



Department
of Energy &
Climate Change

**RECORD OF THE HABITATS REGULATIONS ASSESSMENT UNDERTAKEN
UNDER REGULATION 61 OF THE CONSERVATION OF HABITATS AND
SPECIES REGULATIONS 2010 (AS AMENDED) FOR AN APPLICATION UNDER
THE PLANNING ACT 2008 (AS AMENDED)**

***Project Title:* BURBO BANK EXTENSION**

Date: 26 September 2014

CONTENTS

SECTION	TITLE	PAGE
1	Introduction	3
2	Development description	7
3	Development location and designated sites	9
4	Likely significant effects test	12
5	Appropriate assessment	16
6	Bowland Fells SPA	18
7	Liverpool Bay SPA	21
8	Mersey Narrows and North Wirral Foreshore SPA/Ramsar site	27
9	Morecambe Bay SPA/Ramsar site	30
10	Ribble Coast and Alt Estuaries SPA/Ramsar site	34
11	River Dee and Bala Lake SAC	37
12	Habitats Regulations Assessment conclusions	39
13	References	40
Annex A	European Sites identified for the HRA	42

TABLES		PAGE
Table 1	RIES summary of sites considered to have a likely significant effect	13
Table 2	Status of plans/projects with the potential for in combination impacts	14
Table 3	Conservation objectives for the Bowland Fells SPA	18
Table 4	Conservation objectives for the Liverpool Bay SPA	21
Table 5	Red-throated diver displacement scenarios	23
Table 6	The numbers of red-throated divers displaced from the Liverpool Bay SPA by offshore wind farms	24
Table 7	Conservation objectives for the Mersey Narrows and Wirral Foreshore SPA	27
Table 8	Conservation objectives for the Morecambe Bay SPA	30
Table 9	Conservation objectives for the Ribble and Alt Estuaries SPA	34
Table 10	Conservation objectives for the River Dee and Bala Lake SAC	37

FIGURES		PAGE
Figure 1	Map of development location: offshore and onshore elements	11

1. Introduction

Background

- 1.1 This is a record of the Habitats Regulation Assessment (HRA) that the Secretary of State (SoS) for Energy and Climate Change has undertaken under the Conservation of Habitats and Species Regulations 2010 (as amended) (the Habitats Regulations) in respect of the Development Consent Order (DCO) and Deemed Marine Licence (DML) for the proposed Burbo Bank Extension Offshore Wind Farm and its associated infrastructure (the Development). For the purposes of these Regulations the SoS is the competent authority.
- 1.2 On 22 March 2013, DONG Energy Burbo Extension (UK) Ltd (hereafter the Applicant) submitted an application to the Planning Inspectorate (PINS), for consent under Section 37 of the Planning Act 2008 (as amended) for the construction and operation of a 259 MW offshore wind farm, and its associated offshore and onshore infrastructure. The 40 km² offshore array, offshore substation and part of the export cable are located within English territorial waters (within 12 nautical miles of the coast) and the whole project is within the UK renewable energy zone. The Development's application is described in more detail in Section 2.
- 1.3 The application did not include works to construct the offshore and onshore grid connections in Wales; as such they lie outside of the scope of this assessment. These works form part of separate consent applications which have not yet been determined. Natural Resources Wales (NRW) have indicated that they are waiting for the outcome of the SoS's decision before determining the application for a Marine Licence, as such there is no timescale available for when this decision will be made.
- 1.4 In England and Wales, offshore energy generating stations greater than 100 MW constitute nationally significant infrastructure projects (NSIPs) and applications for consent are subject to the requirements of the Planning Act 2008 (as amended). This Development constitutes an NSIP as it has a generation capacity of 259 MW.
- 1.5 The Development was accepted by on 19 April 2013 and an Inspector was appointed as the Examining Authority (ExA) for the application. The examination of the Development application began on 26 September 2013 and was completed on 26 March 2014. The ExA submitted its report of the examination, including its recommendation (the ExA's Report), to the SoS on 26 June 2014.
- 1.6 The SoS conclusions on habitats and wild birds issues contained in this HRA report have been informed by the ExA's Report, and further information and analysis, including a Report on the Implications for European Sites (RIES) and written responses to it.
- 1.7 Natural England (NE) is the Statutory Nature Conservation Body (SNCB) for England and for English waters within the 12 nm limit. NRW is the SNCB for Wales. Both agencies registered as Interested Parties as whilst the Offshore Wind Farm is located in English Waters, the cabling and grid connection will be located in Wales.

Habitats Regulation Assessment (HRA)

- 1.8 Council Directive 92/43/EC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) aims to ensure the long-term survival of certain species and habitats by protecting them from adverse effects of plans and projects.
- 1.9 The Habitats Directive provides for the designation of sites for the protection of habitats and species of European importance. These sites are called Special Areas of Conservation (SACs). The Birds Directive provides for the classification of sites for the protection of rare and vulnerable birds and for regularly occurring migratory species. These sites are called Special Protection Areas (SPAs). SACs and SPAs are collectively termed European sites and form part of a network of protected sites across Europe. This network is called Natura 2000.
- 1.10 The Convention on Wetlands of International Importance 1972 (the Ramsar Convention) provides for the listing of wetlands of international importance. These sites are called Ramsar sites. UK Government policy is to afford Ramsar sites in the United Kingdom the same protection as European sites.
- 1.11 In the UK, the Habitats Regulations transpose the Habitats and Birds Directives into national law as far as the 12 nm limit of territorial waters. Beyond territorial waters, the Offshore Habitats Regulations serves the same function for the UK's offshore marine area.
- 1.12 Regulation 61 of the Habitats Regulations provides that:
".....before deciding to give consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European site (either alone or in combination) and which is not directly connected with or necessary to the management of the site, the competent authority must make an appropriate assessment of the implications for the site in view of the site's conservation objectives."
- 1.13 This Development is not directly connected with, or necessary to, the management of a European site or a European marine site. The Habitats Regulations require that, where the project is likely to have a significant effect (LSE) on any such site, an appropriate assessment (AA) is carried out to determine whether or not the project will adversely affect the integrity of the site in view of its Conservation Objectives. In this document, the assessments as to whether there are LSEs, and, where required, the AAs, are collectively referred to as the HRA.
- 1.14 The HRA takes account of mitigation measures which are secured by requirements and conditions within both the DCO and DML.

