles                                                                           | <i>Halichoerus grypus</i>                                                                                                                                                                                            | None identified                                              | Primarily Z1   |
| UK0014784 | Usk Bat Sites/ Safleoedd Ystlumod Wysg                                                    | <i>Rhinolophus hipposideros</i>                                                                                                                                                                                      | None identified                                              | Z8             |
| UK0013043 | Winterton-Horsey Dunes                                                                    | No sensitive interest features identified at screening stage                                                                                                                                                         |                                                              | Z5             |
| UK0014794 | Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena | <i>Rhinolophus ferrumequinum</i><br><i>Rhinolophus hipposideros</i>                                                                                                                                                  | None identified                                              | Z8             |
| UK0012727 | Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy                                              | <i>Rhinolophus ferrumequinum</i>                                                                                                                                                                                     | None identified                                              | Z8             |
| UK0030202 | Y Fenai a Bae Conwy / Menai Strait and Conwy Bay                                          | Submerged or partially submerged sea caves<br>Mudflats and sandflats not covered by seawater at low tide<br>Reefs<br>Sandbanks which are slightly covered by sea water all the time<br>Large shallow inlets and bays | Round 1 and 2 windfarms and possible extensions, oil and gas | Z9             |
| UK0012687 | Yell Sound Coast                                                                          | <i>Phoca vitulina</i>                                                                                                                                                                                                | None identified                                              | Primarily Z1   |

**Table 7.3 Summary of the HRA for the Round 3 Plan HRA – UK Ramsar Sites Assessed at Screening Stage and in AA**

| Site Code | Ramsar Site Name                                     | Sensitive Ramsar Criteria                                                                                                                                                   | Possible Sources of In-Combination Effects                | Relevant Zones |
|-----------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------|
| UK11002   | Alde-Ore Estuary                                     | 2 –Saline lagoon invertebrates<br>3 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                            | Round 2 windfarm and possible extension, aggregates       | Z5             |
| UK11007   | Blackwater Estuary (Mid-Essex Coast Phase 4)         | 1 –Saltmarsh habitat<br>2 –Terrestrial invertebrates<br>3 –Saltmarsh plants<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                               | Round 1 and 2 windfarm and possible extension             | Z5             |
| UK11008   | Breydon Water                                        | 5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                                              | Round 1 and 2 windfarm and possible extension, aggregates | Z5             |
| UK11015   | Colne Estuary (Mid-Essex Coast Phase 2)              | 1 –Saltmarsh habitat<br>2 –Terrestrial invertebrates and certain saltmarsh plants<br>3 –Saltmarsh habitat<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1) | Round 1 and 2 windfarm and possible extension             | Z5             |
| UK14004   | Cors Fochno and Dyfi                                 | 1 – Wetlands (includes greenshank, refer to Table 7.1)                                                                                                                      |                                                           |                |
| UK11058   | Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) | 2 –Plant and terrestrial invertebrate species<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                             | Round 1 and 2 windfarm and possible extension             | Z5             |
| UK11017   | Deben Estuary                                        | 2 –Terrestrial snail species                                                                                                                                                | Aggregates                                                | Z5             |

| Site Code | Ramsar Site Name                   | Sensitive Ramsar Criteria                                                                                                                                                                 | Possible Sources of In-Combination Effects                                                  | Relevant Zones                             |
|-----------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------|
|           |                                    | 6 –Birds (refer to Table 7.1)                                                                                                                                                             |                                                                                             |                                            |
| UK11018   | Dengie (Mid-Essex Coast Phase 1)   | 1 –Saltmarsh habitat<br>2 –Invertebrate species<br>3 –Saltmarsh habitat<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                 | Round 1 and 2 windfarm and possible extension                                               | Z5                                         |
| UK13017   | Firth of Forth                     | 5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                                                            | Scottish offshore windfarms                                                                 | Z2                                         |
| UK11026   | Foulness (Mid-Essex Coast Phase 5) | 1 –Saltmarsh habitat<br>2 –Plant and invertebrate species<br>3 –Saltmarsh habitat<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                       | Round 1 windfarm and possible extension                                                     | Z5                                         |
| UK11028   | Hamford Water                      | 6 –Birds (refer to Table 7.1)                                                                                                                                                             | Aggregates                                                                                  | Z5                                         |
| UK11031   | Humber Estuary                     | 1 –Saltmarsh and estuary habitat<br>3 –Breeding colony of grey seal<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)<br>8 – Migratory route for river lamprey.           | Port activities, navigational dredging, Round 2 windfarm and possible extension, aggregates | Z3 & Z4, primarily Z3 and Z4 for grey seal |
| UK11044   | Minsmere-Walberswick               | 1 –Marine, freshwater, marshland and reedbed habitat<br>2 –Plant and invertebrate species (excluding bird aspects of criterion)<br>2 –Bird aspects of criterion only (refer to Table 7.1) | None identified                                                                             | Z5                                         |

| Site Code | Ramsar Site Name                    | Sensitive Ramsar Criteria                                                                                                                                                                        | Possible Sources of In-Combination Effects                                                      | Relevant Zones |
|-----------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------|
| UK13048   | Moray and Nairn Coast               | 1 –Mudflats and saltmarsh habitats<br>2 –Aquatic and coastal plants<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                            | Oil and gas                                                                                     | Z1             |
| UK11045   | Morecambe Bay                       | 4 –Migratory wildfowl (refer to Table 7.1)<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                     | Round 1 and 2 windfarms and possible extension, oil and gas                                     | Z9             |
| UK11057   | Ribble and Alt Estuaries            | 2 –Natterjack toad population<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                                  | Round 1 and 2 windfarms and possible extension, oil and gas                                     | Z9             |
| UK11081   | Severn Estuary                      | 1 –Annex I habitats<br>3 –Estuarine communities.<br>4 –Migratory fish within the estuary<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)<br>8 –Fish (including migratory fish) | Aggregates, possible tidal power scheme                                                         | Z8             |
| UK11067   | Stour and Orwell Estuaries          | 2 –Plant species<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                                               | Aggregates                                                                                      | Z5             |
| UK11082   | The Dee Estuary / Aber Afon Dyfrdwy | 1 - Annex I habitats<br>5 –Birds (refer to Table 7.1)<br>6 –Birds (refer to Table 7.1)                                                                                                           | Oil and gas, Round 1 and 2 windfarms and possible extensions, navigational dredging, aggregates | Z9             |



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# **Appendix A**

## **Responses to Consultation on the Screening Report**

21 Pages

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| Company/organisation<br>(contact / date received)                     | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Countryside Council for Wales<br>(CCW)<br><br>(Andy Hill / 18-Nov-09) | 1   | CCW understands the difficulties of assessing the implications of R3 development in the absence of detailed information about activities associated with development and notes the intention to defer consideration of certain aspects of the HRA to the project stage when more detailed information will be available. CCW considers that this approach is consistent with the regulations and guidance and that the three tests described in Section 1.2.1 (p3) are appropriate and have been correctly applied. It should be noted, however, that sufficient flexibility will need to be maintained within the plan to ensure that the requirements of the second test are met.                                                                                                             | No response required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                       | 2   | CCW agrees that it will be important that the HRA clearly identifies the additional work necessary to support assessment at the zone and project level, especially in the light of the need to defer aspects of the assessment to that level. It will also be important to ensure that this is taken into account by individual developers who will be undertaking assessments at the zone and project levels.                                                                                                                                                                                                                                                                                                                                                                                  | In this report, the requirement for developers to undertake HRA at project level has been stated explicitly. The AA report makes it clear where and why AA will need to be deferred to project stage for individual interest features/sites.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                       | 3   | It is also important to recognise that effects screened out by the plan HRA level may become significant when detail about individual projects becomes available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | This requirement has been stated explicitly in this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                       | 5   | <p>CCW considers that effective mitigation will be critical in reducing potential effects of the R3 plan. It is therefore important to establish where effective mitigation for these effects exists and CCW is pleased to see that this has been addressed in Section 2.3.6. CCW would, however, suggest two amendments to Table 2.6.</p> <ul style="list-style-type: none"> <li>• Under 'Turbine Installation' there should be reference to the use of alternate foundation types as a method for reducing noise-related impacts associated with windfarm construction</li> <li>• Under both 'Turbine Operation' and 'Cable Operation' there should be recognition that cable protection to reduce scour may in itself be a source of impact that will require careful evaluation.</li> </ul> | <p>The choice of turbine base type by a developer is related to a number of factors, including the nature of seabed sediments and underlying geology, water depth and hydrodynamic climate. It is not therefore considered appropriate to require developers to make their turbine base choice purely on noise-reduction grounds (although they may take this into consideration). For this reason, use of alternate foundation types was not included in Table 2.6 of the screening report. However, it has been included in this report as a possible project-level means of achieving the plan level requirement for noise reduction.</p> <p>The comment about scour protection has been noted in the appropriate section of this report.</p> |

| Company/organisation<br>(contact / date received)                                             | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Countryside Council for Wales<br>(CCW)<br><br>(Andy Hill / 18-Nov-09)<br><br><i>Continued</i> | 6   | CCW considers that some of the indirect hydrodynamic effects described in Section 3.6.2. (p46) may have been underestimated. Whilst we agree that effects of this kind are likely to be restricted to within one tidal excursion where monopile foundations types are deployed, we believe that there is potential for other foundation types, especially gravity based foundations, to have effects further afield through changes to wave climate, especially given the scale of development anticipated in R3. This may have implications for some coastal sites (in Wales for example, Severn Estuary SCI, Carmarthen Bay Dunes SAC, Carmarthen Bay & Estuaries SAC, Menai Strait & Conwy Bay SAC, Dee Estuary SCI; Burry Inlet SPA, Carmarthen Bay SPA, Lavan Sands Conwy Bay SPA, Severn Estuary SPA) that should be 'screened in' at this stage to allow more detailed consideration at the next phase of assessment. | This point is noted. However, all available evidence (modelling and monitoring) from windfarms close to the shore (including re-modelling of the effects of gravity bases at Gwynt y Môr) indicates that effects of changes in wave climate on sediment dynamics at the shore are negligible. Whilst the scale of Round 3 developments may be larger, it should be noted that they will be located further offshore, in deeper water and with greater turbine separation. |
|                                                                                               | 7   | We would urge caution in screening out bird features on the basis of the statement in Section 4.3.4. (p79) that 'there is unlikely to be a significant effect on a bird population if a very small proportion of the habitat it depends upon is changed or lost'. It should not be interpreted that an activity that only affects a small area of habitat will not have a significant effect. Furthermore, in order for features or sites to be 'screened out' on this basis, information about the use of areas of habitat by birds will need to be examined at a very fine scale and this would be better undertaken at the next stage of assessment.                                                                                                                                                                                                                                                                      | This point is noted, and has been addressed in the bird chapter of the AA report.                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                               | 8   | Cors Fochno & Dyfi Estuary Ramsar site should be 'screened in' to the next stage of assessment as, in common with the Dyfi Estuary SPA which has been taken forward, it has migratory waterfowl (Greenland White Fronted Geese) as an interest feature.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | This site has been added to the list of Ramsar sites which have been addressed in the bird chapter of this report.                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                               | 9   | All sites designated for marine mammals have been 'screened in' to the next stage of assessment. However, the rationale for assessing impacts on mammals described in Section 4.3.2 (p77) focuses on potential effects on marine mammal abundance and does not address potential impacts of development on habitat degradation and animal disturbance. Both aspects will need to be considered at the next stage of assessment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | These aspects of effects on marine mammal interest features have been taken into consideration in this report.                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                               | 10  | CCW has recently published an Atlas of the distribution of marine mammals in Welsh and adjacent waters and a copy of this has been sent to you separately. This report provides up to date information about mammal distribution that should be of assistance in the next stage of assessment as far as they relate to Welsh Waters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Information in this Atlas will also be of use when project-level HRAs are undertaken.                                                                                                                                                                                                                                                                                                                                                                                     |

| Company/organisation<br>(contact / date received)                                | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Department for Energy and<br>Climate Change (DECC)<br><br>(Phil Bloor 23-Nov-09) | 1   | <p>On page 80 you state that due to a lack of quantifiable data "... it is appropriate to rely on HRA work at a project level". I wonder whether this approach is robust based on the ECJ ruling C-06-/04 (Commission v UK) that found that the UK had failed to transpose the provisions of art 6(3) and 6(4) into UK law. In short the UK had attempted to argue that Regional Spatial Strategies should be exempt from HRA because detailed AAs would be completed at the project level, where required. The ECJ recognised that there may be limitations or uncertainties in predicting effects on European sites at the strategic level. However, the requirement, where uncertainty exists, is to ensure the precautionary approach is applied, and if necessary, that the plan accounts for and directs the continuation of the HRA process.</p> <p>Table 2.6 – Although I do not necessarily disagree with the basic mitigation measures being proposed there is no need for them to have to be to the satisfaction of statutory consultees, they do have to be to the satisfaction of the regulator (which will in effect be the IPC).</p> <p>Table 2.6 – I would prefix the table header with the word "Possible" or "Potential".</p> <p>Table 2.6 Cable Operation – What effects are there on electrosensitive species from cable operations?</p> | <p>The approach that has been adopted reflects the recognised difficulties in predicting effects on European sites at the strategic level, when project level details are not available. Our approach to addressing this is for the plan level HRA to rely upon lower level, project HRAs on the basis that when these are carried out we know that they will be able to conclude no adverse effect on integrity. The Plan-level HRA has clearly directed project level HRA towards the main areas for further assessment once project details have become clear.</p> <p>This point has been addressed in Chapter 1 of this report.</p> <p>The general environmental measures identified in Table 2.6 of the screening report (reproduced in Table 1.1 of this report) are best practice options, and as part of the plan, zone developers will be obliged to undertake them where appropriate to mitigate adverse effects on European/Ramsar sites for individual projects. The inclusion of the words 'possible' or 'potential' is therefore considered inappropriate.</p> <p>This mitigation was included on the basis of lamprey interest features, which have electroreceptors. The potential effects of cables on electrosensitive fish has been the subject of a number of reports.</p> |

| Company/organisation<br>(contact / date received)                                                        | No. | Response from company/organisation                                                                                                                  | Response to comments                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Department for Energy and<br>Climate Change (DECC)<br><br>(Phil Bloor 23-Nov-09)<br><br><i>Continued</i> |     | Table 3.1 – What airborne noise is there from seismic surveys that could affect birds?                                                              | This table entry refers to noise not necessarily from the survey but from boat and human activity associated with undertaking the survey.                                                                 |
|                                                                                                          |     | Table 3.1 – Turbine Foundation Installation – Any change in substrate due to gravel for gravity bases would be permanent.                           | The comment in Table 3.1 was misleading, the use of the word temporary in this table was used to highlight the fact that gravel on the seabed would be covered by a gravity base in turbine installation. |
|                                                                                                          |     | Table 3.2 – Cetaceans – Seismic surveys have not been known to cause noise injury to cetaceans but they can cause disturbance.                      | This point is noted and has been incorporated into the sensitivity table of the marine mammals section of the AA report.                                                                                  |
|                                                                                                          |     | Table 3.2 – As above Noise injury from seismic should be replaced with noise disturbance.                                                           | This point is noted and has been incorporated into the marine mammals chapter of the AA report.                                                                                                           |
|                                                                                                          |     | Table 3.2 – barrier effects to the movement of migrating bats. Really???                                                                            | This point has been discussed within the bat chapter of the AA report.                                                                                                                                    |
|                                                                                                          |     | Table 3.2 – Migratory Fish – why especially to shad? This is the only mention of a specific species in the whole table.                             | Shad were included in the table specifically on the basis of comments received from SNCOs as part of consultation on the pre-screening report.                                                            |
|                                                                                                          |     | Table 3.3 – no mention of little gull? Are there no European SPAs for this species.                                                                 | European SPAs have not been listed in this report as the information received to date from the EU DG Environment is not complete.                                                                         |
| English National Park<br>Authorities Association<br><br>(Paul Hamblin / 27-Oct-09)                       | n/a | In view of the comments made in reaction to those made by the Campaign for National Parks, in the screening report, ENPAA have no further comments. | No response required                                                                                                                                                                                      |