The RIES and Statutory Consultation

- 1.15 Under the Habitats Regulations the competent authority must, for the purposes of an AA, consult the appropriate nature conservation body and have regard to any representation made by that body within such reasonable time as the authority specify.

- 1.16 The ExA, with support from the Planning Inspectorate (PINS), prepared a RIES, based on working matrices prepared by the Applicant. The RIES documented the information received during the examination and presented the ExA's understanding of the main facts regarding the HRA to be carried out by the SoS.
- 1.17 The RIES was published on PINS planning portal website and circulated to interested parties on 19 February 2014 for a period of 21 days for the purposes of statutory consultation. The RIES, and the written responses to it, have been taken into account in this assessment. There were four substantive responses to the RIES consultation (the Applicant, the RSPB, NE, and NRW).
- 1.18 The SoS is content to accept the ExA's recommendation that the RIES, and written responses to it, represents an adequate body of information to enable the SoS to fulfil his duties in respect to European sites and species.

Information Sources

- 1.19 This HRA report should be read in conjunction with the following documents that provide extensive background information:
- Planning Act 2008. Burbo Bank Extension Offshore Wind Farm. Examining Authority's report of findings and conclusions and recommendation to the Secretary of State for Energy and Climate Change;
 - Report on the Implications for European Sites (RIES). Burbo Bank Extension Offshore Wind Farm. An Examining Authority report prepared with the support of the Environmental Services Team;
 - Environmental Statement (the ES);
 - REP 090: Natural England written representations;
 - REP 097: Natural Resources Wales written representations;
 - REP 098: Royal Society for the Protection of Birds written representations;
 - REP 125: DONG Energy – Statement of Common Ground with Natural England (general matters);
 - REP 155: Natural England – Written summary of submissions and evidence provided during the issue specific hearings on 19 to 21 November 2013 submitted for the deadline of 05 December 2013.
 - REP 192: DONG Energy – Appendix 9 - Lesser black-backed gull collision risk modelling: An update to the in-combination assessment submitted for the deadline of 5 February 2014 (Table 6 of Appendix 6.1 has been amended);
 - REP 196: DONG energy - Appendix 13 Position statement: Status with regards to outstanding concern on adult salmon migration and proposed condition;
 - REP 233: DONG Energy - Appendix 6 AGREED Statement of Common Ground with

Natural Resources Wales and Natural England on red throated diver;

- REP 234: DONG Energy - Appendix 7 Red-throated Diver Displacement: Clarification of density dependent effects v4;
- H1-DOC 9: Decision letter from DEFRA in regards to the Warton Aerodrome Gull Cull Licence;
- REP 244: NE – Response to the RIES and Examining Authorities RIES (Annex B);
- REP 245: RSPB – Response to the revised draft DCO and RIES;
- REP 247: NRW – Response to the report on the implications for European sites;

1.20 The key information in these documents, written representations and discussions at issue specific hearings (which are available as an audio recording) are summarised and referenced in this report where used.

2. Development Description

Development Components

- 2.1 The offshore array is proposed to cover approximately 40 km², with a maximum installed capacity of 259 MW and up to 69 three-bladed, horizontal axis wind turbines. The offshore components of the Development include:
- Up to 69 three-bladed, horizontal axis wind turbines
 - Up to one offshore substation
 - Inter-array cables between the turbines and the substations
 - Export cables linking the substations to the seabed boundary between the territorial waters of England and Wales.
- 2.2 Full details of the infrastructure to be used in the Development are detailed in Schedule 1, part 1 of the DCO.

Rochdale Envelope

- 2.3 The Rochdale Envelope is a term used in planning to reflect that often a developer will not know all of the details associated with the proposal at the time of application. The Rochdale Envelope allows a developer to set out the broad range of options under consideration and then carry out an Environmental Impact Assessment (EIA) based on the worst case scenario for each of those options.
- 2.4 In this case, the precise siting of turbines within the application boundary as well as the foundation type, turbine model and certain elements of the export cable route will be determined post-consent, once detailed geotechnical seabed investigations, foundation and engineering design, economic assessments and the selection and appointment of equipment and contractors have taken place (ES, 6.15: table 6.35). The Applicant therefore seeks to retain flexibility in the final project design and the DCO has been framed to allow for multiple design options in accordance with the Rochdale Envelope concept. The Environmental Statement (ES) sets out these multiple options for a number of project components including indicative turbine specification (ES, 6.6.9: Table 6.2), foundation types (ES, 6.6.15: table.6.3), offshore substations (ES, 6.8.5: table 6.15), and cable types, routes and installation methods (ES, 6.8.23: table 6.20).
- 2.5 The ES is therefore based on the assessment of a maximum adverse scenario (the realistic worst case) in environmental terms (ES, 6.4). The Development is however, bound by the DCO application boundary, which sets out areas within which the infrastructure can be located, together with various technical restrictions.

Development stages

Construction

- 2.6 The Applicant states in the ES that the overall construction period for the Development from the commencement of onshore works to completion of commissioning of the wind farm will be approximately 2 years (ES: 6.3, figure 6.4). The Applicant estimates that the offshore components of the Development are likely to be constructed over a 1 to 1.5 year period and that construction of the onshore components of the Development will take place over 1.5 years, followed by commissioning (ES, 6.3, figure 6.4). However, this is an indicative programme that could be affected by many factors such as weather windows, vessel availability, materials and equipment lead times and the choice of contractors. The DCO contains a requirement for construction to commence within 5 years of issue.

Operation and Maintenance

- 2.7 The chosen offshore operation and maintenance options will depend upon a number of factors including health, safety, security and environmental legislation and best practice, scheduled maintenance will take place year round.

Decommissioning and Repowering

- 2.8 At the end of the Development's design life, a decision will be made to either refurbish the Development by allowing it to extend its life by repowering it with the latest turbine technology, or to decommission it. The decision on repowering would be taken on commercial grounds, based on the performance of the wind farm and would be subject to a future consents application and a fresh assessment under the Habitats Regulations by the relevant authorities at that time. Decommissioning will take place at the end of the Development lifetime and will involve the removal of all accessible offshore installed components. It is however anticipated that the onshore cables will be left buried *in situ*, unless lifted to be replaced by new cables to be run along the same route as part of future developments or wind farm repowering.
- 2.9 The Development falls within the scope of the Energy Act 2004 which includes decommissioning provisions. Broadly speaking, the SoS shall require a person who is responsible for an offshore renewable energy installation to prepare a costed decommissioning programme and ensure that it is carried out. The SoS can approve, modify or reject a decommissioning programme at any point.
- 2.10 Decommissioning activities will need to comply with all relevant UK legislation at the time. The person(s) responsible for the wind farm will produce and agree a decommissioning programme with the Department of Energy and Climate Change (DECC) and in consultation with the Marine Management Organisation (MMO), SNCBs or their respective successors.

3. Development location and designated sites

Location

- 3.1 The offshore elements of the Development are located in the Irish Sea, off the coast of the Wirral Peninsular and adjacent to the existing Burbo Bank OWF. The wind turbine array is approximately 7 km north of Hoylake at its closest point. A map of the array and offshore export cable is given at figure 1.

European and International Sites

- 3.2 The following sites were included in the RIES LSE screening matrices. There is significant overlap between SPA and Ramsar designations, so for the purposes of this assessment; consideration of the Ramsar designations has been undertaken in parallel with the SPA designation. All relevant species are covered by both designations.

- Aberdaron Coast and Bardsey Island SPA
- Bowland Fells SPA;
- Cardigan Bay SAC;
- Copeland Islands SPA;
- Dee Estuary SPA;
- Dee Estuary Ramsar site;
- Dee Estuary SAC;
- Duddon Estuary Ramsar site;
- Duddon Estuary SPA;
- Eileanan agus Sgeiran Lios Mór SAC;
- Llyn Peninsula & the Sarnau SAC;
- Menai Strait and Conwy Bay SAC;
- Mersey Estuary SPA;
- Mersey Estuary Ramsar site;
- Mersey Narrows and North Wirral Foreshore SPA;
- Mersey Narrows and North Wirral Foreshore Ramsar site;
- Morecambe Bay SPA;
- Morecambe Bay Ramsar site;
- Murlough SAC;

- Pembrokeshire Marine SAC;
- Ribble and Alt Estuaries Ramsar site;
- River Dee and Bala Lake SAC;
- Roaringwater Bay and Islands SAC;
- Sefton Coast SAC;
- Shell Flat and Lune Deep SAC;
- Skerries and Causeway SAC;
- Skokholm and Skomer SPA;
- South-East Islay Skerries SAC;
- Strangford Lough SAC;
- The Maidens SAC;
- Upper Solway Flats and Marshes SPA; and
- Upper Solway Flats and Marshes Ramsar site.

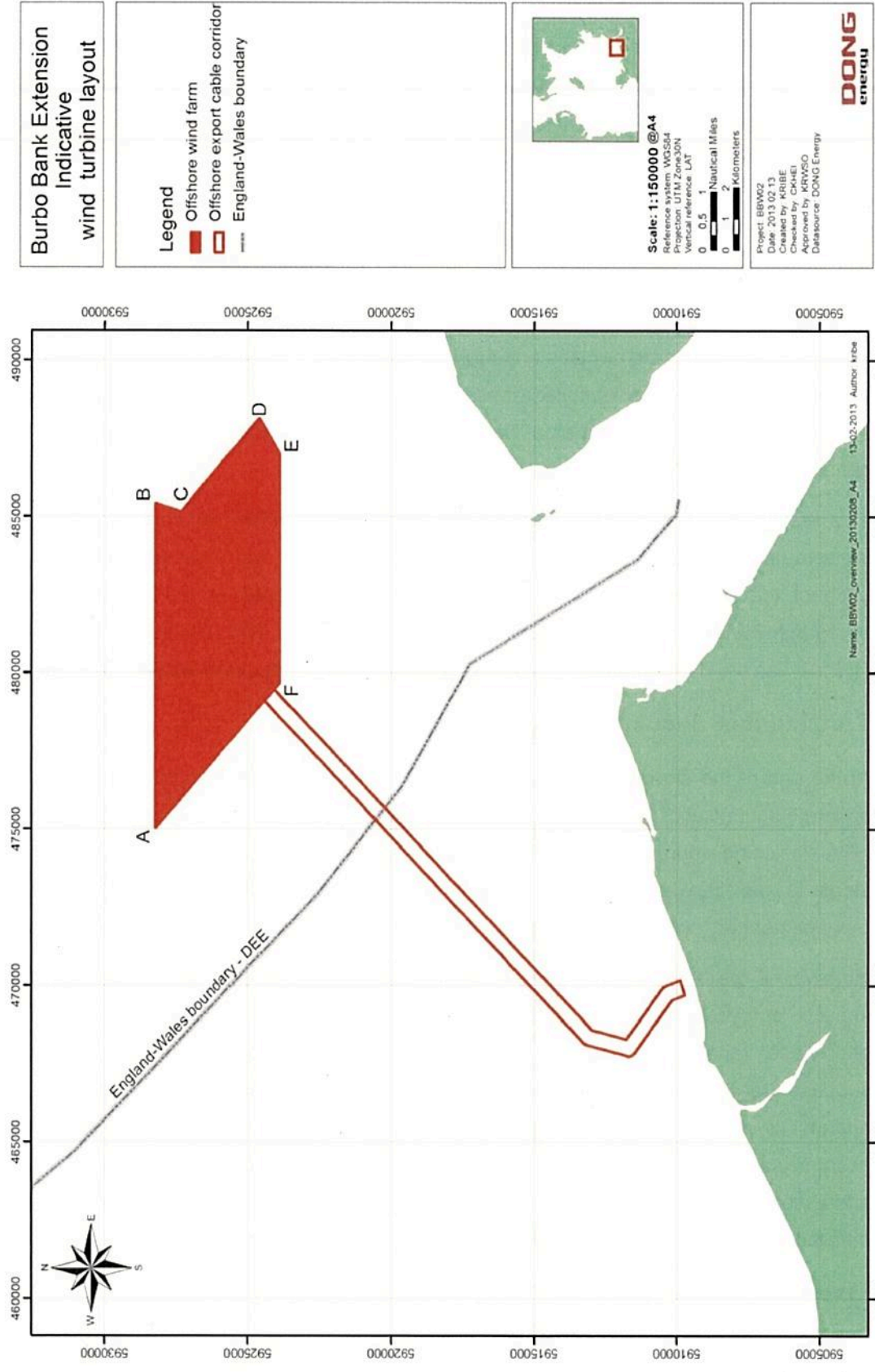
3.3 The qualifying features of these sites are listed in Annex A.