| Company/organisation<br>(contact / date received)                                                                                                     | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Joint Nature Conservation<br>Committee (JNCC) and<br>Scottish Natural Heritage<br>(SNH)<br><br>(Response combined)<br><br>(Finlay Bennet / 18-Nov-09) | 1   | <b>An open and transparent process.</b> JNCC and SNH are concerned to fully understand the commitment being placed upon consortia to work towards addressing HRA issues as part of the ZDAs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | In the conclusions of this report, the implications of the HRA findings at the zone level are set out. The Crown Estate is working on developing mechanisms to ensure that HRA issues are taken into consideration during zone development.                                                                                                                                                                                                                                                              |
|                                                                                                                                                       | 2   | <b>Deferring judgements – ensuring a robust process.</b> Ref the flow chart contained in Figure 1.1 on page 7 of the Screening Report. An important issue is to fully understand the implications of a judgement of no likely significant effect (LSE) at the plan level for project level proposals. We are keen to ensure that de minimis issues are screened out of the process at plan level and not unnecessarily revisited at the project level. However we believe it will be of value to have some mechanism in place to anticipate the scenario that the potential for LSE to arise might only become apparent at the project level, despite having been screened out at plan level. Our view is that it would be useful to have a similar mechanism in place for plan level judgements of no adverse impact on site integrity. The concern is to ensure any risk of project level effects and/or impacts can be addressed. | The report makes it clear that HRA at plan level is not a replacement for HRA at project level, and sets out the situations in which additional HRA would need to be undertaken by project developers. Given the project-level uncertainties within the plan, it is clear that project level HRAs will need to be undertaken. The extent to which these HRAs can draw on the plan-level HRA outcomes will vary between projects, and can be considered by statutory consultees at the appropriate stage. |
|                                                                                                                                                       | 3   | <b>Deferring judgements – accounting for risks identified in HRA.</b> There is a need to refer to potential LSEs that will arise in respective zones at the project level. It would therefore be useful if the HRA process identifies all these risks, including those for which judgement is being deferred to the project level and have therefore being screened out of the HRA plan level process. We recognise that insufficient information may be available for some of the deferred issues, but are keen to ensure that further analysis of deferred issues at a zonal level takes place as part of the HRA plan level assessment. The output would be a list of risks associated with each zone. We view this as an essential stepping stone to ensure continuity between the HRA at plan level and project level needs.                                                                                                    | Zone level risks have been highlighted and drawn together in the conclusion to this report to assist in this process.                                                                                                                                                                                                                                                                                                                                                                                    |

| Company/organisation<br>(contact / date received)                                                                                                                             | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Response to comments                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Joint Nature Conservation<br>Committee (JNCC) and<br>Scottish Natural Heritage<br>(SNH)<br><br>(Response combined)<br><br>(Finlay Bennet / 18-Nov-09)<br><br><i>Continued</i> | 4   | <b>Cumulative impacts between zones.</b> The value of the zonal approach to CE in enabling them as competent authority to manage risks of LSE or adverse effect on site integrity arising at a zonal level is apparent. There are particular uncertainties and risks associated with potential for adverse impacts on a qualifying interest arising from development in a number of different zones. It would be useful if the plan level HRA specifically identifies those mobile species for which it is considered there is a risk arising from across more than one zone; and the zones the risk applies to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Cumulative effects (in terms of development within and between zones) have been addressed in the conclusion of this report. |
|                                                                                                                                                                               | 5   | <b>Effects on marine mammals.</b> The proposed way to assess LSE in 4.3.2 (p77) focuses on the impacts on individual animals and the likelihood of presence of significant numbers in the area affected in terms of populations associated with sites. Whilst potential concerns were raised with respect to the pre-screening report's 100km buffer as an appropriate cut off point to exclude areas from consideration for LSE test, we feel that covering areas as far as Spain and Portugal is overly precautionary. We understand that time constraints largely account for the precautionary approach adopted. Our advice is that rather than the maximum possible distance an individual marine mammal could range, SACs should be included in the assessment only when there is some evidence that animals in those SACs could occur in significant numbers on a regular basis in the areas of development. Hopefully you can use this advice to concentrate only on the relevant sites in the next stage.<br><br>Assessing the impacts on the conservation objectives for marine mammals as a qualifying feature of SACs should take account of the potential for habitat degradation to adversely impact species and also for significant disturbance (e.g. the barrier effect) to have an adverse impact. The overall judgement of impact on site integrity will hopefully be informed by a balanced consideration of these objectives alongside the objective relating to the population of the site. | These factors have been taken into consideration within the AA undertaken in this report.                                   |

| Company/organisation<br>(contact / date received)                                                                                                                           | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <p>Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage (SNH)</p> <p>(Response combined)</p> <p>(Finlay Bennet / 18-Nov-09)</p> <p><i>Continued</i></p> | 6   | <p><b>Effects on bird interest of SPAs and Ramsar sites.</b> Our concern relates to the sentence in section 4.3.2 on page 79 that states that there is unlikely to be a significant effect on a bird population if a very small proportion of the habitat it depends on is changed or lost. We believe that this assumes that all suitable habitat is uniformly important to the birds. In some cases this might be true but it will depend greatly on the ecology of the site and species. For example, a species might feed over a large area of shallow sandbanks but certain tides and currents may concentrate prey in one small area at certain times of day/year that make that area very important relative to the rest of the potential feeding habitat. Losing this area could have a significant effect on a population. This would need to be considered on a site-by-site and species-by-species basis. To illustrate this issue more, our advice is that activities such as cabling could have a likely significant effect on a qualifying interest such as common scoter at Liverpool Bay pSPA.</p> <p>An additional issue with respect to birds is the potential impact of night time lighting. Our understanding is this was only considered for bats. This was only for onshore installations though (p.32). Clearly birds may also be affected by night time lighting, including seabirds, but only during specific times of the year and in specific weather conditions. The type and location of lighting may also be relevant.</p> | <p>The point regarding the size of area affected in relation to its importance for birds has been addressed in the bird chapter of this AA report.</p> <p>Effects arising from lighting of individual projects will need to be assessed at project level; there is insufficient information at Plan level to allow this assessment to be undertaken, as the locations of individual windfarm projects and the nature of the lighting which they will employ have not yet been defined.</p>                                                                                                                                                             |
|                                                                                                                                                                             | 7   | <p><b>Future additions to the Natura 2000 Network.</b> JNCC and the other SNCBs are undertaking work to meet the UK Government's obligations with respect to the Natura 2000 Network. We recognised that given that this work is running over a considerable time-scale and concurrent with overall Round 3 development, it is not feasible to seek to account for all risks that arise with respect to the HRA at the plan level; however desirable it might be to do so. We also recognised the value of ongoing early dialogue as one of the tools that will help to address issues. With respect to marine SPAs, JNCC hope to provide CE with a copy of the following categories of work by Friday 4th December: 1. Areas of search for inshore aggregations of waterbirds outside the breeding season; 2. Colony extensions for fulmars, gannets and auks; 3. Possible additional areas for terns, shags and red-throated divers; 4. Important offshore hotspots. It is important to note that the information will only provide an indication of where pSPAs might eventually be located e.g. Areas of Search. They will not identify possible boundaries; it is therefore important that the information is handled with sensitivity.</p>                                                                                                                                                                                                                                                                                                         | <p>This comment is noted. It is clearly not possible to assess all future designated sites within the UK as part of the Round 3 plan HRA, and for the specific areas mentioned in the response the information will not be available within necessary timeframe - assessment of areas within the Plan-level HRA requires knowledge of both boundary and qualifying features. However, we have made it clear within this report that plan-level HRA does not exclude the requirement for project-level HRA, and that the designation of new sites after completion of the plan-level HRA would be an important factor to consider at project level.</p> |

| Company/organisation<br>(contact / date received) | No.          | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Natural England<br>(Victoria Copley / 18-Nov-09)  | Intro para 2 | "If the Round 3 plan is to meet this test, it is imperative that it provides the flexibility that is required to enable individual projects to be designed in such a way that there is no adverse effect on the integrity of European/Ramsar sites". This is the most important aspect of this HRA process and we wish to flag this now to stress the fundamental requirement for such flexibility. It is vital that this plan level HRA is as specific as possible as to the assumptions made within it as to which effects may/ should be avoided and may/ should be mitigated by taking certain measures. It is these assumptions which zonal developers will need to incorporate into their optimised zone layout. Only then can we have the confidence that the deferred project level assessment will take place within a framework of sufficient flexibility. | Within this report, the summary tables provided clearly show the sites and features for which additional assessment will be required at project level. In addition it has been re-emphasised that plan-level HRA does not preclude the requirement for project-level HRA. The plan assumptions have been stated in the screening report and this report, and have been summarised in the conclusion to this report.                                                           |
|                                                   | 1            | P6 penultimate paragraph –the scope of preliminary assessment work or research is not adequately covered in Chapter 5. We note that discussions are planned but it is our view that this should be more specific in the next stage of the HRA process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Further information has been provided in this report.                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                   | 2            | Mitigation measures – scour protection is not generally a measure taken to mitigate environmental impact, indeed in many cases it may exacerbate it. (table 2.6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | This point is noted. Scour protection should be used where appropriate and with regard to possible additional environmental impacts. This has been noted in the appropriate sections of the report.                                                                                                                                                                                                                                                                           |
|                                                   | 3            | Rather than listing huge numbers of sites entering the screening process (eg Table 3.6) would it be possible to include shorter tables listing those sites that were screened out (or would such lists be even longer?) It is not possible to scan this list and verify that all sites that are on it should be, and that all those sites not on it should not be.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | The sites entering the screening process were selected from the full national (and transnational) site lists on the basis of the criteria outlined in Chapter 3 of the screening report (and previously detailed in the Pre-Screening report). This was done largely through GIS analysis of the complete datasets. The list of sites NOT entering the screening process would therefore be considerably longer than the table provided in Chapter 3 of the Screening Report. |
|                                                   | 4            | Page 44, 3rd paragraph, it should be noted that Rounds 1 and 2 have only used monopole foundations and it is expected that a variety of other turbine bases will be adopted for Round 3. Therefore the assumptions as to the significance of impact on sedimentary processes can not be relied upon if only based on experience to date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | This point is noted, and has been incorporated in the assessments undertaken for the habitats chapter of this report.                                                                                                                                                                                                                                                                                                                                                         |

| Company/organisation<br>(contact / date received)                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                            | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| Natural England<br>(Victoria Copley / 18-Nov-09)<br><i>Continued</i> | 5   | In the lists of SPAs included, we note that this does not include possible offshore extensions to existing terrestrial SPAs eg foraging locations for breeding terns. We concur with JNCC that it is important that NE and JNCC maintain a close dialogue with The Crown Estate and developers to ensure that the best available information on which locations may qualify in future is used in assessments. | This comment is noted. It has not been able to include these possible extensions within the HRA process as the boundaries have not been defined, and we understand that the information regarding the areas of search will not be available within necessary timeframes. However, we have made it clear within this report that plan-level HRA does not exclude the requirement for project-level HRA, and that the designation of new sites after completion of the plan-level HRA would be an important factor to consider at project level. |
|                                                                      | 6   | Page 78 – section 4.3.4 In this section there is frequent references to “prey”. These references should perhaps be changed to read “food” because herbivorous birds like geese, swans and some ducks which feed on vegetation on intertidal flats within SPAs may also have their food supplies impacted by changes to the habitat.                                                                           | References to ‘prey’ have been amended to ‘food’ in this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                      | 7   | Page 79 – it is wrong to conclude no LSE on bird species simply because the area of SPA habitat impacted is small.                                                                                                                                                                                                                                                                                            | This point has been addressed in the bird chapter of this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                      | 8   | Page 80 – the statement that “there is little information regarding the distribution of birds at sea” is very dismissive of all the work which JNCC, WWT and developers have carried out in the past and also more recently both independently and under the auspices of SEA and RAG. The HRA should be clear about what information is available and the gaps whether temporal or spatial.                   | This point has been addressed in the bird chapter of this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                      | 9   | Page 80 last sentence. We believe it is incorrect that there are no conservation objectives for habitats within SPAs that are supporting habitats for the bird interest features. Many sites will have targets for the supporting habitats – largely because they are notified interest features of the underlying SSSIs.                                                                                     | This statement was made in respect of habitats within SPAs as designated under the Habitats Regulations. It is understood that these habitats are important for bird interest features (which was the reason for their assessment in the screening process), and that they may have conservation targets as part of SSSIs, but as part of the SPA they have no Conservation Objectives within the Habitats Regulations meaning of that term.                                                                                                   |

| Company/organisation<br>(contact / date received)          | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Response to comments                                                                                                                                                                                                                                                                                                        |
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| Natural England<br>(Victoria Copley / 18-Nov-09)           | 10  | Page 82 table 4.1 – are there any fisheries plans or projects which should be included in combination?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Marine fisheries are not subject to HRA and do not constitute plans or projects under the Habitats Regulations.                                                                                                                                                                                                             |
| <i>Continued</i>                                           | 11  | Appendix D SPA Habitat screening forms – on various sites it is concluded that there will be no LSE on saltmarsh habitats due to sediment disturbance arising from cabling because “saltmarsh is naturally an area of sediment accretion”. However, on many sites (especially in the south and east), saltmarsh habitat is already eroding significantly and it is therefore potentially vulnerable to any loss of sediment from the system that may arise due to sediment disturbance while cabling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | It is agreed that saltmarsh will be sensitive to erosional effects at/near cable landfall points, and mitigations have been incorporated into the plan for this effect. The statement regarding the accretional nature of saltmarsh habitat was intended to address issues relating to sediment deposition on this habitat. |
|                                                            | 12  | Appendix D Liverpool Bay, Morecombe Bay and Outer Thames. In these 3 cases an LSE due to the direct effect of cabling on the habitat is ruled out on the grounds that the area affected directly will be small in relation to the area of sedimentary habitat in question. This does not follow if the area through which the cables run happens to be relatively more important to the birds than other areas (see point 5 above).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | This issue has been addressed in the bird chapter of this AA report.                                                                                                                                                                                                                                                        |
| Marine and Fisheries Agency<br>(Dickon Howell / 17-Nov-09) | n/a | The MFA are happy that their comments on the pre-screening report have been addressed, and have no further comment to make on the screening report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | No response required                                                                                                                                                                                                                                                                                                        |
| One North East<br>(Phil Jones / 13-Nov-09)                 | n/a | The Agency welcomes the opportunity to comment on the Screening Report for the Habitats Regulations Assessment for the Round 3 Plan, but have no specific comments at this stage.<br><br>The Agency recognises that the proposed locations of the windfarm zones are not within the North East region. However, it is noted that four of the Special Areas of Conservation (SAC sites) within or bordering the region are designated for coastal features in addition to the fact that the majority of Special Protection Areas (SPA sites) (four of these also designated as Ramsar sites) in the region are coastal. The Berwickshire & North Northumberland Coast, Durham Coast, North Northumberland Dunes and the Tweed Estuary SACs all lie along the coast and demonstrate some of the richest examples in the North East. The coastal SPAs have significant populations of breeding birds and populations of passage and wintering waterbirds of some 14 species. These issues should be considered in any development proposals in terms of all synergistic, cumulative and direct effects not only on the location of the windfarms and cables but also disruption during their construction. | One North East's comments are welcomed. All the SACs, SPAs and Ramsar sites mentioned in the response have been assessed as part of the screening process.                                                                                                                                                                  |

| Company/organisation<br>(contact / date received)                                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09) | 1   | Consideration of strategic research (including an integrated gap analysis of all seabirds at sea data) and bird monitoring (including understanding the linkages between birds, zones and SPAs/Ramsar sites) is vital for robust assessments of the impacts on off-site SPA birds of Round 3 offshore wind. We consider that such information is a key area for urgent consideration between the relevant parties, and welcome the references to this in the screening report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | No response required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                      | 2   | Introduction - Page 2, Box 1.1: We appreciate the difficulties involved in assessing Natura 2000 sites that are in the process of designation, but we strongly welcome the inclusion of the potential SPAs in the screening process of the Round 3 Habitats Regulations Assessment (HRA).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | No response required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                      | 3   | Overall approach of the HRA (Section 1.2, page 3-7) The approach set out in this section appears logical. However, we have two concerns about the following statement (first paragraph of section 1.2.1, page 3): "Even if there is sufficient information to enable a conclusion to be reached that there are LSEs, there may be insufficient information to undertake an Appropriate Assessment." Firstly, the precautionary nature enshrined in the Habitats Regulations indicates that the determination of LSE is not whether one has enough information to find LSE, but whether there is enough information to exclude LSE. As such, where information is limited, a precautionary approach should be taken, and LSE assumed if it cannot be excluded on the available information. However, the approach of the remainder of the screening report does appear to be suitably precautionary in this respect. Secondly, whilst we appreciate that the information available at present may limit the extent of the appropriate assessment, the lack of sufficient information at this stage does not preclude the necessity of undertaking appropriate assessment where LSE is concluded (or indeed where LSE cannot be excluded). We therefore consider that not undertaking appropriate assessment at the plan level is essentially not an option. As such, we welcome recognition (last paragraph of section 1.2.1, page 4) of the Onshore and Offshore Habitat Regulations requiring appropriate assessment, where necessary, at the plan level. | The approach that has been adopted reflects the recognised difficulties in predicting effects on European sites at the strategic level, when project level details are not available. Our approach to addressing this is for the plan level HRA to rely upon lower level, project HRAs on the basis that when these are carried out we know that they will be able to conclude no adverse effect on integrity. This approach means that there is sufficient information for the Crown Estate to undertake AA at the plan level. |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 4   | Page 3 - 4: Test B of the determination as to whether lower-tier assessments are appropriate specifically refers to the ability of the lower-tier plan (i.e. the project) to change the nature and/or scale and/or location of the proposal in order to avoid adverse effects. The RSPB accepts that there is clearly room for changes in scale at the project level. However, the Round 3 Plan and this screening report are clear that no development of offshore wind turbines will take place outwith the nine zones; therefore, the scope for changing the location of the proposal is limited to that within zones. So, whilst it is acknowledged elsewhere in the screening report (e.g. page 19) that, for some of the zones, there may be (limited) scope for mitigation measures by means of micro-siting of turbines within the zones, the question remains as to the extent of the ability to change the location of a proposal at the project stage. The RSPB therefore endorses further consideration of this issue in the Round 3 HRA, with the suggestion that micro-siting of turbines within zones may be a critical mitigation measure that will need utilising at the project-level HRA stage. | Micro-siting will be a critical mitigation measure at the project level. However, if micro-siting (or other measures) is not sufficient to enable windfarm development to be progressed within a zone without adverse effects on integrity there remains the ultimate mechanism, in extreme circumstances, of the development of entire zones being excluded in the event that the consenting authority could not be satisfied with the outcome of the project level HRA. |
|                                                                                                              | 5   | <p>Page 6: The RSPB notes that none of the seven possible conclusions include the Round 3 Plan having an adverse effect on site integrity. We do not believe, however, that at this stage, it is possible to confidently conclude the Plan poses no risk of an adverse effect to designated sites. This is especially so because:</p> <ul style="list-style-type: none"> <li>- it is proposed that a fuller assessment of the available information concerning possible impacts to protected sites and their species (off-site) will not be undertaken in the plan-level HRA; and</li> <li>- the securing of mitigation measures at the project level (as detailed in the screening report, pages 23-24) is necessary for a conclusion of no adverse effect of the Plan.</li> </ul> <p>Further consideration (by Entec and the Crown Estate (TCE)) is therefore needed on this issue. With specific regards to mitigation, we encourage further consideration of turbine micro-siting at the project level (as this is likely to be a key and necessary mitigation measure), and if necessary, revising the scale of the proposal to incorporate such necessary locational/micro-siting measures.</p>              | Text has been added to chapter 1 to address this point and the flow chart has been amended.                                                                                                                                                                                                                                                                                                                                                                               |

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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 6   | Page 7, Fig 1.1: Only three of the seven outcomes (as detailed on pages 5 - 6) involve a full completed appropriate assessment of the Plan. The RSPB believes that appropriate assessment is required if it cannot be concluded there is no LSE/LSE is determined; what can differ between the scenarios is the level of assessment able to be undertaken at the plan level. It is implicit in the screening report that all features which "pass" HRA at the plan level will also likely have to be reassessed at the project level. The RSPB feels that, especially in light of the comments made above, it is highly likely that project-level HRAs will be needed irrespective of the conclusions of the Round 3 HRA. Therefore, to avoid any confusion, we suggest that it would be of benefit to clearly state that project-level HRAs will also need to be carried out, irrespective of the conclusions of the Round 3 HRA. | The AA report is more explicit regarding the need for HRA at the project level. However, it is considered likely that in some cases at least these project level HRAs will be able to draw on the plan level HRA in some areas, and the term 'irrespective of the conclusions of the Round 3 HRA' is therefore not considered appropriate for use in the report.                                                                                                               |
|                                                                                                              | 7   | Plan Definition (Section 2.1, page 9-10) The screening report refers to the importance of ensuring that the Plan remains viable (both technically and financially). It also indicates that any refining of the Plan (e.g. changes to, or additional assumptions regarding mitigation measures) for the HRA must not hinder its deliverability. The RSPB, fully appreciating viability as a key consideration, sees the scope of a 'viable project' as including its consent. However, the HRA process requires one to ascertain no adverse effect on site integrity before consent can be granted. Any changes necessary to the Plan on this basis (i.e. on the need to ensure no adverse effect on site integrity) are essentially, therefore, part of the Plan's viability. It thus appears necessary to ensure that any mitigation measures required to this effect, form part of the viability consideration of the Plan.      | It is accepted that viability of a project depends on its consentability. However, at plan-level it is impossible to determine the most appropriate mitigation measures for individual projects within the plan. For this reason, the plan has been adapted to incorporate over-arching plan-level mitigations which are necessarily generic; project developers will need to ensure that these conditions are met by using the most appropriate mitigations at project level. |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 8   | The screening report indicates that where developers at the project level follow the assumptions developed as part of the HRA of the Round 3 Plan, subsequent project appropriate assessments/HRAs may be simplified by referring to the plan HRA. Whilst this is an acceptable position in principle, the RSPB (as in our comments on the pre-screening report) advises that consideration be afforded to the issues relevant to the likely time-lag between completion of the Round 3 HRA and any project appropriate assessments. This is because the likely time between plan- and any project- level HRAs may result in parts of the plan HRA being outdated in light of new information and understanding available (as to, for example, the environmental impacts of offshore windfarms and the effectiveness of mitigation measures) at the time of project HRAs. As such, the applicability and relevance of the conclusions of the plan HRA may be somewhat limited, and caution therefore needs to be taken when considering whether project HRAs can be simplified by referring to the (assumptions of the) plan HRA. It is also pertinent to note that necessary site-specific work (for Environmental Impact Assessments and project HRAs) may re-affirm (or not) the conclusions of the plan HRA, so reliance on the conclusions of the latter must be taken with due caution. These comments somewhat reaffirm the statement made in section 2.1, and therefore the RSPB essentially endorses what is written there. | As noted before, the requirement for project-level HRAs has been stated more explicitly in this report, and the reasons for undertaking HRA at project-level more clearly stated.                                                                                                                                                                                                                                                             |
|                                                                                                              | 9   | Mitigation incorporated into the plan (in section 2.3.6, page 23-24, table 2.6) The RSPB endorses the incorporation of these basic mitigation measures in the Round 3 Plan. Securing such measures as an integral part of the Plan will ensure that due weight can be afforded to their deployment and effectiveness at the project level (and as stated above, the RSPB sees that such mitigation measures (and any other further necessary measures) are a key part of ensuring project viability). Under turbine operation ('activity'), 'avoidance of (e.g. foraging) large bird aggregations of vulnerable bird species (where possible)' should be added to the list of 'basic mitigations' regarding maintenance vessel activity. Further, consideration could be given to measures that can be proposed for the lighting of turbines (as lights can increase collision risk by acting as an attractant to birds), such as placement of minimum lighting (consistent with H&S), the use of intermittent/flashing lights and minimum lumens consistent with navigational requirements. Under cable installation ('activity'), intertidal cabling works at low water may be best with respect to sediments but could potentially maximise disturbance impacts on feeding birds. Temporal/seasonal restrictions on such activity may therefore be appropriate, and where sediment suspension and toxicity are not issues, work at high tide may be more appropriate.                                                             | Mitigations incorporated into the Round 3 Plan must necessarily be high-level, as they need to remain appropriate for a wide range of areas and project types. The mitigations which are most appropriate to individual projects in specific areas are the next tier down. The mitigations suggested by RSPB have been included in this report as possible project-level means of achieving the plan level requirements in relation to birds. |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Response to comments                                                                                                                                                                                                                                                                                                                |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 10  | Page 32, Table 3.1: Add birds to 'night - time lighting potentially affecting bats' (as birds can be attracted to turbine lights at night/in stormy weather, and this can thus increase the risk of collision).                                                                                                                                                                                                                                                                                                                                                                                                                                                             | There is insufficient information available for the effects of night time lighting on birds to be assessed at the Plan level. This is because the locations of individual windfarm projects and the nature of the lighting which they will employ have not yet been defined. Reliance is therefore placed on the project level HRA. |
|                                                                                                              | 11  | Page 38 - 43, Table 3.2: The updates and amendments to this table, such as the inclusion of potential barrier and noise/visual disturbance effects to sensitive bird species, are very welcome. On page 40, we strongly suggest that Entec add the words "and/or presence" to turbine operation (on the second row of the table on page 40). It would thus read 'turbine operation and/or presence' (since the presence of turbines can also have an effect on birds). Amending references of 'turbine operation' (to include 'and/or presence') will therefore need to be considered throughout the screening report (for clarity, this is done throughout this document). | The effects of the presence of turbines are referred to in the bird chapter of this report.                                                                                                                                                                                                                                         |
|                                                                                                              | 12  | The RSPB supports the adoption of the precautionary approach (in that, unless it can be shown that there is not a LSE, LSE is assumed) in the screening report. The use of the tidal ellipse threshold for effects from cable laying and development within zones also appears reasonable and should ensure that the potential/likely effects of such development are included in the assessment.                                                                                                                                                                                                                                                                           | No response required                                                                                                                                                                                                                                                                                                                |
|                                                                                                              | 13  | Effects on the bird interest of SPAs and Ramsar sites (section 4.3.4, page 78-81): We welcome the consideration being afforded to the transnational SPAs that may be affected by the Round 3 Plan. The RSPB suggests that transnational Ramsar sites – given the UK government's policy on Ramsar sites - should also be considered by the Round 3 HRA, and assessed where necessary. It should be noted that transnational Ramsar in non-EU countries, such as Norway, would also need to be included.                                                                                                                                                                     | Information regarding transnational SPAs and Ramsar sites is incomplete. It should be noted that effects on birds migrating between the UK and transnational SPAs/Ramsar sites will need to be addressed through project level HRA as described in the bird chapter of this report.                                                 |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                   |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 14  | Effects related to change in habitat (page 78-79): In determining LSE, it may appear reasonable to consider the extent of the habitat likely to be affected by all development related to the Round 3 Plan. However, unless it can be shown (by means of ecological evidence) that it will not, direct effects on habitat are in principle likely to cause a LSE. Caution therefore clearly needs to be used with this approach, since even a small change or loss of habitat (accounting for only a small proportion of the designated site) may still have a LSE on that site. For example, the area in question (even if only a small area in proportion to the overall size of the site) may be a key foraging or roosting habitat and therefore may hold a disproportionate number of birds than compared to the site as a whole. Loss of even a small proportion of a particularly rare or vulnerable habitat type could also be significant. The RSPB therefore questions whether, on this issue, it is possible to conclude no LSE without adequate (site specific) survey work informing this. Further, the short duration of an effect (although clearly a factor in determining its severity) does not necessarily preclude it resulting in a LSE. For example, during periods of extreme cold weather, birds are more susceptible to disturbance, and therefore even a short period of disturbance from (e.g. cable laying) may result in LSE (whereas in 'normal' conditions, one may conclude no LSE). | This point is similar to that made by some of the SNCAs, and has been addressed in the bird chapter of this AA report. |
|                                                                                                              | 15  | Effects of noise and visual disturbance during cable laying/removal (page 79): turbine installation also has the potential to affect SPA birds, and therefore the RSPB suggests that the HRA considers potential effects from turbine installation when determining LSE. For example, effects could occur from visual/noise disturbance from construction vessels etc, and/or from the installation of turbines by pile driving, which has the potential to affect the abundance of prey species, thus indirectly affecting SPA birds through a reduction in prey resources.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Effects of noise and visual disturbance have been referred to within the bird chapter of this AA report.               |
|                                                                                                              | 16  | Effects relating to turbine operation (and/or presence) (page 79-80): The RSPB agrees with the screening report's conclusion that there is an LSE from turbine operation on SPA birds. Considering 'turbine presence' can also have a potential effect (as above), this section should also include (and conclude) LSE from the presence of turbines. There is a dearth of information regarding the effects of turbine operation (and/or presence) for some (indeed many) bird species, particularly for pelagic and migratory birds. However, the RSPB does consider that there is sufficient information from currently operating windfarms (both on- and offshore) to indicate that turbine operation and/or presence can (dependent on location) result in a LSE on birds. Therefore, whilst we agree with the conclusion that there is a LSE from turbine operation (and/or presence), we do not wholly agree that a LSE must only be assumed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | This point is noted, and has been addressed within the bird chapter of this AA report.                                 |

| Company/organisation<br>(contact / date received)   | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Response to comments                                                                     |
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| Royal Society for the<br>Protection of Birds (RSPB) | 17  | The RSPB agrees with the screening report's statement that there is little information regarding the distribution of seabirds. The RSPB considers that the lack of information relates to both foraging birds and the actual routes of (the majority of) migratory species.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | No response required                                                                     |
| (Toby Gethin / 18-Nov-09)                           | 18  | This section concludes (page 80) that, for turbine operation (and therefore turbine presence, the principal long-term effect) "it is appropriate to rely upon HRA work at the project level." With the lack of information, the RSPB accepts that an assessment of the effects of turbine operation on SPA species, at the plan level, is problematical. For the majority of qualifying features, it may be necessary to rely more heavily on project-level HRA work. However, for some species (particularly for long-distance Annex 1 migrants likely to occur in the zones only in transit: e.g. corncrake, dotterel, stone curlew, nightjar, whooper swan), there are likely to be effects that will be equally (or indeed more) difficult to address at the project level and would be most appropriately addressed at the geographical scale of the plan (i.e. at the strategic/plan level). Therefore, at a minimum, the RSPB suggests that the strategic level assessment could usefully identify bird species and zones most likely to be susceptible to collision or displacement from the presence (and/or operation) of turbines (including associated maintenance and repair vessels, personnel etc). Potential cumulative effects on categories of SPA qualifying feature across the Plan and the UK could also therefore be identified. | Certain migratory species have now been screened out of the assessment.                  |
| <i>Continued</i>                                    | 19  | While the scope of the appropriate assessment may be limited by the available information, it can none-the-less identify all the possible impacts of the Plan and address as many effects as possible at this stage (including setting out the extent of the assessment and any caveats). Clarification as to which effects have been left for the project-level assessment will maximise the value of the plan HRA and help to clarify the scope of future project-level HRAs. As stated in the screening report, assessing the available information at the plan level will aid direction at the next stages of assessment (i.e. at the project level). Conducting such work now will also mean that all such necessary work will not be loaded on to the project level stage; a route that is likely to be less well equipped to undertake an assessment at such a strategic level necessarily required due to the nature and geographical scope of the Round 3 Plan.                                                                                                                                                                                                                                                                                                                                                                               | Effects that require assessment at the project level are identified in the bird chapter. |