3.4 NRW held a consultation about proposals to extend 3 sites and amend their Conservation Objectives in Wales. Those sites were:

- Aberdaron Coast and Bardsey Island SPA
- Skokholm and Skomer SPA
- Grassholm SPA

3.5 The ExA's report confirmed that whilst these sites' conservation objectives may be subject to change following consultation, there was no indication from any of the parties that an adverse effect upon the revised site's integrity is possible. On this basis, they have been screened out of further assessment.

Figure 1: Map of Development location: offshore and onshore elements (taken from ES)



4 Likely Significant Effects Test

- 4.1 Under Regulation 61 of the Habitats Regulations, the SoS must consider whether a Development is likely to have a significant effect (LSE) on a European site, either alone or in combination with other plans or projects. A LSE is, in this context, any effect that may be reasonably predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects. An AA is required if a plan or project is likely to have a significant effect on a European site, either alone or in combination with other plans or projects.
- 4.2 The purpose of this test is to identify LSEs on European sites that may result from the Development and to record the SoS's conclusions on the need for an AA and his reasons for screening activities, sites or plans and projects in for further consideration in the AA. For those features where a LSE is identified, these must be subject to an AA. This review of potential implications can be described as a 'two-tier process' with the LSE test as the first tier and the review of effects on integrity (AA) as the second tier.
- 4.3 This section addresses this first tier of the HRA, for which the SoS has considered the potential impacts of the Development both alone and in combination with other plans and projects on each of the interest features of the European sites identified in the RIES (and listed in paragraph 3.2) to determine whether or not there will be an LSE. Where there are predicted LSEs, these are described briefly in table 1. Further detail is set out in the RIES Matrices.

Treatment of decommissioning impacts

- 4.4 At the end of the Development's lifetime, decommissioning must take place and at that point separate authorisation will be required, as a planning matter, after the preparation of an ES and HRA (including appropriate consultation with the relevant SNCBs). It is not possible at this stage to predict with any certainty what the European and Ramsar site context of the Development will be in the future: sites may increase or decrease in importance over that time.
- 4.5 However, if the environmental baseline were to be similar to the current situation, then the impacts of decommissioning of the Development could be expected to be similar to the anticipated impacts of construction, without the impacts of piling. There is no reason to suppose that the impacts of decommissioning would cause an adverse effect on site integrity and on this basis, the SoS considers that it is reasonable not to include a detailed discussion on decommissioning impacts in this report. He is satisfied that decommissioning effects will be addressed fully by the relevant authorities, prior to decommissioning and in light of more detailed information on decommissioning processes and environmental conditions at that time.

Likely Significant Effects: Development Alone

- 4.6 The information within the RIES present the potential interactions of each stage of the Development (construction, operation, decommissioning) with the qualifying features of those 32 sites listed in Annex A.

- 4.7 The RIES reported that a LSE could occur at 6 different sites as shown in Table 1. These sites were taken forward to consider whether the Project will result in an adverse effect upon the integrity (section 5).
- 4.8 The RIES conclusions on the potential for a LSE from the impacts of the Project alone were not disputed by any of the Interested Parties.

Table 1. RIES summary of the sites considered to have a likely significant effect (LSE) from the Burbo Bank extension.

Site	Feature	Effect	LSE Alone	LSE In combination
Bowland Fells SPA	Lesser black-backed gull (breeding)	Collision	Y	Y
Liverpool Bay SPA	Red-throated diver (overwintering)	Displacement		Y
Mersey Narrows and North Wirral Foreshore SPA/Ramsar	Common tern (breeding)	Collision	Y	Y
Morecambe Bay SPA/Ramsar	Lesser black-backed gull (breeding); Herring gull (breeding)	Collision	Y	Y
Ribble and Alt Estuaries SPA/Ramsar	Lesser black-backed gull (breeding)	Collision	Y	Y
River Dee and Bala Lake SAC	Atlantic salmon (migratory)	Migration barrier	Y	

Likely Significant Effects: In Combination

Scope of in combination assessment

- 4.9 Under the Habitats Regulations, the SoS is obliged to consider whether other plans or projects in combination with the Burbo Bank Extension might affect European sites. In this case there are a number of other plans and projects which could potentially affect some of the same European sites as the Development. These include a number of planned and existing offshore wind farms within the vicinity of the Development as well as the plan to cull gulls at the BAES Warton site (see Table 2). The SoS will limit the scope of his in combination assessment solely to the projects identified within Table 2, however because of differences in species composition not all of the European sites will be affected by all of the plans/projects listed.
- 4.10 As different projects are at different stages of development, there are variable levels of information and certainty available on the predicted environmental impacts. For this reason the in combination plans and projects have been grouped according to their development status.