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| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Response to comments                                                                                                                                                                                                                                                                                                              |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 20  | Notwithstanding the above, the proposed absence of a plan-level HRA for birds means that there is an even greater need to ensure that project-level HRAs (and especially assessment of "in-combination" effects) are carried out to a suitably high common standard, adopting a more strategic approach than necessary at other previous project-level HRAs. Further consideration, in the next Round 3 HRA report, of how this can be achieved would therefore be welcome.                                                                                                                                                                                                                                                                                                                                                         | Plan-level HRA has been undertaken for birds but this places extensive reliance on project level HRA, as discussed above. The requirement for project-level HRA has been explicitly stated in this report. The standard to which these assessments are undertaken is the responsibility of the project-level competent authority. |
|                                                                                                              | 21  | The "linkages between birds, potential zones of development and SPAs/Ramsar sites", referred to in the penultimate paragraph of this section (page 80), are clearly a key aspect of assessing the impacts of Round 3 offshore windfarms, and will require specific, targeted work and/or modelling to resolve. We strongly support the report's conclusion in section 4.3.4 that these links need to be understood, and agree that this information is clearly critical for robust and adequate project-level HRAs. On this basis, we encourage the relevant parties (Entec, TCE, the developers, government departments etc) to give further consideration as to how such information can be obtained (e.g. survey work, such as targeted studies and modelling) and to ensure that sufficient resources are provided to this end. | This comment is noted. The Crown Estate is undertaking a large number of 'enabling actions' in relation to Round 3, and many of these are focused on the collection and analysis of bird data for the zones.                                                                                                                      |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response to comments                                                                                                                                   |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 22  | <p>Screening forms (section 4.3.5, page 80-81) - Due to the screening report's conclusion that it is not possible to undertake a reasoned (plan-level) HRA of the operation and/or presence of turbines (plus associated maintenance works etc) on SPA birds, effects on (SPA and Ramsar) bird interests off-site have not been screened (i.e. only the effects on Natura 2000 and Ramsar habitats have been screened). The RSPB considers that a worthwhile assessment of off-site bird interests could be undertaken at the plan level (see above). However, notwithstanding our concerns that the plan-level HRA for off-site birds should be carried out, at the very least, we recommend that:</p> <ul style="list-style-type: none"> <li>- the Round 3 HRA makes it clear that the decision not to undertake a plan-level assessment on off-site birds does not indicate no LSE (or indeed that the effects of turbine operation and/or presence are seen as lesser issue than other considerations). It would also be advisable to take a precautionary approach to the judgement of LSE and screen all sites in plan HRA (rather than not screen) – this would be consistent with the precautionary (and welcomed) approach taken throughout the screening report.</li> <li>- the Round 3 HRA stress that that decision further underlines the need to undertake thorough and targeted survey work to ensure that there is sufficient information available for a comprehensive and joined-up/strategic screening process and subsequent assessment (where necessary) at the project level.</li> </ul> | This report makes it clear that project level HRA will be required, where appropriate, and that this will need to be informed by detailed survey work. |
|                                                                                                              | 23  | In-combination effects (section 4.3.7, page 82) The list of plans/projects that have possible in-combination effects with the Round 3 Plan appears comprehensive and we support the approach adopted in the screening report. With regards to Round 1 and Round 2 offshore windfarms, the report states that "it has been assumed that landfall points [for cable routes] will be along the coast closest to the windfarm." Whilst we appreciate that not all (Round 2) offshore windfarms have been constructed/consented, the majority have, and there is (on the whole) much information available regarding the remaining projects still outstanding. We therefore suggest that the Round 3 HRA uses the information, available in the majority of cases, as opposed to relying on assumptions regarding cable routes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | This point is noted, and it is considered that this information would be useful at the project-level HRA stage.                                        |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Response to comments                                                                                                                                                                                                                                                                                                                                                                      |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 18-Nov-09)<br><br><i>Continued</i> | 24  | We note that some Special Areas of Conservation (SACs), including Braunton Burrows SAC and Morecambe Bay SAC, by means of the mitigation measures proposed in the screening report, have been screened out (i.e. no LSE has been concluded). Whilst we welcome the mitigation measures proposed and accept they might enable an avoidance of adverse effect, it is the RSPB's view that since the precise details of mitigation measures are not known at this stage, it cannot be concluded with certainty that there will be no LSE at the plan level.                                                                                        | The list of SPAs and Ramsar sites that could be significantly affected has been reviewed and Morecambe Bay has been screened-in.                                                                                                                                                                                                                                                          |
|                                                                                                              | 25  | Next stage of the assessment (section 5.2, page 118) The RSPB supports the conclusion that there is a need for a strategic approach to addressing current information gaps. In the context of the issues raised above, we believe that there is an urgent need for an integrated gap analysis of all seabirds at sea data to identify those areas for which no current data exists, and for which survey is required, and development of a monitoring programme to facilitate the ongoing monitoring of seabird populations in UK waters.<br><br><i>(Further suggestions regarding the nature of this assessment were made in the response)</i> | This comment is noted. The Crown Estate is undertaking a large number of 'enabling actions' in relation to Round 3, and many of these are focused on the collection and analysis of bird data for the zones.                                                                                                                                                                              |
|                                                                                                              | 26  | Identification of sites and clarity of colours used in the maps: From the maps in the Appendices, the colouring suggests that some of the sites are not designated and/or screened in. For example, in Figure B1 it is difficult to ascertain (from the colouring of the map, which appears to be pink/orange) what protection the Humber Estuary has; greater clarity in terms of colouring sites and map keys would therefore be welcome.                                                                                                                                                                                                     | Owing to the large number of sites which needed to be included on the maps, and the overlaps in site boundaries, it was difficult to make designations perfectly clear. The inclusion of a range of maps was intended to clarify the sites, in addition to site name labels in different colours. The maps should be read in conjunction with the site lists presented within the report. |
| Welsh Assembly Government<br>(Energy Branch)<br><br>(Michael Cummings / 19-Nov-09)                           | 1   | WAG are also undertaking marine mammal and diving bird surveys off Anglesey and Pembrokeshire. The data could be made available for assisting the Appropriate Assessment when the reports are completed in Feb/Mar 2010.                                                                                                                                                                                                                                                                                                                                                                                                                        | The data from these surveys will unfortunately not be available within the timeframe of this HRA. However, these data may be important in the project-level HRAs for zones 8 and 9, and should be assessed at this stage.                                                                                                                                                                 |

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| Company/organisation<br>(contact / date received)                                                          | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Response to comments                                                                                                                                                                                              |
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| Welsh Assembly Government<br>(Energy Branch)<br><br>(Michael Cummings / 19-Nov-09)<br><br><i>Continued</i> | 2   | Section 5.2.2 of the screening report mentions that The Crown Estate are proposing to develop a research programme. The Offshore Renewables Research Steering Group (chaired by DECC) should be mentioned here. This group will agree a comprehensive programme of research and data collection that targets the key impact issues and stakeholder concerns. The programme of research is focussed mainly on R3 offshore wind and will supplement the individual developers' zone or project level research and development. The Crown Estate sit on the Steering Group and both research Programmes should link up to ensure no duplication. | This point is noted, and highlighted to The Crown Estate. The Crown Estate's involvement in the Steering Group will assist in the development of complementary research streams specifically relating to Round 3. |

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# Appendix B

## Responses to Consultation on the Report to Inform Appropriate Assessment

30 Pages

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The following table is a record of consultee responses to the consultation draft of this report.

The table records the way in which the responses have been incorporated into the final version of this report.

| Company/organisation<br>(contact / date received)                       | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09) | 1   | CCW confirms that we agree with the overall findings of the assessment and, subject to our comments below, we would be content for TCE to conclude no adverse effect from the Round 3 plan for Offshore Wind. Subject to our comments below, the plan level assessment correctly identifies the likelihood of adverse impacts and, where necessary, the mitigations or need for project specific HRA necessary to allow the conclusion that the R3 plan will not have an adverse impact on any European site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comments from CCW have been incorporated as described below. CCW have been issued with a track-changes version of this report to demonstrate that their comments have been taken into account.                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                         | 2   | The phrasing of the description of the relationship between the HRA of the Round 3 plan and project specific HRA (Sections 1.3 & Section 7) implies that there is no requirement for sites or features to be assessed at the individual project level where the plan level assessment concludes no adverse impact on that site or feature, and where the R3 plan assumptions are met at the project level. We recognise that assumptions made at the individual project level are very unlikely to be identical to those at the plan level. However, the requirements of the Habitats Directive should be applied to all elements of plans or programs, regardless of whether a preceding plan level HRA had concluded that there was unlikely to be an adverse impact arising from the plan or any part of the plan. At our meeting you confirmed that it was not your intention to imply the possibility that assessment at the project level might not be required in these circumstances. We suggest amending the phrasing of the relevant text in the report to emphasise that the undertaking of HRA at the Plan level does not negate the need for relevant assessment processes to be undertaken at the project level. It may be also be appropriate to impose a caveat within the Zone Development Agreements or the associated Schedules which says that any development project that could have an adverse effect on the integrity of a European site will not be in accordance with the assumptions of the R3 plan. | TCE notes that the HRA process will need to be followed at project-level and to emphasise project-level requirements has included relevant text in the schedules to a side letter which will be exchanged with each of the preferred developers and which is cross-referenced in and made binding by the Zone Development Agreement for each zone. The detail of this text has been agreed through further consultation with Statutory stakeholders. Final versions of the schedules will be distributed to the statutory consultees for their future reference. |
|                                                                         | 3   | We recognise the need to defer consideration of in-combination effects to the project level when sufficient information will be available about activities for a meaningful assessment to be made. However, whilst we agree that in-combination effects within individual zones can be addressed in zonal and project specific planning by developers we believe that there is a need for a mechanism to ensure consideration of these effects across multiple zones. It may be helpful to specify the need for this assessment in the Schedules to the Zone Development Agreements or other supporting guidance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | The schedules have been amended to include a reference to consideration of the need for a zonal approach to HRA and for reference to any applicable guidance. The detail of this text has been developed in consultation with Statutory stakeholders to reflect key findings of AA. Final versions of the schedules will be distributed to the statutory consultees for their future reference.                                                                                                                                                                  |

| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 4   | There is a need to be more precise and consistent in the use of the term 'mitigation'. For instance in Sections 5.3.14 and 6.4, the term 'Plan Level Mitigation' is used to describe what would conventionally be considered to be mitigation. However, Section 7.1.1 describes outcomes termed 'Plan Level Mitigation' although the text describes the objectives of mitigation rather than the mitigation measures. We suggest that in this case 'Plan Level Mitigation' is replaced with 'Mitigation Objective'.                      | Throughout the AA document and the schedules, the following terms have been used:<br><br><i>General environmental measures</i> to refer to the list of measures set out in Table 1.1<br><br><i>Avoidance and mitigation measures</i> to refer to the Plan level requirements. This use of the term mitigation is considered appropriate as they mitigate the effects of the <i>PLAN</i> ; they are effectively the measures that the Plan-level AA relies on to mitigate LSE and avoid adverse effect on integrity. |
|                                                                                                 | 5   | Table 4.5. There is evidence that bottlenose dolphin migrate in significant numbers from Cardigan Bay, where they form part of the population that is a feature of the Cardigan Bay SAC. We do not disagree with the conclusion that the R3 plan will not have an adverse effect on the bottlenose dolphin feature of the Cardigan Bay SAC, but bottlenose dolphin should be taken into account during any HRA of an individual project in the vicinity of the North Wales coast.                                                        | The potential for the bottlenose dolphin interest feature of the Cardigan Bay SAC to be affected by windfarm projects in the vicinity of Wales has been noted in the text and has resulted in the site being placed in the 'yellow' category (where Plan-level mitigations are required). Table 7.2 has been amended to show that effects on this SAC would arise primarily from Z8 (Bristol Channel) and Z9 (Irish Sea).                                                                                           |
|                                                                                                 | 6   | The description of the sensitivities of habitat interest features to Round 3 activities in Section 5.1.3 describes 'the establishment of fishery exclusion zones'....that 'will protect reef habitat from effects of trawling resulting in an increase in habitat'. This does not describe a sensitivity rather a potential benefit which is not relevant to the AA. We suspect that this should read 'the establishment of fishery exclusion zones'....that 'will affect reef habitat...' and should be amended accordingly or deleted. | This text has been amended in accordance with this comment.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Response to comments                                                                                                                                                                                           |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 7   | <p>We do not believe that the assessment of the risks of biological disturbance on page 106 is sufficiently comprehensive. The assessment only considers the risks of vessels delivering equipment as potential vectors for the introduction of non-native species, and also assumes that there is only a risk from vessels originating outside Europe implying that any non native species found in Europe will be endemic in the UK. Significant damage may be caused by allowing the spread of non-native species within Europe and also within the UK as evidenced by the effects of the recent introductions of <i>Crepidula</i> (Slipper limpet) and <i>Didemnum</i> (Carpet Sea Squirt) in North Wales. Any assessment should also consider the installation rigs for the turbines and cables and any associated underwater equipment. It is also necessary to assess the potential for turbines, scour protection or other permanent deposits to act as a 'stepping stone' for non native species (a potentially significant issue as most turbines will be sited on sandy sediments).</p> <p>Identification of suitable mitigation that might be implemented at the project level should, however, ensure no adverse impact from non native introductions (perhaps in Section 5.3.14). The plan level assessment should therefore advise the need for individual projects to assess the risk of the introduction of invasive non-native species and ensure that appropriate steps are taken to ensure no adverse impact on European site features.</p> | The text in Section 5.1.3 and the subsequent assessments have been amended in the light of these comments, and additional mitigations have been suggested for reducing risks associated with invasive species. |

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| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 8   | It is not clear why the Atlantic Salt meadow (saltmarsh) feature has been screened out from the AA. CCW considers that saltmarsh in the vicinity of cable works in particular, such as may be the case in the Dee Estuary SAC where the plan anticipates cabling activity, is potentially vulnerable to damaging disturbance. The potential for such effects should be recognised in Table 5.13 and by adding a mitigation objective relating to the need to ensure no adverse effect on site integrity due to effects on any saltmarsh features (Section 7.1.1.1). | Saltmarsh within the Dee Estuary SAC (and other SACs) was screened out on the basis that the implementation of general environmental measures (as set out in Table 1.1 of this report) would be sufficient to mitigate the potential effects on saltmarsh habitats. Whilst saltmarsh (and some other habitat types) have been screened out at Plan level, it is clear that project-level HRA will need to screen sites on the basis of the potential for specific project proposals to have LSEs/adverse effects on their integrity. At this stage, project developers will need to incorporate the appropriate general environmental measures and demonstrate that their proposals will have no adverse effect on integrity. Should they be unable to demonstrate this, additional mitigation would be required. Text has been added in Section 5.1.1 to clarify this. Given this, and the conclusions of the screening process, it is not considered appropriate within the HRA process to include a Plan-level avoidance and mitigation measure for saltmarsh. |

| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 9   | <p>The plan indicates that 70 km of cable might go through the Menai Strait and Conwy Bay SAC or within one tidal ellipse of that area but, because the area is not heavily industrialised, there will be no risk of toxic contamination from disturbed sediments (p104). The AA therefore concludes no adverse effect from toxic contaminants on the SAC despite the possibility of sediment disturbance from laying cables. However, this assessment does not consider the risk of disturbing sediment known to be contaminated by historic activities such as sludge dumping and local mining. For instance, Red Wharf Bay on Anglesey is affected by significant contamination from sludge dumping and there is significant metal contamination within the sediments around Amlwch that originated from mining activities at Parys Mountain. Both areas are adjacent to the SAC and, should they be disturbed by the nearby cable laying activities predicted by the plan, there is a risk of contamination. The site conclusion in Table 5.33 should therefore identify the need for this issue to be addressed at individual project level once adequate information about cable laying activity and routes is known. The plan level mitigation identified in bullets 8, 9 and 11 should perhaps also be amended to reflect the need to address this issue.</p> <p>There is also some confusion about the extent to which cabling will affect the site. Table 5.33 on page 163 indicates that 70km of cable will be located within the site however, on p164 the commentary describes cabling as taking place over 18km from the site. This paragraph also indicates that the relevant zone (9) will be 2km from the site, whereas we suspect this should read 20km. Although, these inconsistencies do not affect the ability to draw conclusions about adverse effects they should be corrected.</p> | <p>Text in Section 5.1.3 has been amended to take account of the possible presence of 'historical' contamination in areas which are not currently heavily industrialised. The text in Section 5.3.13 has also been amended with the specific contamination details for the site.</p> <p>On the advice provided by CCW, the potential for sea caves at Menai Strait and Conwy Bay SAC to be affected by contaminated sediments has been identified, and the requirement for assessment at project level has resulted in the outcome for this feature being altered from 'green' to 'orange'. This has resulted in the inclusion of a new Plan-level mitigation and avoidance measure for sea caves in Section 5.3.14.</p> <p>Cable length and site distance figures amended within the text (70km of cable runs through the site, and the zone is 23km from the site).</p> |
|                                                                                                 | 10  | <p>Section 6.3 describes the effects of cable laying on bird interest features and correctly concludes that un-armoured cable is unlikely to cause significant habitat loss or change and that the effects of armoured cabling on habitat availability can only be determined, and so will need to be assessed, at the project level. Table 6.3 concludes, for instance in the case of Liverpool Bay pSPA, no adverse effect of cabling due to changes in habitat availability once mitigation is implemented. The AA identifies cable micro-siting as potentially an effective method of mitigating these effects at plan level (Section 6.4 bullet 4). Avoidance of areas, such as important feeding habitat for birds, may require significant re-routing of cables rather than small scale repositioning and the mitigation here should reflect this, perhaps by substituting the word 'micro-siting' with 're-routing'.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>Clarification text has been added towards the end of Section 6.3. Re-routing the cable has been given as an example of a suitable mitigation measure.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Response to comments                                                                                                                                                                                                                                                                                                                                                      |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 11  | CCW considers that tern species in the Dee Estuary SPA and Ramsar site should also be identified as being at risk of adverse effects from cabling disturbance (Table 6.3, page 194) but that appropriate mitigation applied at the project level would remove these risks.                                                                                                                                                                                                                                                         | Effects on Terns have now been considered for a number of sites including the Dee Estuary SPA. Text is provided in section 6.2.3 and an assessment provided in Table 6.3.                                                                                                                                                                                                 |
|                                                                                                 | 12  | The draft Schedules currently describe general environmental measures and some of the feature specific mitigations that must be taken into account as part of project level HRA for each zone. We understand that the Schedules will be re-drafted based on our advice on the AA, as far as it effects the Schedules, and we assume that TCE will transcribe the relevant amendments faithfully. We have however provided some comments on the generic content of the draft schedules to help with re-drafting the final versions. | TCE has noted the comments of consultees and amended the schedules (where relevant) in accordance with those comments. Final versions of the schedules will be distributed to the statutory consultees for their future reference.                                                                                                                                        |
|                                                                                                 | 13  | As stated above, the text that describes the requirement for project level HRA should make it clear that project-level HRA will be applicable to all aspects of any plan or project that comes forward under the Round 3 plan.                                                                                                                                                                                                                                                                                                     | TCE has noted the comments of consultees and amended the schedules (where relevant) in accordance with those comments. Final versions of the schedules will be distributed to the statutory consultees for their future reference.<br><br>The text in Section 1.3.2 and 7.1.2 of the AA report has also been amended to clarify the requirement for HRA at project level. |
|                                                                                                 | 14  | The Schedules might also usefully highlight that consent for individual developments may be withheld where adverse effects on European sites cannot be discounted.                                                                                                                                                                                                                                                                                                                                                                 | This comment is noted.                                                                                                                                                                                                                                                                                                                                                    |

| Company/organisation<br>(contact / date received)                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                     | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Countryside Council for Wales<br>(CCW)<br><br>(Keith Davis / 16-Dec-09)<br><br><i>Continued</i> | 15  | The feature specific mitigations described in the draft Schedules would be better termed 'Mitigation Objectives'.                                                                                                                                                                                                                                                                      | Throughout the AA document and the schedules, the following terms have been used:<br><br><i>General environmental measures</i> to refer to the list of measures set out in Table 1.1<br><br><i>Avoidance and mitigation measures</i> to refer to the Plan level requirements. This use of the term mitigation is considered appropriate as they mitigate the effects of the <i>PLAN</i> ; they are effectively the measures that the Plan-level AA relies on to mitigate LSE and avoid adverse effect on integrity. |
|                                                                                                 | 16  | It would be helpful if Schedules for each zone provided a clearer summary of the key issues and, in particular, the nature of any potential adverse effects that will require mitigation at the project level. Some reorganisation of the Zone Specific Considerations tables to clearly highlight the issues associated with each zone might help with this.                          | Schedules are a contractual document, and primarily intended for the understanding of the zone development partners. TCE feels the current structure clearly and concisely conveys the findings of the AA to development partners highlighting the specific issues they will need to comply with.<br><br>The final report containing information to inform the AA will be distributed to zone development partners with the Schedules.                                                                              |
|                                                                                                 | 17  | The AA provides useful summaries of mitigation measures that, whilst not essential to allow no adverse effect to be determined at the plan level, should be recorded as guidance to developers. This information might usefully be provided in the Schedules although it may also be appropriate to consider placing this information in other guidance to support Round 3 developers. | TCE will work with SNCAs, zone development partners and other stakeholders to develop relevant guidance, including guidance on mitigation, during the next (development) phase of Round 3.<br><br>The requirement for zone developers to take emerging guidance into consideration at project level has also been noted in this AA report.                                                                                                                                                                          |

| Company/organisation<br>(contact / date received)                                                                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| DECC<br>(Phil Bloor / 17-Dec-09)                                                                                     |     | Many thanks for providing DECC the opportunity to comment on the Habitat Regulations Assessment undertaken by Crown Estate for the proposed Round 3 for offshore wind farms. We note your consideration of our previous comments and the approach you have taken with regards the plan and project level assessments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No response required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Joint Nature Conservation Committee (JNCC)<br><br>Scottish Natural Heritage (SNH)<br><br>(Finlay Bennet / 16-Dec-09) | 1   | <u>Overall Conclusion:</u> We believe the findings of the report would be strengthened by including an overall conclusion. This would be with respect to both requirements under the Habitats Regs that have been addressed through the HRA process i.e. the likely significant effect test, and the conclusion that there is no reasonable scientific doubt as to the absence of adverse effects on conservation objectives for the interest features of sites.                                                                                                                                                                                                                                                                                                                                                                                            | An overall conclusion has now been included in Section 7.1.1.<br><br>TCE has also recorded the conclusion internally alongside supporting information taken from the reports which have been consulted upon as a record of appropriate assessment.                                                                                                                                                                                                                                                        |
|                                                                                                                      | 2   | <u>Requirement for Project Level HRA:</u> We discussed the language used in the report that essentially describes when this requirement may apply (e.g. Sections 1.3.2 & 7.1.2). We believe that the fact that HRA will apply at the project level whenever there is any uncertainty with respect to the effects of the project on qualifying interests of sites could be articulated more simply and clearly. This would address our concern that misunderstandings may arise with respect to Habitats Regs responsibilities at the plan level vis-à-vis project level.                                                                                                                                                                                                                                                                                    | The text In Section 1.3.2 and 7.1.2 has been amended to clarify the requirement for HRA at project level.<br><br>The schedules have been amended to include a reference to consideration of the need for a zonal approach and for reference to any applicable guidance. The detail of this text has been developed in consultation with Statutory stakeholders to reflect key findings of AA. Final versions of the schedules will be distributed to the statutory consultees for their future reference. |
|                                                                                                                      | 3   | Cumulative and in-combination effects We note the work undertaken to address these effects (e.g. Section 7.1.3) and consider that the findings of the HRA process point towards them being a very important issue requiring further consideration. Our principal concern is that the opportunity to consider cumulative and in-combination impacts and their mitigation at the zonal level, as distinct from the project level, is recognised. There is scope for Crown Estate to enable this e.g. by ensuring the wording of the Schedules reflects the overall benefits to the plan of addressing these issues, as far as is possible, at the zonal level. We believe this should be an effective mechanism to ensure that individual projects help deliver the objectives of the plan whilst taking account of cumulative and in-combination HRA issues. | The schedules have been amended to include a reference to consideration of the need for a zonal approach and for reference to any applicable guidance. The detail of this text has been developed in consultation with Statutory stakeholders to reflect key findings of AA. Final versions of the schedules will be distributed to the statutory consultees for their future reference.                                                                                                                  |

| Company/organisation<br>(contact / date received) | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Response to comments                                                                                                                                                                                                                                                                                                                                                                |
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| Joint Nature Conservation<br>Committee (JNCC)     |     | a. For Dogger Bank dSAC, assessment of the impact of development on the different biotopes that together represent the sandbank qualifying feature of the site. There is a possibility that the cumulative impacts could be adverse for a particular biotope, and zonal planning can be used to position projects away from key areas of sensitivity. Further information on our current understanding of biotope distribution on this site can be found in: Diesing, M., Ware, S., Foster-Smith, B., Stewart, H., Long, D., Vanstaen, K., Forster, R. & Morando, A, (2009), Understanding the marine environment - seabed habitat investigations of the Dogger Bank offshore draft SAC, JNCC Report 429, ISSN 0963 8901.        | Text within Section 5.3.4 has been amended to highlight the unique nature of Dogger Bank dSAC in relation to the size of overlap between the site and Zone 3, and the requirement for a strategic level (zone level) assessment of the effects of Zone 3 development.                                                                                                               |
| Scottish Natural Heritage<br>(SNH)                |     | b. Impacts of ensonification on marine mammals that form a qualifying interest of a site, and potential strategic management of e.g. project construction schedules.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Some text has been added to Section 4 to highlight the requirement to consider cumulative effects within and between zones in terms of ensonification. This had already been noted in Section 4.3.6, and built into the Plan-level avoidance and mitigation measures.                                                                                                               |
| (Finlay Bennet / 16-Dec-09)                       |     | c. Impacts on bird species as qualifying interests of sites and mitigation through zonal planning where key areas of importance for birds are identified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | The need for assessment of in-combination effects has been stated clearly within the AA. In-combination effects with regard to zones and sites are discussed with respect to cable impacts in Section 6.2.3. In-combination effects with reference to turbine effects are referred to in Section 6.4, where they are deferred to the project level due to insufficient information. |
| <i>Continued</i>                                  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                   | 4   | <u>Schedules</u> : We discussed the presentation of the zone specific considerations. We noted that the layout has been taken from the approach used in the HRA documentation. It is our view that the information could be presented more clearly and simply within the Schedules. Making the Schedules accessible to a lay person, who may not be familiar with the HRA for the Round 3 plan, will help ensure their content is well understood and effectively addressed. For example, we questioned the value of using colour coding and associated criteria within the Schedules. Hopefully our comments on marine mammals below will also help ensure the content is made as useful as it can be for each zonal developer. | Schedules are a contractual document and primarily intended for the understanding of the developer partners. TCE feels the current structure clearly and concisely conveys the findings of the AA to development partners highlighting the specific issues they will need to comply with.                                                                                           |

| Company/organisation<br>(contact / date received)                                                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Joint Nature Conservation Committee (JNCC)<br><br>Scottish Natural Heritage (SNH)<br><br>(Finlay Bennet / 16-Dec-09)<br><br><i>Continued</i> | 5   | <p><u>Marine mammals</u>: We discussed our comment at the screening stage regarding the rationale for screening sites out. It remains our view that there are still many sites that are and should not be included in this AA. For those sites that are not likely to experience any significant effects as a consequence of the Round 3 plan (justification based on distance from the zones and movements and distribution of qualifying species of marine mammals), we think it is counterproductive to include those SACs in the AA. Appropriate Assessment efforts should be focussed on sites where it cannot be discounted that there is a potential for LSE. This rationale should also be applied at the project level HRA. For example, we suggest that the following sites could be excluded at the LSE stage (the same logic could apply to other sites, including those in other Member States):</p> <p>a. For common seals: Ascrib, Islay and Dunvegan SAC, Eileanan agus Sgeiran Lios Mor, Mouse SAC, Sanday SAC, Southeast Islay Skerries SAC and Yell Sound coast SAC</p> <p>b. For grey seals: we have not had sufficient time to consider in detail the sufficiency of the tagging data and how it can be interpreted, but would expect that Isles of Scilly Complex SAC, Monach Islands SAC and potentially other sites (Faray and Holm of Faray SAC, North Rona SAC and Treshnish Isles SAC) could be removed.</p> <p>A visual or GIS based analysis of maps of SACs for seals and of tagged seal movements available in publications which are easily accessible online should, at the LSE stage, have enabled a more reasoned screening of those sites not requiring further consideration.</p> <p>c. For cetaceans: further to queries raised in our meeting: for the German Dogger Bank SAC for harbour porpoise it is our view that projects within Zone 3 (Dogger Bank) will need to undergo the HRA process. However we do not expect this requirement to apply to any of the other zones in the North Sea. For bottlenose dolphin as a qualifying interest of Moray Firth SAC we expect project level HRA to apply to Zone 1 (Moray Firth) and potentially also Zone 2 (Firth of Forth), while bottlenose dolphin as a qualifying interest of the Welsh sites should be considered for Zones 8 and 9. Cetacean sites to be excluded include for example SACs for cetaceans in Spain and west coast of Ireland. No bottlenose dolphins or harbour porpoises from those SACs are even remotely likely to occur in significant numbers on a regular basis in areas affected by Round 3, to the extent that site integrity could be compromised. Therefore these sites should not make it to AA stage.</p> <p>We see a purpose of the Schedules being to provide developers with some steer as to what sites they should be focussing on in relation to their zone. Hence, it would be useful if sites that are identified at the Plan level as those to be excluded at the LSE stage (e.g. sites and rationale suggested above), are not included in the Schedules. It is our opinion that the HRA process at the project level will benefit from focussing on those sites for which effects are likely to be significant. Likewise, it would be best to identify, for each site to be considered, those Zones that are relevant (rather than say – “possibly all”).</p> | <p>JNCC/SNH's comments regarding the treatment of marine mammal sites are welcomed, and with hindsight it would have been possible to exclude a number of sites at the screening stage. Following screening, a decision was made to justify the way in which marine mammal sites were assessed by providing additional information to support the decisions made, and the obvious vehicle for achieving this was the AA report.</p> <p>However, by assessing marine mammal sites together as a group it has been possible to build a coherent argument for all sites based on the available evidence base. The conclusions drawn in the HRA are broadly in agreement with the conclusions noted by JNCC/SNH in their response; in essence the sites which have been colour coded 'green' in the tables are those where effects of the Plan are not considered significant, and all the sites mentioned by JNCC/SNH fall into this category.</p> <p>In response to the advice from JNCC/SNH, the following changes have been made to the AA conclusions: Mousa SAC – changed from yellow to green; Sanday SAC – changed from orange to green; Yell Sound Coast SAC – changed from yellow to green; Isles of Scilly SAC – changed from yellow to green; Faray and Holm of Faray SAC – changed from orange to green.</p> <p>With respect to the comments about cetaceans, the zones which could affect marine mammal interest features have been added to the summary table in Section 7, and amendments made to the schedules.</p> <p>Developers will need to consult with SNCAs regarding possible effects on marine mammal sites at project (and possible zone) level.</p> |

| Company/organisation<br>(contact / date received) | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Joint Nature Conservation<br>Committee (JNCC)     | 6   | <u>Best practice mitigation measures:</u> We welcome the identification of best practice mitigation measures for groups of species (e.g. diadromous fish on p.45, marine mammals on p.81 & birds from cabling on p182 & 183). During the meeting we discussed the value of identifying these measures early on, and the options available to the Crown Estate to ensure developers fully understand the benefits of applying these measures. Our principal concern is to ensure that these very useful mitigation measures are promulgated to the zonal developers in a proactive manner. | TCE notes these examples of mitigation, and agrees that they should be identified to development partners. Consequently TCE will identify mechanisms for developing and disseminating mitigation options through the developers' forum, further technical works and the development of relevant guidance.                                                                                                                                                                                           |
| Scottish Natural Heritage<br>(SNH)                |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (Finlay Bennet / 16-Dec-09)                       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Continued</i>                                  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                   | 7   | <u>Freshwater pearl mussel &amp; Atlantic salmon sites as part of HRA process:</u> Ideally the following site designated for freshwater pearl mussel and Atlantic salmon should be taken into account as part of the HRA process:<br><br>River Oykel and River Spey, both these site you have already mentioned for salmon interests.<br><br>Ideally the following site designated for freshwater pearl mussel and Atlantic salmon should be taken into account as part of the HRA process:<br><br>For the Round 3 Zone 2 site the River South Esk - UK 0030262, Montrose is relevant.    | The text in the relevant mitigation sections of the chapters in this report has been amended to identify the presence of relevant emerging guidance to which zone developers should refer.<br><br>Information about freshwater pearl mussel (FWPM) and the links with salmon populations has been added to Section 3 of this report.<br><br>FWPM has been noted as a qualifying feature for the Rivers Oykel, Spey and South Esk, and has been assessed in conjunction with the salmon populations. |
|                                                   | 8   | <u>Freshwater pearl mussel &amp; Atlantic salmon sites as part of HRA process:</u> Ideally the following site designated for freshwater pearl mussel and Atlantic salmon should be taken into account as part of the HRA process:<br><br>Also in terms of salmon interests, other sites are: River Tay (UK0030312) and River Tweed (UK0012691). Both the Tay and Tweed have freshwater pearl mussel, however they are not Natura qualifying interests for these SACs, at the moment.                                                                                                      | The Rivers Tay, Tweed and South Esk have been added to the list of sites assessed in Section 3.                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                   | 9   | p.53; section 4.1.1 the marine mammals referred to here are Annex II species not Annex I.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | The text has been amended in accordance with this comment.                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Company/organisation<br>(contact / date received)                                     | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                       | Response to comments                                                                                                                                                                                                                                                                                        |
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| Joint Nature Conservation<br>Committee (JNCC)                                         | 10  | Sect. 4.1.1; second para: After "(particularly cetaceans)" insert "and the possibility that animals using the site may also occur in significant numbers outside the site on a regular basis"                                                                                                                                                                                                                                            | This sentence has been added.                                                                                                                                                                                                                                                                               |
| Scottish Natural Heritage<br>(SNH)<br>(Finlay Bennet / 16-Dec-09)<br><i>Continued</i> | 11  | p.63; sect 4.1.3: Sensitivities of Annex II marine mammal sites to R3 have been oddly categorised. Strictly speaking these need a fuller definition. Neither "noise" nor "prey species" constitute an effect on marine mammals.                                                                                                                                                                                                          | The bullet points and table in Section 4.1.3 are sensitivities rather than effects, and the text has been amended to make this clear. Further details regarding the way in which marine mammal species can be affected by Round 3 activities is provided in the text following the tables in Section 4.1.3. |
|                                                                                       | 12  | In addition, effects should, throughout most of the report as appropriate, be referred in relation to "marine mammal sites" and not just to "marine mammals".                                                                                                                                                                                                                                                                            | The text has been amended in accordance with this comment.                                                                                                                                                                                                                                                  |
|                                                                                       | 13  | p.64 In table 4.2 the question: "Do cetaceans from SAC populations frequent the zone area" should be rephrased as "Do cetaceans from SAC populations frequent the area affected by a R3 zone in significant numbers on a regular basis".                                                                                                                                                                                                 | The question has been amended as advised. A similar amendment has also been made for the seal section of the table.                                                                                                                                                                                         |
|                                                                                       | 14  | Ideally the authors should not cite work that has only been presented in conferences.                                                                                                                                                                                                                                                                                                                                                    | This comment is noted. References to conference papers have been removed. This has not resulted in any changes to the conclusions of the AA.                                                                                                                                                                |
|                                                                                       | 15  | p.80; section 4.3.6: we welcome the suggested mitigation measures at plan level. Particularly the suggestion that alternative foundation methods to those involving pile driving may need to be used, at least in a proportion of the turbines installed. This is mostly due to the strict protection measures required for European Protected Species which covers all cetaceans, but it may be a requirement also in relation to SACs. | This comment is noted. Text regarding the protection for European Protected Species has been added to Section 4 for clarity.                                                                                                                                                                                |
|                                                                                       | 16  | p.5; sect 1.3.1 The MMO may also be a competent authority at project level.                                                                                                                                                                                                                                                                                                                                                              | The text has been amended in accordance with this comment.                                                                                                                                                                                                                                                  |
|                                                                                       | 17  | p.21; sect 2.1.1 Bats are Annex II species not Annex I                                                                                                                                                                                                                                                                                                                                                                                   | The text has been amended in accordance with this comment.                                                                                                                                                                                                                                                  |