Table 2: Status of plans/projects with the potential for in combination impacts. (Source: RIES).

Project	Status
Atlantic Array	Withdrawn
Barrow	Operational
Codling Park	Consented
Gwynt y Môr	Under construction
Navitus Bay	In planning
North Hoyle	Operational
Oriel	Consented
Ormonde	Operational
Rhiannon	Withdrawn
Rhyl Flats	Operational
Walney I and II	Operational
Walney Extension	In planning
West of Duddon Sands	Under construction
Warton Aerodrome gull cull consent	Granted

- 4.11 The Applicant characterised the projects so as to place greater weight on those which were operational, under construction or consented and less weight on projects in planning for which there is variable amounts of information available.
- 4.12 It should be noted that since the close of the Examination, Centrica have announced that it will not proceed with its Celtic Array Zone (which includes the Rhiannon development).
- 4.13 The SoS considers that sufficient information has been presented on projects with the potential for in combination impacts for the purposes of assessing this application under the Habitats Regulations.
- 4.14 The Burbo Bank Extension application to the SoS does not include the export cables needed to link the offshore wind farm with a grid connection. This will form part of an application for a Welsh Marine Licence from NRW who will act as the competent authority. As no information about the export cables, or the potential impacts upon European sites is available, these works have been screened out of this Habitats Regulations Assessment. Nonetheless the ExA was of the view, based on submissions received by NRW, that there are sufficient monitoring and mitigation mechanisms available to the Applicant to resolve any potential issues.

Likely Significant Effect: In combination assessment

- 4.15 The matrices in the RIES (1 to 33) consider the potential impacts of the Development in combination with other plans and projects and considers whether there is the potential for a LSE on the qualifying features of the 32 sites listed in Annex A.
- 4.16 The potential for a LSE was identified for specific features at 5 sites (see table 1) in England and Wales. LSEs on all the other qualifying features at those sites (listed in full in Annex A) were excluded with the agreement of all parties.

4.17 The SoS agrees with the ExA, he is unable to exclude a LSE from the 5 sites identified in Table 1 when the impacts of the Burbo Bank Extension are considered in combination with the impacts of other plans and projects.

Conclusions on Likely Significant Effects

4.18 The SoS considers that sufficient information has been provided to inform a robust assessment in line with his requirements under the Habitats Regulations.

4.19 On the basis of the information supplied by the RIES and the responses to that document, the ExA concludes that the Burbo Bank Extension is likely to have a significant effect upon the sites (and features) listed in Table 1.

4.20 The SoS is satisfied to use the recommendations of the ExA, the RIES, and written responses to it to inform his view. He considers that the evidence behind these judgements has been fully tested as part of the examination process. Having given due consideration to the information and analysis presented to him, the SoS is in agreement with the ExA and considers that it is these sites and features for which LSE could not be excluded that are relevant to his AA.

4.21 The SoS agrees with the ExA that there are no other LSEs on any of the other interest features of the 32 sites listed in Annex A as a result of the Development, either alone or in combination with other plans or projects. On this basis, the SoS is content that these features need not be subject to any further assessment.

5 Appropriate Assessment

Test for Adverse Effect on Site Integrity

- 5.1 The requirement to undertake an AA is triggered when a competent authority, in this case the SoS, determines that a plan or project is likely to have a significant effect on a European site either alone or in combination with other plans or projects. Guidance issued by the European Commission states that the purpose of an AA is to determine whether adverse effects on the integrity of the site can be ruled out as a result of the plan or project, either alone or in combination with other plans and projects, in view of the site's conservation objectives (European Commission, 2000).
- 5.2 The purpose of this AA is to determine whether or not adverse effects on the integrity of those sites and features during the LSE test can be ruled out as a result of the Development alone or in combination with other plans and projects in view of the site's conservation objectives and using the best scientific evidence available.
- 5.3 If the competent authority cannot ascertain the absence of an adverse effect on site integrity within reasonable scientific doubt, then under the Habitats Regulations, alternative solutions should be sought. In the absence of an acceptable alternative, the project can proceed only if there are imperative reasons of overriding public interest (IROPI) and suitable compensation measures identified. Considerations of IROPI and compensation are beyond the scope of an AA.

Conservation Objectives

- 5.4 Guidance from the European Commission indicates that disturbance to a species or deterioration of a European site must be considered in relation to the integrity of that site and its conservation objectives (European Commission, 2000). Section 4.6.3 of that guidance defines site integrity as:

"...the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified."
- 5.5 Conservation objectives outline the desired state for a European site, in terms of the interest features for which it has been designated. If these interest features are being managed in a way which maintains their nature conservation value, they are assessed as being in a 'favourable condition'. An adverse effect on integrity is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of its designation (English Nature, 1997).
- 5.6 There are no set thresholds at which impacts on site integrity are considered to be adverse. This is a matter for interpretation on a site-by-site basis, depending on the designated feature and nature, scale and significance of the impact.

- 5.7 Conservation objectives have been used by the SoS to consider whether the Development has the potential for having an adverse effect on a sites' integrity, either alone or in combination.
- 5.8 The potential for the Burbo Bank Extension to have an adverse effect is considered for each site in turn.
-

6 Bowland Fells SPA

- 6.1 The Bowland Fells are an extensive upland area in Lancashire; its major habitats are heather-dominated moorland and blanket mire. These habitats help to support important populations of upland breeding birds, especially breeding merlin (*Falco columbarius*) and hen harrier (*Circus cyaneus*). The site covers approximately 16,000 ha and is approximately 55 km from the Burbo Bank Extension project. The Conservation Objectives for the site are shown in Table 3.
- 6.2 The SPA Review in 2001 recommended the addition of breeding lesser black-backed gulls (LBBG) (*Larus fuscus*) to the citation, as such they have been considered within this Appropriate Assessment. The Bowland Fells SPA citation lists the breeding population of LBBG as being 13,900 birds.