| Company/organisation<br>(contact / date received) | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Response to comments                                                                                                                                                                                                                                                                                       |
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| Joint Nature Conservation<br>Committee (JNCC)     | 18  | p.53; sect 4.1.1 Marine mammals are Annex II species not Annex I.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The text has been amended in accordance with<br>this comment.                                                                                                                                                                                                                                              |
| Scottish Natural Heritage<br>(SNH)                |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                            |
| (Finlay Bennet / 16-Dec-09)                       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                            |
| <i>Continued</i>                                  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                            |
|                                                   | 19  | p101; sect 5.1.1 Habitats are listed under Annex I not Annex II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | The text has been amended in accordance with<br>this comment.                                                                                                                                                                                                                                              |
|                                                   | 20  | Comment on Table 6.3 (p185) in relation to terns: During the meeting we discussed the consideration of terns in Table 6.3. This is in relation to tern species that are qualifying interests in Humber Estuary SPA, Morecambe Bay SPA and The Dee Estuary pSPA, specifically the foraging distributions of little tern and sandwich tern. The issue relates to the impacts of cable laying. In general we agree that cable laying will impact on a small area in comparison with the potential foraging ranges but our concern is in relation to cable laying overlapping with a particularly important foraging area. We recommended it would be appropriate to add these species to the 5th column along with the other species where there might be an adverse effect without mitigation. | Effects on terns in the Humber Estuary SPA, Morecambe Bay SPA and The Dee Estuary pSPA have now been identified in the fifth column of Table 6.3. Effects on foraging areas outside of European/Ramsar sites have also been assessed (see text in Section 6.2.3 and the assessment provided in Table 6.3). |
|                                                   | 21  | For little terns in the Humber Estuary SPA and Dee Estuary pSPA, it is not clear to us there is sufficient evidence to support the claims that foraging little terns are "likely to range over a very wide area in the Humber estuary, offering plenty of scope for them to find alternative foraging habitat" and that "given...the foraging opportunities off the mouth of the [Dee] Estuary, it is unlikely that there will be adverse effects on the tern populations" conservation status". It is our understanding that they may forage over specific areas around the tide edge (Davies 1981) and that their foraging range is relatively restricted compared to other tern species (e.g. Allcorn et al. 2003).                                                                       | The text has been amended to reflect a more precautionary view point, and to encourage further examination at the project level.                                                                                                                                                                           |

| Company/organisation<br>(contact / date received) | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Response to comments                                                                                                                     |
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| Joint Nature Conservation<br>Committee (JNCC)     | 22  | For Morecambe Bay SPA and The Dee Estuary pSPA we note the commentary for sandwich terns, in that an extensive foraging area is available to them and they are unlikely to be affected by disturbance over a small area of cable route. We agree this is reasonable, but would expect impacts to still be assessed at the project level so that mitigation measures could be put into place if deemed necessary.                                                                                            | The text has been amended to reflect a more precautionary view point, and to encourage further examination at the project level.         |
| Scottish Natural Heritage<br>(SNH)                |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                          |
| (Finlay Bennet / 16-Dec-09)                       | 23  | p195, commentary. It talks about effects on estuarine invertebrates being preyed on by waterfowl, but they may also be taken by little terns (Davies 1981; Cramp 1985) so should be mentioned here.                                                                                                                                                                                                                                                                                                         | Text has been amended to reference little tern in this section of Table 6.3.                                                             |
| <i>Continued</i>                                  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                          |
|                                                   | 24  | P1. Footnote indicates that pSPAs are both "potential" and "possible" – this could be clarified. pSPA stands for "potential" SPA.                                                                                                                                                                                                                                                                                                                                                                           | Footnote amended to refer to 'potential SPA'.                                                                                            |
|                                                   | 25  | p.7, section 1.4.2 refers to Figure 4.1 and should refer to Figure 1.1.                                                                                                                                                                                                                                                                                                                                                                                                                                     | The text has been amended in accordance with this comment.                                                                               |
|                                                   | 25  | p81; sect 4.3.7 Sentence should refer to marine mammals not fish.                                                                                                                                                                                                                                                                                                                                                                                                                                           | The text has been amended in accordance with this comment.                                                                               |
|                                                   | 27  | p. 173, Section 6.1.2: Conservation Objectives states that "sites in England and Wales rely on information in the citations for the underlying SSSIs". This is not the case for marine SPAs – they have their own specific conservation objectives as the SSSI status doesn't extend below the low water mark.                                                                                                                                                                                              | The text has been amended in accordance with this comment.                                                                               |
|                                                   | 28  | p.184, section 6.5 Last sentence "mitigate Plan level mitigation measures" doesn't make sense.                                                                                                                                                                                                                                                                                                                                                                                                              | The text has been amended in accordance with this comment.                                                                               |
|                                                   | 29  | Langston 2009 is referred to a few times in terms of the foraging ranges of terns, but there is no full reference. JNCC & SNH think we have not seen this report and would be interested in receiving a copy if it is available.                                                                                                                                                                                                                                                                            | This reference has been added. The paper is still in draft form. A copy of the latest draft has been forwarded to JNCC, SNH, CCW and NE. |
|                                                   | 30  | We highlighted that although useful to list the reasons why it was not possible to conclude effects at the Plan level and therefore project-level HRA is likely to be required, the wording "Project-level HRA will be required in circumstances where.." (para 9) may give a false sense that this will not always be the case. It may be more appropriate to replace "Project-level HRA will be required in circumstances where.." with "Project-level HRA will be required for the following reasons..." | The text In Section 1.3.2 and 7.1.2 has been amended to clarify the requirement for HRA at project level.                                |

| Company/organisation<br>(contact / date received)                                                                                                  | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Joint Nature Conservation<br>Committee (JNCC)<br><br>Scottish Natural Heritage<br>(SNH)<br><br>(Finlay Bennet / 16-Dec-09)<br><br><i>Continued</i> | 31  | During our meeting we discussed the need to ensure consistent use of phraseology, particularly with respect to the word "mitigation." As it stands, section 1.2 is titled "mitigation" but only the table in 1.2.1. details actual mitigation measures (and could therefore be called "general mitigation measures"?) which need to be applied at the project level, and the "feature-specific Plan-level mitigations," (1.2.2) are merely the conservation objectives which need to be ensured through further consideration of project-level mitigation. Perhaps "Plan-level Provisions for Specific Features" is a more appropriate descriptor?                                                                                                                                                                                             | Throughout the AA document and the schedules, the following terms have been used:<br><br><i>General environmental measures</i> to refer to the list of measures set out in Table 1.1<br><br><i>Avoidance and mitigation measures</i> to refer to the Plan level requirements. This use of the term mitigation is considered appropriate as they mitigate the effects of the <i>PLAN</i> , although it is recognised that mitigation employed at project level may be more specific in nature. |
|                                                                                                                                                    | 32  | In the draft Schedules for each zone we have the following tracked changes on the references to "feature-specific mitigations for marine mammal interest features (section 1.2.2):<br><br>- "The Round 3 Plan must be undertaken in such a way as to ensure that noise levels produced during the construction and decommissioning of Projects within a zone and between zones does not exceed the level at which there will be an adverse effect on the integrity of both any Annex II cetacean populations and any Annex II seal populations, as viable components of the sites.<br><br>- The Round 3 Plan must be undertaken in such a way as to ensure that any physical damage to haul-out sites or disturbance of seals at haul-out sites does not result in an adverse effect on the integrity of any Annex II seal populations sites." | TCE has included relevant text in the schedules to a side letter which will be exchanged with each of the preferred developers and which is cross-referenced in and made binding by the Zone Development Agreement for each zone. The detail of this text has been agreed through further consultation with Statutory stakeholders. Final versions of the schedules will be distributed to the statutory consultees for their future reference.                                               |
| Natural England<br><br>(Victoria Copley / 16-Dec-09)                                                                                               | 1   | We believe that the report would be strengthened by the inclusion of an overall conclusion explaining that there is potential for adverse effects and that these can and must be mitigated against either through the management measures set out in the Schedules or at subsequent individual project level design.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | An overall conclusion has now been included in Section 7.1.1.<br><br>TCE has also recorded the conclusion internally alongside supporting information taken from the reports that were consulted upon as a record of appropriate assessment.                                                                                                                                                                                                                                                  |

| Company/organisation<br>(contact / date received)                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Natural England<br>(Victoria Copley / 16-Dec-09)<br><i>Continued</i> | 2   | We have previously agreed that the principle of the HRA relying on subsequent project level HRAs to make an assessment, identify and implement necessary mitigation measures and ultimately conclude that there “will be no adverse effects on the integrity of the relevant sites” is acceptable. We do however have concerns with the statement that “there is no likelihood that a conclusion would be reached that the plan or any individual project would have an adverse effect on the integrity of any European/Ramsar site”, particularly given the need for future project level HRAs to address some potentially complex issues especially in relation to in combination and cumulative effects. We are concerned that the document in several places seems to assume that individual projects may not require a HRA. In fact they will need to be assessed and consented by another competent authority and it is likely that most projects will in fact require an HRA, if only to audit that they have met the various conditions and requirements as set out in the plan level AA. | TCE notes that the HRA process will need to be followed at project-level and to emphasise project-level requirements has included relevant text in in the schedules to a side letter which will be exchanged with each of the preferred developers and which is cross-referenced in and made binding by the Zone Development Agreement for each zone (in the form of a schedule) . The detail of this text has been agreed through further consultation with Statutory stakeholders. Final versions of the schedules will be distributed to the statutory consultees for their future reference. |
|                                                                      | 3   | We are disappointed that this report does not consider in combination effects to any great extent. Additionally, given that “cumulative effects between zones are more apparent at Plan level” (section 7.1.3) and that “the potential for inter-zone cumulative effects on bird species {and marine mammals} is considerable”, these are probably going to be the hardest assessments to make at project level. Whilst we understand that it has not been possible to make such assessment at the plan level because of a lack of detail concerning the timing of works and project design, we believe that there is an omission which needs to be addressed at the strategic level.                                                                                                                                                                                                                                                                                                                                                                                                             | The schedules have been amended to include a reference to consideration of the need for a zonal approach and for reference to any applicable guidance. The detail of this text has been developed in consultation with Statutory stakeholders to reflect key findings of AA. Final versions of the schedules will be distributed to the statutory consultees for their future reference.                                                                                                                                                                                                         |
|                                                                      | 4   | Overall and notwithstanding the comments in this response, we believe that this HRA has been a comprehensive and robust process. We appreciate the structured consultation which was set out at the start and has enabled positive interactions between The Crown Estate and the statutory agencies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | This comment is noted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                      | 5   | P63 – there is potential for lethal effects on marine mammals in very close proximity to piling activity, not just auditory injury. Again on p67 lethal effects not mentioned – admittedly very low chance but possible without mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | A reference to lethal effects has now been inserted in both sections of text.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Company/organisation<br>(contact / date received)                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                       | Response to comments                                                                                                                                                                                                                                                                                                                                                                      |
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| Natural England<br>(Victoria Copley / 16-Dec-09)<br><i>Continued</i> | 6   | P68 – refers to a fishery exclusion zone around windfarms when operational – is this referring to the permanent 50m exclusion zone around turbines bases or is it suggesting that Round 3 windfarms will be exclusion zones – this would be a significant change from existing windfarms. It is not clear from the text. | AA report text amended. The intended reference was that of the exclusion of fishing from the immediate vicinity of turbine bases.                                                                                                                                                                                                                                                         |
|                                                                      | 7   | When referring to prey species the document repeatedly says that impacts on fish are known to occur within a very short distance of the source – we are not aware of the evidence for this, especially in behavioural terms, hence the COWRIE fish work currently underway.                                              | The text has been amended to reflect this uncertainty.                                                                                                                                                                                                                                                                                                                                    |
|                                                                      | 8   | P81 – What is the evidence for extending the duration of impact during piling as a mitigation method to decrease piling noise? Longer duration impact may be potentially more damaging in some cases.                                                                                                                    | It is accepted that longer duration of piling impact may be more damaging to sensitive species, particularly when the scale of Round 3 (and consequent potential for lengthy construction times) is taken into account. The text in the bullet point has been amended to reflect this.                                                                                                    |
|                                                                      | 9   | The last line on p81 should say marine mammals – not diadromous fish                                                                                                                                                                                                                                                     | The text has been amended in accordance with this comment.                                                                                                                                                                                                                                                                                                                                |
|                                                                      | 10  | P83 – The Wash and North Norfolk coast – says no impact on foraging areas and therefore no adverse effect. Please can you confirm the evidence to support this we consider this would need plan level mitigation to ensure no adverse effect and therefore put it in the yellow category.                                | It is agreed that the potential exists for effects on the foraging grounds for seals from The Wash and North Norfolk Coast SAC, and that mitigation at Plan level is required. On the advice of Natural England, the site conclusion for seals at this site has therefore been amended from 'green' to 'yellow'.                                                                          |
|                                                                      | 11  | Page 102 – Essex Estuaries also includes “ <i>Salicornia</i> and other annuals etc” and should have a tick in the table.                                                                                                                                                                                                 | “ <i>Salicornia</i> and other annuals colonising mud and sand” is recognised as being a qualifying feature of the Essex Estuaries SAC. However, this feature was screened out for the Essex Estuaries SAC within the screening report, and has not therefore been considered at AA stage. This is the reason that there is no tick for <i>Salicornia</i> at Essex Estuaries in Table 5.1. |

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| Natural England<br>(Victoria Copley / 16-Dec-09)  | 12  | Section 5.1.2. Since our meeting on the 10th Dec, we note there was in fact only one conservation objective missing, for sandbanks in the Essex Estuaries and that this has been revised to take into account "maintain and/or restore".                                                                                                                                                                                                                                                | As noted in the comment, the issue has been clarified and the text has been amended following a query from Natural England on 10/12/2009.                                                                                                                                                                                                                                                                                                                                       |
| <i>Continued</i>                                  | 13  | 5.1.3 Gain of habitat – new hard structures in soft sediment places proved new habitat. Possible stepping stones for aliens or even native species expanding ranges due to climate change.                                                                                                                                                                                                                                                                                              | The text has been amended to reflect this point.                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                   | 14  | 5.1.3 Some of the paragraphs in the physical loss/gain of habitat section also need including in the next section "Physical Damage to habitats and species" These include, trawling, ship wash and scour, which are more about damage than removal. Similarly these pressures could have a biological effect.                                                                                                                                                                           | The bullet points in Section 5.1.3 are taken directly from the sensitivity table in the screening report, and for continuity it is not considered appropriate to amend them, particularly as the effects of trawling, shipwash and scour have been assessed for sensitive habitats within the tables for different sites. A comment has been made in the 'Physical loss/gain' section that the bullet points mentioned also refer to 'Physical damage to habitats and species'. |
|                                                   | 15  | Page 105 physical loss of reef is mentioned due to trawling as part of survey work but not physical damage to sandbanks. Has this has been screened out as low level, temporary etc?. The physical disturbance during cable and turbine installation also only relates to reefs – were sandbank impacts screened out? In Margate and Long Sands dSAC "Advice on operations" we said that physical damage will occur from cable installation although this is temporary and recoverable. | This assumption is correct. Damage to sandbanks from trawling associated with survey work was screened out within the screening report, as the intensity of activity is low, the duration is short, and sandbank habitat is recoverable. The sensitivity of reef habitats is higher as a result of the lower rates of recoverability, which is why the sensitivity to survey trawling has been assessed for reef habitats.                                                      |
|                                                   | 16  | Table 5.3 and table 5.4 and Table 5.8 In section 5.1.3 it is suggested that trawling during survey may cause physical disturbance (and possibly mobilise toxic substances) but this is not recorded in the table.                                                                                                                                                                                                                                                                       | See previous response - trawling was only considered to be a sensitivity of reef habitats, which is why it has not been included in Tables 5.3, 5.4 and 5.8.                                                                                                                                                                                                                                                                                                                    |