Table 3. The Conservation Objectives for the Bowland Fells SPA.

Conservation Objectives	<p>Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.</p> <p>Subject to natural change, to maintain or restore:</p> <ol style="list-style-type: none"> 1. The extent and distribution of the habitats of the qualifying features; 2. The structure and function of the habitats of the qualifying features; 3. The supporting processes on which the habitats of the qualifying features rely; 4. The populations of the qualifying features; 5. The distribution of the qualifying features within the site. <p>Qualifying Features:</p> <ul style="list-style-type: none"> ➤ Hen harrier (Breeding); <i>Circus cyaneus</i> ➤ Merlin (Breeding); <i>Falco columbarius</i> <p>Additional Qualifying Features Identified by the 2001 UK SPA Review:</p> <ul style="list-style-type: none"> ➤ Lesser black-backed gull (Breeding); <i>Larus fuscus</i>
-------------------------	---

- 6.3 A LSE was identified for this site because of the potential for an increase in collision risk as a result of the Burbo Bank Extension alone but also in combination with other plans and projects.

Estimating and understanding the effects of increased collision risk

- 6.4 There are two parts to estimating collision mortality. The first is to understand the number of birds passing through the swept area of the turbines within the OWF. This is determined by calculating the number of birds which are likely to be passing through OWF and then factoring in the heights above sea level at which various species fly at to determine the numbers of birds at collision risk height. This calculation is done using a mathematical model, the Band model being the most commonly used. There are several different versions of the Band model which use bird flight height in different ways to produce different estimates of collision risk. Band models 1 and 2 (known as the basic Band model) assume that all individuals of a species of bird fly at the same height. For Band model 1, that height is determined by aerial or *in situ* boat

surveys. For Band model 2, that height is based on published literature from Cook *et al* (2012). Band model 3 (known as the extended Band model) uses detailed flight height data (from Cook *et al*, 2012) to calculate the proportional risk to a bird according to its location within the swept rotor space. The rationale being that if a bird is closer to the nacelle then it is at greater risk of collision than if at the edge of the blade.

- 6.5 The second step to estimating collision mortality is to define the percentage of birds that are likely to make a behavioural response to the presence of a wind farm (or to an individual turbine) so as to avoid flying on a path that puts them at risk of collision with the rotating turbine blades. This is known as the avoidance rate (AR). The choice of AR has a significant influence on the number of predicted collisions. The overall AR will be the result of a combination of factors including macro-avoidance (of the whole wind farm, by diverting over or around it) and micro-avoidance (ability to avoid collision with a turbine blade once within a wind farm). In practice, the actual AR for any given location will also be affected by site-specific and temporal variations, including the layout of turbines, weather and visibility, whether the birds are foraging or migrating and also whether they are part of a large flock.
- 6.6 Whilst collision AR can be generic, where essentially the same rate of turbine blade avoidance is assumed for a wide range of bird species, irrespective of any behavioural assumptions or empirical observations, it can also be tailored to a species or a group of species on the basis of qualitative assessments (taking known behaviours including manoeuvrability into account) and empirical data (such as surveys of actual bird behaviours for example blade avoidance, or mortality impacts evidenced by recovered dead bird counts). Species-specific AR have been developed by Scottish Natural Heritage to take into account factors such as the behaviour patterns, reactions, size and agility of different bird species (Scottish Natural Heritage, 2010).
- 6.7 Once the number of birds expected to collide with the wind turbines have been calculated, the next step is to determine what impact that will have on the species population on a recurring annual basis. There are several methods of doing this, this project has used Potential Biological Removal (PBR) analysis to calculate this
- 6.8 PBR analysis quantifies the potential level of additional mortality which could occur on an annual basis without resulting in a long term population decline. One of the key parts of the PBR calculation is determining what the recovery factor (f factor) for a species is. This value (ranging between 0.1 and 1.0) is intended to compensate for the inherent uncertainties present when making estimates about impacts upon a population. A recovery factor of 0.1 is often used for endangered species/populations where the risks of getting a prediction wrong would have serious consequences for that species/population.

Lesser black-backed gulls - alone

- 6.9 NE initially disagreed with the approach used by the Applicant to undertake their CRM. Following further discussions with NE, the Applicant undertook further CRM using the Band model options 2 and 3. This estimated that the Burbo Bank Extension could result in an annual

mortality of around 18 LBBG from the Bowland Fells SPA population during the breeding season (Band model option 2, 98% AR). The Applicant used PBR analysis to estimate the number of birds which could be sustainably removed from the population every year without causing a long term decrease in numbers. The PBR analysis showed that approximately 298 birds could be removed from the population (based on a recovery factor of 0.5) on an annual basis without affecting the population in the long term (Paper 8: PBR analysis of common tern, LBBG and herring gull colonies).

- 6.10 Whilst NE did not agree with all of the parameters chosen by the Applicant for the PBR analysis, they agreed that the results of the CRM and the PBR analysis demonstrated that the Burbo Bank Extension alone would not have an adverse effect upon this site.
- 6.11 The SoS is of the view that the additional LBBG mortality levels as a result of the Development would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the estimated annual mortality (of around 18 birds) is much lower than the population could withstand without experiencing a long term population decline (around 300 birds). These figures are based on a population estimate of 10,937 in 2011 (JNCC SMP database).
- 6.13 The SoS is therefore satisfied that the Burbo Bank Extension (when considered alone) will not have an adverse effect upon the integrity of the Bowland Fells SPA as a result of the increased collision risk to LBBGs.