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| Natural England<br>(Victoria Copley / 16-Dec-09)<br><i>Continued</i> | 17  | 5.3.5 p126 It would be helpful to have scientific names for species, especially reef building worm, whiteweed                                                                                                                                                                                                                                                                                                                                                                               | These names have been included in the document, where available.                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                      | 18  | Page 127 - Re movement of vessels - it is not certain that European vessels only operate in Europe – without knowing a ship's movement history, introductions of non-native species can not be totally ruled out. Besides there is the possibility of introducing a non-native to the Essex coastline from European (even UK) waters anyway. However, this is probably of little consequence due to proximity to Harwich international port – the largest container port in the UK.         | The text in Table 5.17 has been amended in accordance with this comment. In addition, the text regarding the introduction of non-native species in Section 5.1.3 has also been amended to reflect the wider issue.                                                                                                                                                                                                                                                                             |
|                                                                      | 19  | Under “mobilisation of contaminated sediments” – TBT contamination occurred in the Crouch Estuary and although there has been a good recovery of marine life, sediment-bound TBT could be remobilised during cable laying. There is plough dredging in the estuary, so sediments are being remobilised in places. However, this does not require a licence from the Marine and Fisheries Agency. A method of cable laying to minimise the impact on sediment movement should be undertaken. | This site-specific information has been added to Table 5.17.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                      | 20  | Page 131 – Flamborough Head SAC – the closest Round 3 site to Flamborough Head SAC is Zone 4 Hornsea and not Dogger Bank. We believe that grid connection for Dogger Bank could be to the north of Flamborough not to the south. If it is to the south then the cable route could pass through Annex I Cobble reef, which although not part of the SAC will still require nature conservation protection.                                                                                   | Text amended to indicate that the closest zone to Flamborough Head SAC is Zone 4 (at approx 30km),. Information available at Plan level indicates cable routes passing to the south east of Flamborough Head (as shown in Figure B1 of the Screening Report). The comment regarding cobble reefs has been added to Section 5.3.6 for clarity.                                                                                                                                                  |
|                                                                      | 21  | Page 135 – Haisborough Hammond and Winterton dSAC - the informal consultation on this proposed site has identified Sabellaria reef within the site which could be affected by turbine and cable installation.                                                                                                                                                                                                                                                                               | The assessment of the Haisborough, Hammond and Winterton dSAC has been based on the information available in the draft Regulation 33 Advice regarding site features and conservation objectives. <i>Sabellaria</i> reef has not been identified as a qualifying habitat feature within this Advice, and has consequently not been assessed as part of the HRA process. The potential for this habitat to be included within the final designation of the dSAC has been noted in Section 5.3.7. |

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| Natural England<br>(Victoria Copley / 16-Dec-09)  | 22  | Table 5.33 Last row seems to indicate that cable will be in the site (point 3(70km) but then goes on to say that no cables will be in the site (point 4 and 5).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Text amended in accordance with this comment (70km of cable runs through the site).                                                                                                                                                                                         |
| <i>Continued</i>                                  | 23  | Outer Thames pSPA - there are mentions of impacts due to cabling but no mention of habitat loss due to disturbance/ displacement. These are correctly mentioned at plan level and suggested as project level mitigation, just not under the pSPA itself on page 193.                                                                                                                                                                                                                                                                                                                                                                                                                      | The text has been amended in accordance with this comment.                                                                                                                                                                                                                  |
|                                                   | 24  | Table 6.1 Missing sensitivity: loss of subtidal foraging habitat due to installation and removal of cables. Sensitivity 3: the wording in the activity column should be the same as for sensitivity 2 given that changes to hydrodynamics can occur sub tidally too                                                                                                                                                                                                                                                                                                                                                                                                                       | The text has been amended as suggested.                                                                                                                                                                                                                                     |
|                                                   | 25  | 6.2 Whilst we appreciate the difficulties of assessing the impact of turbine effects on birds at this point due to a lack of detail on the specific projects that will deliver the plan, we are disappointed that this plan level HRA doesn't even attempt to address some of the issues which might best be addressed at the plan level.                                                                                                                                                                                                                                                                                                                                                 | The deferment of turbine effects to the project level assessments has been decided upon due to the lack of information available about the wind farm projects that will be developed under the Plan.                                                                        |
|                                                   | 26  | Table 6.2 whilst we appreciate the point that in the cases of species that migrate across broad fronts, and particularly those where the main route is across the English Channel that the risk posed by R3 developments will be low. However, we are not convinced by the argument that because the population size is low and hence bird occupancy is low that the risk is therefore low. In cases where there is a small population (perhaps on the edge of viability) eg honey buzzard, the death of just a handful of individuals could be highly significant to the well-being of that population. We understand that the specific risks will be assessed at project level however. | This issue had been considered, and the text has been amended to avoid screening out the species completely at Plan level. However, emphasis on bird occupancy remains, as this will be the basis of collision risk models (and therefore the assessment) at project level. |
|                                                   | 27  | 6.3.2. 2nd para. It is not necessarily true that the benthic biota associated with soft intertidal sediment is well adapted to living in areas of highly mobile sediment and so can be expected to recolonise trenched areas quickly. This might be true for species associated with mobile sandy substrates but species typical of sheltered stable mud habitats may be far less tolerant of sediment disturbance.                                                                                                                                                                                                                                                                       | The text has been amended in accordance with this comment.                                                                                                                                                                                                                  |
|                                                   | 28  | 6.4 1st para. Text needs edited to read "Developers will be OBLIGED/REQUIRED to comply with these measures". The word "obliged" is used in section 7.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | The text has been amended as suggested.                                                                                                                                                                                                                                     |

| Company/organisation<br>(contact / date received)                    | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Response to comments                                                                                                                                           |
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| Natural England<br>(Victoria Copley / 16-Dec-09)<br><i>Continued</i> | 29  | 6th & 12th bullet points – in some circumstances it may be better to conduct cabling works over intertidal areas at high tide rather than low tide. This could reduce physical disturbance to the sediment adjacent to the cable route (machines can operate from floating barges) and avoid disturbance to wading birds/waterfowl foraging on the intertidal flats at low tide. The timing of cabling needs to be decided on a case by case basis depending on eg bird usage levels at HW and LW and levels of toxic substances in the sediment, current strength and likely plume sizes. | This comment is accepted, and the text has been amended accordingly.                                                                                           |
|                                                                      | 30  | Page 183 – the third italicised mitigation measure should be edited to delete the reference to “turbine operation” and replace with “it”. We are concerned that as it stands this one (unlike the other two) is too closely confined to turbine operation and this may create a loophole whereby activities not strictly related to turbine operation may somehow not then be required to adhere to this mitigation measure.                                                                                                                                                               | Text has been amended to refer to turbine construction, presence, operation or decommissioning.                                                                |
|                                                                      | 31  | Page 183 1st bullet point. Stopping cabling work by end of August will not necessarily allow algal growth to recover the algal biomass before the winter. Most algal growth will occur between May and August. By September many species will probably be slowing down.                                                                                                                                                                                                                                                                                                                    | Reference to algal growth has been removed.                                                                                                                    |
|                                                                      | 32  | Table 6.3 For all 10 sites this table concludes no adverse effect on the integrity of the site due to either i) disturbance associated with cable installation/removal or ii) habitat loss due to cable installation and operation. In several cases, the assumption of no adverse effect depends (in part) on the adaptation of estuarine invertebrates to living in environments with high rates of sediment deposition and hence an assumed ability to recover from smothering and sediment disturbance. This may not necessarily be true in all cases.                                 | In relation to the intertidal zone, please see the changes made in response to comment 27.                                                                     |
|                                                                      | 33  | Liverpool Bay. Increased turbidity is unlikely to have any effect on the foraging efficiency of common scoters which, when foraging on the seabed under several metres of water, are probably hunting by touch rather than visually.                                                                                                                                                                                                                                                                                                                                                       | The wording in Table 6.3 has been changed to reflect this comment.                                                                                             |
|                                                                      | 34  | 7.1.1 Mitigation relating to bird interest features. The third measure needs editing to remove the specific narrow reference to “turbine operation”. It is the whole plan that must be undertaken to ensure no adverse impact on population of migrating or foraging birds. In any case why do we need a specific measure relating to foraging birds – as these will be over-wintering, passage or breeding birds and hence covered by the first two generic measures.                                                                                                                     | The third measure has been amended to refer to turbine construction, presence, operation or decommissioning. The first two measures relate to cabling effects. |

| Company/organisation<br>(contact / date received)                                | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Response to comments                                                                                                                                                                                                                                           |
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| Natural England<br>(Victoria Copley / 16-Dec-09)<br><i>Continued</i>             | 35  | 7.1.2 The first paragraph is essential. The comment that site/interest features screened out at plan level or where a conclusion of no adverse impact has been reached at plan level may nonetheless need to be assessed at project level if specific project design may have an effect on the site/interest feature is also essential.                                                                                                                                                                                                                                                    | This comment is noted. Within the whole AA report the requirement for undertaking project-level HRA has been clarified and made more explicit.                                                                                                                 |
| One North East<br>(Phil Jones / 16-Dec-09)                                       | 1   | It is noted that the Agency's previous comments at the screening stage have been included in the document's appendix. Whilst the Agency recognises that the proposed locations of the wind farm zones are not within the North East region, the Berwickshire and North Northumberland Coast Special Areas of Conservation (SAC sites) have been included within the screening process.                                                                                                                                                                                                     | No response required.                                                                                                                                                                                                                                          |
|                                                                                  | 2   | I confirm that One North East has no further comment to make regarding the Appropriate Assessment and I look forward to the next stage in the consultation process.                                                                                                                                                                                                                                                                                                                                                                                                                        | No response required.                                                                                                                                                                                                                                          |
| Royal Society for the<br>Protection of Birds (RSPB)<br>(Toby Gethin / 16-Dec-09) | 1   | The RSPB supports plan-level appropriate assessment (i.e. the R3 HRA) being undertaken, and believes it the best place to undertake a strategic assessment of the effects of turbines on the marine environment. We therefore endorse the appropriate assessment of the R3 licensing Plan, but appreciate the currently limited availability of relevant ecological information. This necessitates additional safeguards imposed on the licensing proposed and that further appropriate assessment will be necessary at the project stage.                                                 | This comment is noted. The text in Sections 1.3.2 and 7.1.2 has been amended to clarify the requirement for HRA (and AA where necessary) at project level.                                                                                                     |
|                                                                                  | 2   | Project-HRA work will need to consider the conclusions of the Plan HRA, but with off-site bird assessment at the project-level, project-HRAs on the effects on off-site SPA birds will need to be carried out to a suitably high common standard. Project-HRA work will also need to consider the applicability of the conclusions of the Plan HRA in light of the new information coming from zonal assessment and more project-specific work, such as for Environmental Impact Assessments. Such information, for example, may or may not reaffirm the conclusions of the Plan HRA work. | This comment is noted. Guidance for zone developers is being compiled which will assist them in understanding the links between assessments at Plan, zone and project levels and the requirement for informed and appropriately comprehensive data collection. |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Response to comments                                                                                                                                                                                     |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 16-Dec-09)<br><br><i>Continued</i> | 3   | Pages 7-9, Assessment of effects on the integrity of European and Ramsar Sites: The RSPB notes that the Report includes reference to the potential for adverse effects on Natura 2000 sites from the R3 Plan. We welcome the safeguards included in the Report, and incorporated into the licensing plan. These safeguards include project developers having to undertake HRA work at the project level, mitigation measures integral to the Plan (and the obligation on developers to utilise these) and those incorporated into the Plan as "Plan level mitigations". These safeguards, ensuring the Plan allows for certain parts of zones to be excluded from development where necessary (or in extreme circumstances, entire zones) to avoid adverse effects, enables the Plan HRA to ascertain no adverse effects arising from the R3 licensing Plan.                                      | This observation is noted.                                                                                                                                                                               |
|                                                                                                              | 4   | Page 174, Table 6.1, Sensitivities of Birds to Round 3 Plan Activities: This table comprehensively covers many of the key relevant sensitivities and related activities. However, in sensitivity 7 (barrier effects...), the presence of structures (in addition to turbine blade movement) should be added, since this also influences barrier effect. We also encourage inclusion of specific reference to potential indirect effects on birds from potential effects of piling activities on prey resources.                                                                                                                                                                                                                                                                                                                                                                                   | The text in Table 6.1 has been amended to reflect this point.                                                                                                                                            |
|                                                                                                              | 5   | Page 175-6, Effects of the Round 3 Plan – Turbine Effects: The information obtained in the aerial zonal surveys by WWT and Hi-Def will be of great importance to identifying seabird species in each of the nine zones and the relative importance of particular areas within zones for birds. This type of information will help to bridge the gap between the HRA work at the plan- and project-levels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | This comment is noted. Bird surveys within the zones are ongoing, and the data will be available for zone developers to use in assessing potential effects of their projects on birds using the areas.   |
|                                                                                                              | 6   | Whilst not explicit in the Report, the RSPB understands that the data obtained from the above aerial surveys will inform "zonal assessment". Since information from aerial surveys is not available for the R3 HRA, the information will help to reduce the knowledge gap between the plan- and project-level HRAs. Zonal assessment will also help to ensure that specific projects can be located in the least damaging areas within zones (i.e. avoidance measures), as well as be critical in informing and identify the further research work necessary at the project level. We would therefore welcome further information and clarification regarding how zonal assessment fits into the plan for R3, and how information from zonal assessment will both help to avoid siting projects in the most sensitive areas of zones, as well as inform further specific, project-level HRA work. | Zone level environmental characterisation guidance for zone developers is currently being compiled, and will be issued for consultation shortly. RSPB's comments on this guidance would be most welcome. |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 16-Dec-09)<br><br><i>Continued</i> | 7   | <p>Page 176-179, Table 6.2, Species that are not likely to be significantly affected by the Round 3 Plan: Whilst the RSPB welcomes the assessment of the 15 species, we caution against assuming no likely significant/adverse effect on the following points:</p> <ul style="list-style-type: none"> <li>- The Migration Atlas does not illustrate known migration pathways, but presents ringing origins and recapture/finding destinations of individual birds, with points joined by a straight line. Several seasons may elapse between ringing and subsequent finding. Therefore, whilst lines joining these points may indicate migration routes, they do not necessarily do so;</li> <li>- There is a mismatch in terms of collision assessment at wind farms; many wind farms have not assessed collision risk. Assumptions about species presence or absence in the collision record will depend on habitats as well as study; and</li> <li>- For some species with small populations (e.g. corncrake and stone curlew), even small numbers of collisions may have a disproportionate effect on the UK population. We therefore recommend re - visiting the 15 species assessed, providing further justification for the conclusion for some of the species, and where necessary, being less categorical in the conclusions (e.g. dotterel, corncrake, marsh harrier, nightjar).</li> </ul> | <p>The text has been amended to note that these species may be at less risk from Round 3 development but that they should still be given due consideration at the project level.</p> <p>In terms of reference material used (e.g. information on recorded collisions and the migration atlas) the approach has been taken to use the best available evidence available in accordance with EC guidance.</p> <p>Reference to bird occupancy remains within the text as this will form the basis of the collision risk models (CRM) carried out at the project level. The data gathered at the project level and subsequent CRM will highlight any issues.</p> |
|                                                                                                              | 8   | <p>Page 182-183: Mitigations at Plan Level: The RSPB welcomes the requirement for developers to comply with the mitigation measures outlined on pages 182-3. Adherence to these mitigation measures, with due consideration of them from the outset of project development, enables the R3 Plan to be sufficiently flexible (with regards to site identification within zones) to have the confidence that projects can avoid adversely affecting SPA birds. Furthermore, the additional mitigation measures identified by the R3 HRA work and, importantly, both their subsequent incorporation into the R3 Plan and the requirement that developer comply with these for project brought forward, are welcome, and provide further reassurance that the Plan can avoid adverse effects on SPA birds.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>This comment is noted.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Company/organisation<br>(contact / date received)                                                            | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Royal Society for the<br>Protection of Birds (RSPB)<br><br>(Toby Gethin / 16-Dec-09)<br><br><i>Continued</i> | 9   | Page 197-199: Summary and Conclusions: The RSPB welcomes the additional Plan level mitigations incorporated into the R3 Plan. However, whilst the Report states that "zone developers will be obliged to comply with these findings during development of projects within zones" (pg 197), the RSPB recommends that this obligation is also made clear within the additional mitigations. Currently, the mitigations relating to bird interest features, for example, state that "the Plan must be undertaken in such a way as to...". We therefore recommend that the wording be revised to clarify and underline the obligation placed on developers of R3 projects brought forward under the R3 licensing Plan: "Projects which are brought forward under the Plan must be undertaken in such a way as to...". This will serve to ensure that the appropriate assessment of the R3 Plan can ascertain that the Plan will not result in adverse effects on the integrity of Natura 2000 sites. | The text has been amended to reflect this point.<br><br>TCE notes these examples of mitigation, and agrees that they should be identified to development partners. Consequently TCE will identify mechanisms for developing and disseminating mitigation options through the developers' forum, further technical works and the development of relevant guidance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                              | 10  | In-combination effects (page 199) effects may occur from projects within zones, potentially between zones, and likely with other plans and projects. Therefore, the RSPB recommends that this section is revised to include acknowledgement – as elsewhere in the Report– of this possibility, and that this will require further assessment at the project level too.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Reference is made to in-combination assessment in relation to the Plan (in Section 7.1.1 as well as more detailed references in previous chapters) and the need for in-combination assessment at the project level is highlighted in Section 7.1.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| South West Regional<br>Development Agency<br>(SWRDA)<br><br>(Claire Gibson / 16-Dec-09)                      | 1   | We welcome the Habitat Regulations Assessment of the Round 3 Plan that you have undertaken, and note the conclusions you have drawn. We are surprised however that the offshore wind development community has not been consulted on the detail of this report. Whilst we understand that The Crown Estate is engaged in a competitive process to identify development partners for each of the zones, a large number of mitigation measures identified in your report are at the project level and it is very difficult for anyone, other than the developers themselves, to comment on the achievability of these measures.                                                                                                                                                                                                                                                                                                                                                                    | It is accepted that the developers themselves will have the most detailed knowledge and understanding of the achievability of the mitigations identified, and that it will be necessary for them to demonstrate at project level that the projects proposed comply with the requirements of the Plan-level HRA. Developers may employ any project-level mitigations they choose, provided that they are able to satisfy the competent authority at project level that they have complied with the requirements of the Plan-level AA findings and otherwise have avoided any adverse effects on qualifying sites; the examples presented in the report are drawn from available guidance and literature available to (or generated by) offshore wind developers. Consequently, consultation with the offshore wind industry was not considered necessary. |

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**Company/organisation  
(contact / date received)**

**No.**

**Response from company/organisation**

**Response to comments**

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South West Regional  
Development Agency  
(SWRDA)

(Claire Gibson / 16-Dec-09)

*Continued*

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We are pleased however that with respect to the South West region, you do not appear to have identified any Likely Significant Effects that could not be mitigated at the project level. We wish to emphasise that the economic benefits of Round 3 to the region will be influenced by the location of the construction, deployment and operations & maintenance ports used, and we are actively working to identify opportunities for such facilities to be located in the South West region. It is quite possible that there might be SACs and/or SPAs and/or RAMSAR sites in the region that will be affected by the development and use of such onshore facilities. We would have welcomed some consideration of this within your report.