Lesser black-backed gulls – in combination

- 6.14 The Applicant has also undertaken CRM to assess the in combination impacts of the Burbo Bank Extension with other plans and projects. The scope of the in combination assessment is described in paragraphs 4.09 - 4.13. The Applicant has re-calculated the CRM and evaluated the results against the PBR for the Bowland Fells SPA (Applicant's response to Deadline V – Appendix 9, amendment 27 January 2014).
- 6.15 The Applicant has estimated that approximately 21 breeding LBBG will be killed by the Burbo Bank Extension in combination with the consented plans/projects (Walney 1 & 2, West of Duddon Sands, Ormonde, Gwynt y Môr, Burbo Bank, Rhyl Flats, North Hoyle and Barrow). This increases to 23 breeding birds when the Walney Extension (in planning) are included in the in combination assessment.
- 6.16 Based on a combined mortality of 23 breeding birds, NE was satisfied that an adverse effect upon the integrity of the Bowland Fells SPA site could be excluded.
- 6.17 The SoS is satisfied that an adverse effect upon the integrity of the Bowland Fells SPA can be excluded based on the cumulative LBBG mortalities as a result of collision with the Burbo Bank Extension in combination with other plans and projects. The PBR analysis demonstrates that the impact will not affect the species at a population level.

7 Liverpool Bay SPA

- 7.1 The Liverpool Bay SPA is located in the south-eastern region of the northern part of the Irish Sea bordering northwest England and north Wales, and running as a broad arc from Morecambe Bay to the east coast of Anglesey. The SPA comprises a single area of 170,225 ha, and is designated to protect important populations of over wintering red-throated divers (*Gavia stellata*) and common scoter (*Melanitta nigra*). The Conservation Objectives for the Liverpool Bay SPA are shown in Table 4, Natural England have advised that the Liverpool Bay SPA is assumed to be in favourable condition (Statement of Common Ground with NRW and NE on red-throated diver).
- 7.2 The Burbo Bank Extension site is mostly located within the Liverpool Bay SPA. The Development itself (excluding any buffer zones) covers approximately 7.81 % of the SPA. The export cable will pass through the part of the Liverpool Bay SPA in Welsh territorial waters
- 7.3 The Applicant identified the potential for the Burbo Bank Extension, in combination with other plans and projects, to have a likely significant effect upon the red-throated diver population of the Liverpool Bay SPA because of the impacts of displacement. The impacts of the Burbo Bank Extension alone were not considered to constitute a likely significant effect. Those birds that are displaced from the wind farm site are likely to suffer from increased mortality as they will need to compete with other birds for scarcer resources. It is the magnitude of that mortality which will determine whether the Project will result in an adverse effect.
- 7.4 The Applicant was of the view that there would not be an adverse effect upon the integrity of the SPA. The SNCBs (NE and NRW) and RSPB disagreed with this conclusion and felt that there was insufficient scientific evidence to be able to rule out an adverse effect.

Table 4. The Conservation Objectives for the Liverpool Bay SPA.

Conservation Objectives	<ul style="list-style-type: none"> ➤ Subject to natural change, maintain or enhance the red-throated diver population and its supporting habitats in favourable condition ➤ Subject to natural change, maintain or enhance the common scoter population and its supporting habitats in favourable condition
-------------------------	---

Red-Throated Diver Ecology

- 7.5 The red-throated diver is the smallest of the world's four species of divers. Although not regarded as being threatened within the EU, the conservation status of this species is regarded as unfavourable because of declines in the European breeding population between 1970 and 1990. The population is now considered stable but depleted (NE and JNCC, 2010). The most recent Great Britain wintering population is estimated to number approximately 17,000 individuals (O' Brien *et al*, 2008)
- 7.6 Red-throated divers breed primarily in Artic regions and it is considered that the Great Britain wintering population is made of birds that breed in the UK, Greenland, Iceland and Scandinavia.

Over winter, they aggregate in substantial numbers in discrete areas around the UK coast, with some 44% of the population within the Outer Thames. The population in Liverpool Bay is considered to be the second highest in the UK (922 individuals, 5.4% of the GB population, 2001/02 – 2006/07), based on the most recent population mean peaks (NE and CCW, 2012). The most recent estimate of the population is 1188 birds; however confidence limits ranging from 920 to 1534 give an indication of the variation associated with this estimate (Bradbury *et al*, 2011). In the Applicant's Statement of Common Ground, Natural England stated that the Liverpool Bay SPA is assumed to be in favourable condition (Statement of Common Ground with NRW and NE on red-throated diver).

- 7.7 Red-throated divers are long-lived birds with a relatively low annual reproduction rate. They are fish eating shy birds which actively avoid activities such as shipping, aggregate extraction, aircraft movements and offshore wind farms. Because of their low manoeuvrability, high sensitivity to disturbance, low flexibility in habitat use, low population size and high conservation status; red-throated divers are considered to be the second most sensitive species to the development of offshore wind farms (Garthe and Huppopp, 2004). As they usually fly below collision risk height, and avoid areas of wind turbines, they are not considered to be vulnerable to collision risk.

Red-throated diver displacement scenarios

- 7.8 There is a two-stage process to evaluating the magnitude of the displacement effects. First, the proportion of the site's population will be displaced must be determined. Then secondly; the proportion of those individuals that will suffer mortality as a result of density-dependent effects needs to be modelled.
- 7.9 The Applicant undertook analysis of the potential impacts by modelling the number of birds displaced from the Burbo Bank Extension site plus a 2 km buffer zone. This would lead to an increase in bird density outside of the site by <1 bird per km². The Applicant considered this would not represent an adverse effect as it would be far lower than the densities of red-throated divers recorded (Webb *et al*, 2009) in the Outer Thames Estuary SPA (which supports closer to 4 individuals per km²).
- 7.10 This approach was disputed by NE, NRW and the RSPB who advised that:
- the potential for red-throated diver displacement beyond the 2 km buffer should be considered;
 - the level of mortality associated with that displacement is not based on sound evidence and;
 - the magnitude of that impact could constitute an adverse effect upon the integrity of the site.
- 7.11 NE, NRW, and RSPB advised that there is evidence (Percival *et al*, 2010) that a wider buffer zone should be used and therefore the Applicant should extend the buffer area to 3 km. They

also recommended using the displacement scenarios as described within the Percival study (Percival *et al*, 2010) as being the most appropriate.