This comment is noted, and the potential for effects on onshore European/Ramsar sites from onshore developments associated with the Round 3 Plan is clear. These ancillary developments do not form part of the Round 3 Plan itself, which is the reason why they have not been included within the HRA. These ancillary developments would be subject to HRA as necessary as and when they are developed, and effects on European/Ramsar sites arising from them would be addressed at that stage.

| Company/organisation<br>(contact / date received)                                                                                                       | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Whale and Dolphin<br>Conservation Society (WDCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09) | 1   | It is unclear exactly what species information was considered in the MARS planning tool used to assist in determining the zones. If only Special Areas of Conservation (SACs) were considered, as the only currently existing areas of protection for cetaceans in the UK, then we strongly believe such data are inadequate. Only three SACs have been designated in UK waters for only one of the two qualifying cetacean species (the bottlenose dolphin). This can be contrasted with the more than 20 species that regularly use our waters. All cetaceans are required to be protected by European law as they are European Protected Species. Joint Nature Conservation Committee (JNCC) has recently developed draft Disturbance Guidance that is not considered in this document. We would be grateful if you would clarify the sources and extent of cetacean data used to select the 9 development zones. | The MaRS tool has been used to provide an initial first sift of potential zones, taking account of a wide range of factors including SACs. As this is an AA of effects on European/ Ramsar sites, wider EPS issues will be considered separately. However, we recognise the point expressed here and expect this to be considered at Zone and Project level in relation to EPS disturbance and Favourable Conservation Status. It is at these levels that the JNCC draft guidance will be fully taken into account.                                                                                                                                 |
|                                                                                                                                                         | 2   | Whilst cetaceans may be widespread, as indicated in the document, this does not mean that there are not particular habitat areas which are of importance to them and which can be degraded, resulting in impacts on the animals. By contrast, haul out sites (which are important for resting, breeding and rearing pups) are discussed for seals, whilst the limit of attention for cetaceans seems to be on only two factors – noise and impacts on prey.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sites which have marine mammals as interest features have been included in the report, and effects within these site boundaries have been assessed as part of the screening and subsequent AA process. It is, however, acknowledged that there are areas outside these site boundaries which are important for marine mammals, particularly in terms of foraging areas (for both cetaceans and seals). The effect on such habitats was included within the 'effect on prey species' in that the majority of these effects will occur as a result of changes to the habitats which support these species. The text has been amended to clarify this. |

| Company/organisation<br>(contact / date received)                                                                                                                                | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Whale and Dolphin<br>Conservation Society (WDCCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09)<br><br><i>Continued</i> | 3   | The report contains scientific errors as well as some assumptions. Common bottlenose dolphins do not occur globally nor are they the most common of the delphinidae. The taxonomy of animals previously known world wide as common bottlenose dolphins, <i>Tursiops truncatus</i> , is complex and two species are now defined – one with a more southerly distribution to <i>T. truncatus</i> . We refer you to the IUCN's recent review of the taxa. More importantly, Europe's remaining inshore bottlenose dolphins should be viewed as remnant populations and seen as vulnerable to further depletion. Further, there is no mention in the document of the status of any of the species considered despite population declines in harbour (common) seals and likely declines in the Moray Firth bottlenose dolphin population. | The text in the section on bottlenose dolphin has been corrected in line with this information, and further information regarding the status of UK seal and cetacean populations has been added to the text.                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                  | 4   | Pile-driving noise should not be classified as a transient impact (e.g. table 4.3) in the context of the construction of wind farms with large numbers of turbines, where powerful impulsive noise will be transmitted into a marine region for months and possibly even years, including in regions or zones where wind farms are to be built in the vicinity of each other.                                                                                                                                                                                                                                                                                                                                                                                                                                                        | The word 'transient' has been replaced with the word 'temporary', and it is hoped that this clarifies the meaning. It is accepted (and has now been clarified in the text) that the duration of piling noise may extend into months/years. The use of the word 'temporary' implies only that the piling noise will not last for the duration of a windfarm's operational life.<br><br>Further to discussions with WDCCS, additional information about the physiological stress experienced by marine mammals as a result of human activity have been added to Section 4. |

| Company/organisation<br>(contact / date received)                                                                                                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| Whale and Dolphin<br>Conservation Society (WDCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09)<br><br><i>Continued</i> | 5   | We are very concerned that there is an over-reliance on 'mitigation measures' to reduce the threshold of impact to that which falls below 'Adverse effects on integrity' (table 4.5). We do not believe that mitigation measures alone can be guaranteed to reduce impacts to an acceptable level. It would be more appropriate to refer to 'management and mitigation measures' or 'avoidance and mitigation measures', which encompasses the concept of avoiding key areas altogether or of ramping back or removing development should adverse impacts be detected. Further there is inadequate discussion of the mitigation measures that will be required, their effectiveness or their applicability (more detailed comments below). Such details would provide useful guidance to developers. | <p>The use of the term 'mitigation' has now been clarified within the report, and the term 'avoidance and mitigation measures' has been employed for Plan-level mitigation objectives.</p> <p>The project-level mitigation examples given are not intended to be an exhaustive list, nor are they necessarily the most effective measures available. They are presented as examples of project-level actions which could be employed to achieve the Plan-level avoidance and mitigation measures. This has been clarified within the text.</p> <p>Guidance on mitigation measures which could be employed at project level is in the process of being prepared, and the advice and experience of relevant experts and other stakeholders will be sought.</p> |
|                                                                                                                                                                                 | 6   | We welcome that the Round 3 Plan includes the cradle-to-grave consideration of each of 9 zones. Decisions about the location of wind farms within zones should be based on a firm knowledge base of each cetacean population's distribution, status and vulnerability, as would be expected in the terrestrial environment (see earlier comment on SACs in the General Comments section). Where data are lacking (as may be identifiable in the MARS planning tool), data should be collected as a priority to a predetermined standard before decisions about development are made.                                                                                                                                                                                                                 | <p>This comment is acknowledged and welcomed. Guidance for developers on undertaking zone level environmental characterisation is being developed; this will necessarily include information on marine mammals. The Crown Estate acknowledges the potential need for additional data collection to inform project-level HRA, and is investing in this to assist the assessment and consenting processes. Relevant experts and other stakeholders will be consulted during the development of guidance and on proposals for further data collection.</p>                                                                                                                                                                                                      |

| Company/organisation<br>(contact / date received)                                                                                                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| Whale and Dolphin<br>Conservation Society (WDCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09)<br><br><i>Continued</i> | 7   | We agree with the approach to include consideration of transnational SACs due to the highly mobile nature of marine mammals. We believe that habitat displacement should be considered under section 4.1.3. Habitat displacement can be short term (days or weeks during pile driving, for example) or it can be long term (months or extending to the life of site operation). Both could have long term and significant implications for individuals and/or populations. Consideration should be given to habitat displacement and the implications of this.                                                                                                                                                                                                                | Habitat displacement was included within the term "noise disturbance" within Table 4.2 of Section 4.1.3. The text has now been clarified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                                                                 | 8   | We concur with JNCC's earlier comments (provided in Appendix A) about habitat degradation. We note with concern that these do not appear to have been taken into account in this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Habitat degradation in respect of foraging ground supporting marine mammal populations within SACs has been addressed by the AA and the text has been amended to clarify this. In terms of degradation of habitats within SACs, no marine mammal sites are overlapped by zones or cable routes.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                 | 9   | We do not agree that pile driving (described in Table 4.3) can be considered as a transient impact in all cases. In the same way that seismic pulses can be considered cumulative, where piles are repeatedly driven, or indeed where development occurs in different wind farms in the same zone, the sound source can be considered cumulative in nature. We would like to see a clear assessment of the likely timescales and extent of pile-driving activities that takes into account not only projected Round 3 developments but the cumulative impacts of similar developments in adjoining Scottish territorial waters. We believe that an investigation should be undertaken into the likely extent of impacts and habitat displacement based on existing knowledge. | With respect to the comment on 'transience' of piling noise, please see the response to point 4 above.<br><br>It is acknowledged that pile driving noise is likely to be a key concern in the assessment of possible effects on marine mammals. It has not been possible to undertake a detailed assessment of effects (or cumulative effects) at Plan level because at this stage it is not known how many turbines will be installed, where and when they will be installed, or if even if pile-driven bases will be used for the turbines. Cumulative effects will, however, need to be addressed through a strategic approach to ensure that adverse effects on sites containing marine mammal interest features are avoided. |

| Company/organisation<br>(contact / date received)                 | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Whale and Dolphin<br>Conservation Society (WDCCS)<br>Sarah Dolman | 10  | Given the rapidly-increasing scale and extent of offshore wind developments around the UK in the coming decades, we encourage the use of other more environmentally benign forms of turbine installation than pile driving wherever possible.                                                                                                                                                                                                                                                                                                                                                              | This comment is acknowledged. The use of alternative base types has been suggested as a possible project-level mitigation measure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| and<br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd          | 11  | We strongly disagree with the suggestion in the summary of section 4.2.1 that cetaceans are tolerant of human activity. Coastal species have no choice but to share their marine environment with increasing human activity. Declines in harbour porpoise and bottlenose dolphin populations around the UK since the industrial era provide scientific evidence for the inability of cetaceans to tolerate certain types of human activity.                                                                                                                                                                | The statement regarding tolerance of human activity has been removed from the report in light of this comment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (16-Dec-09)<br><i>Continued</i>                                   | 12  | The report makes an unsubstantiated statement about changes in prey species which is of concern. We note that the EU Habitats Directive requires scientific certainty in determining significant impacts. Changes in prey density in the vicinity of offshore wind farms, and subsequent changes in cetacean distribution, is clearly an area that requires further investigation. We strongly disagree with the statement that cetaceans 'are not restricted to a single foraging area'. This contradicts the available science on the biology and foraging requirements of a number of cetacean species. | A detailed assessment of the possible effects of Round 3 developments on specific foraging areas/prey species is not possible at Plan level, as the locations and nature of projects within the zones is not yet known. Where zones or cables overlap areas within foraging reach of SAC populations, the AA conclusions require developers to demonstrate no adverse effect on qualifying marine mammal populations, and to comply with Plan-level avoidance and mitigation measures. This is considered to be a suitably precautionary approach.<br><br>The reference to cetacean foraging habits has been removed. |
|                                                                   | 13  | Section 4.2.2 fails to mention that harbour (or common) seals have undergone major declines, due to unknown but likely cumulative impacts of a number of sources, in large parts of their range in UK waters. This is a significant point that should not only be included, but considered as a matter of priority in decision-making.                                                                                                                                                                                                                                                                     | The text in Section 4.2.2 has been amended to include this information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Company/organisation<br>(contact / date received)                                                                                                                                | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Whale and Dolphin<br>Conservation Society (WDCCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09)<br><br><i>Continued</i> | 14  | Section 4.3.2 states that "none of the sites designated for bottlenose dolphins will be physically affected". Under the EU Habitats Directive, it is not the SAC boundaries that are important here, but the ranges of the animals themselves, where the protection is not contained within the SAC boundaries, but follows the animals (for example, the current offshore wind farm being considered off Aberdeen is about to undertake an Appropriate Assessment because of the bottlenose dolphins that frequent the area and the protection provided for them under the inner Moray Firth SAC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | This point is noted, and the reference to effects within the site boundaries has been removed to avoid confusion.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                  | 15  | <p>Mitigation alone can not guarantee that adverse impacts can be removed or reduced to acceptable levels. We have serious concerns about the effectiveness of some of the suggested mitigation measures to be implemented at plan level in order to prevent damage and disturbance. Some measures are technical and can be expected to reduce noise levels, such as not piling or extending the duration of piling (although there are issues here associated with the duration of disturbance). Clearly the extension of the duration of piling, while possibly reducing physical injury, will add to general disturbance. This cannot, therefore, be described as effective mitigation. However, other measures are either not tested or have shown limited effectiveness to date, including air bubble curtains, soft start and the use of Acoustic Harassment Devices (AHDs). There are legal issues relating to disturbance for all cetacean species where AHDs are proposed for use during pile driving. "Conducting seismic surveys during daylight hours" is only likely to be a mitigation measure where independent Marine Mammal Observers are used to detect those animals that are in the immediate vicinity and at the surface during appropriate weather conditions (detections are unlikely in fog and in increased sea states, for example). Where large-scale developments or cumulative the impacts of multiple developments are concerned (particularly given that cetaceans can detect noise at a range of at least ten's of miles), mitigation that might be appropriate for individual turbine installation will no longer be effective.</p> <p>As a result, <u>we have no confidence that mitigation measures undertaken at the time of a development will take a Plan below the threshold for adverse effect on integrity.</u> This includes all those sites identified in Table 4.5.</p> | <p>Developers will be required to demonstrate at project level that their proposals have no adverse effect on integrity. Where necessary this will need to be achieved through both avoidance and technical mitigation measures (possibly including, but not limited to, those indicated within the AA report)</p> <p>The inclusion of Plan-level avoidance and mitigation measures allows full confidence that the Plan can be undertaken with no adverse effects on integrity of European/Ramsar sites (as assessed through the HRA process).</p> |

| Company/organisation<br>(contact / date received)                                                                                                                               | No. | Response from company/organisation                                                                                                                                                                                                                                                                                                                                                 | Response to comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| Whale and Dolphin<br>Conservation Society (WDCS)<br>Sarah Dolman<br><br>and<br><br>Scottish Wildlife Trust (SWT)<br>Dr. Rebecca Boyd<br><br>(16-Dec-09)<br><br><i>Continued</i> | 16  | Swedish research that recorded Daubenton's bats foraging 10+km from land is mentioned. The report suggests that bats flying over sea are only migrating. This is unsubstantiated.                                                                                                                                                                                                  | Daubenton's bat does fly over water while foraging. However, it is not an Annex II bat species, and is mentioned in relation to the Swedish research. Based on the information presented in Section 2 of this report it is not considered that Annex II bat species will regularly occur offshore.                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                 | 17  | This document only deals with potential impacts on Annex 2 species. The Crown Estate is also required to address the licensing of disturbance impacts for Annex 4 species including all cetacean (and microchiroptera) species that reside in or regularly visit UK waters. We would like an indication from the Crown Estate as to how this will be obligation will be fulfilled. | AA of the Round 3 Plan relates to effects on European sites that include SACs with marine mammal features. Favourable Conservation Status (FCS) of cetaceans as European Protected Species (EPS) is therefore outside the scope of this work at this stage. However, TCE are aware of the need to consider EPS impacts (disturbance and FCS) and will continue to work with regulators and the scientific community to address this at zone and project levels. This will also need to be assessed as part of the EIA process for windfarm projects within the zones.<br><br>A comment to this effect has been inserted in Section 4.1. |
|                                                                                                                                                                                 | 18  | A strategic approach to understanding and filling the data gaps of marine species is also required. Development of broader monitoring programmes than the development sites themselves will help to ensure cumulative and in-combination impacts are accounted for and monitored.                                                                                                  | The Crown Estate acknowledges the potential need for additional data collection to fill gaps and assist in the understanding of cumulative effects, and is investing in this. Relevant experts and other stakeholders will be consulted during the development of proposals for further data collection. It is anticipated that assessments of the potential for cumulative effects will be undertaken at zone level (particularly for the larger zones), and that this strategic overview will be of great value.                                                                                                                      |