- 7.12 The Percival study was a report undertaken to examine the post construction effects of the Kentish Flats OWF upon red-throated divers in the Outer Thames Estuary SPA.
- 7.13 A comparison of the 2 scenarios, showing the estimated red-throated diver displacement over a series of distance bands, is shown in Table 5. The main differences between the 2 scenarios are that the Percival study recorded more birds being displaced within each distance band than was predicted within the Kentish Flats Extension HRA. The Percival study also recorded that 63 % of red-throated divers were displaced in the 2-3 km distance band. The potential for displacement of red-throated divers beyond 2 km was not considered within the Kentish Flats HRA.
- 7.14 The Applicant considered that the Percival study was not appropriate for use in this exercise as the study advises caution in the application of its results to other wind farm sites, particularly those with higher levels of red-throated diver usage, such as in the Outer Thames Estuary. Instead the Applicant endorsed the approach used by DECC in the Kentish Flats Extension HRA.

Table 5. Red-throated diver displacement scenarios. The percentage indicates the number of birds which will be displaced from that area (Source: NE's written representations).

	Wind farm footprint	0 – 500 m	500 m – 1 km	1 km – 2 km	2 km – 3 km
Percival (2010)	95%	87%	76%	61%	63%
Kentish Flats Extension HRA (DECC)	94%	83%	77%	59%	N/a

- 7.15 The size of the buffer zone chosen around the Burbo Bank Extension project determines the relative proportion of the SPA population predicted to be affected by the development. The predicted displacement of red-throated divers from the Liverpool Bay SPA by offshore wind farms is shown in Table 6. The Applicant calculated that approximately 10.85 % of the Liverpool Bay SPA population will be affected by the Burbo Bank Extension (based on a 2km buffer) in combination with other plans and projects in the Irish Sea (Burbo Bank, Rhyl Flats and Gwynt y Môr). This value increases to 11.88 % of the SPA population when using a 3 km buffer zone. These figures were agreed with NE and NRW (Statement of Common Ground with NRW and NE on red-throated diver).

Density-dependent mortality estimates

- 7.16 A key area of disagreement between the Applicant and several Interested Parties (SNCBs and the RSPB) centred on the predicted mortality levels for displaced birds.

Table 6. The numbers of red-throated divers displaced from the Liverpool Bay SPA by offshore wind farms. The Burbo Bank Extension figures are based on a 2 km buffer zone (Source: DONG Energy – Red-throated diver displacement: clarification of density-dependent effects (version 4)).

Offshore Wind Farm	Year Operational	Divers Displaced	% of SPA population
Burbo Bank	2007	11	1.19
Rhyl Flats	2009	24	2.60
Gwynt y Môr	Expected 2014 (construction commenced 2012)	35	3.80
Burbo Bank Extension	N/a	30	3.25
Total		100	10.85

- 7.17 To calculate the density dependent mortality estimate, the Applicant first calculated the number of birds likely to be displaced from the site and the buffer zone. This was determined by applying the displacement scenarios in Table 5 to the red throated diver densities established by pre-application survey work.
- 7.18 The next step of the analysis was to estimate the 'P' value, this value determines what proportion of the displaced birds will die (for example a 'P' value of 1 means that all displaced birds will die)
- 7.19 In the absence of evidence for a suitable 'P' value for red-throated divers, the Applicant used results obtained for the impacts of density-dependent mortality effects on oystercatchers (*Haematopus ostralegus*) as a surrogate (Durell *et al*, 2000; Durell *et al*, 2001) . The Applicant stated that the Oystercatcher model supports a 'P' value of less than 0.75 (with a 2 km buffer) and less than 0.77 (for a 3 km buffer).
- 7.20 The SNCBs agreed that it was unrealistic that all displaced red-throated divers would die but advised caution in the use of data based on oystercatchers as the similarities (or differences) between the 2 species cannot be tested. The SNCBs also stated that there was no scientific basis for the use of a 'P' value lower than 0.75.
- 7.21 The Applicant calculated that the proportion of red-throated divers likely to suffer from density-dependent mortality would be between 8.14 % (using a 2 km buffer) and 9.15 % (using a 3 km buffer) of the SPA population. Based on a population of 922 individuals this would result in the loss of between 76 and 84 birds respectively (NB numbers rounded to nearest integer).
- 7.22 The Applicant felt that the density dependent mortality figures were precautionary in that it was based on a number of worst case assumptions. It assumed that the P value would be 0.75 (0.77 for 3 km buffer) when a value between 0.3 and 0.45 would be more appropriate. The use of a lower P value would decrease the estimated density dependent mortality figure, thereby resulting in a smaller effect upon the Liverpool Bay SPA. The use of a P value of 0.77 is equivalent to a density dependent mortality rate of 5 % whereas a P value of between 0.3 and 0.45 is equivalent to a mortality rate of between 2 and 3 %.

- 7.23 In the absence of any offshore wind farms, the Applicant calculated that the average density of red-throated divers in the Liverpool Bay SPA would be 0.549 birds per km². This is relatively low compared to the Outer Thames Estuary SPA which supports a density closer to 4 individuals per km² (Webb *et al*, 2009). Once displacement from the Burbo Bank Extension and other offshore wind farms is taken into consideration, red-throated diver density would increase to 0.616 (for a 2 km buffer zone) and 0.621 (3 km buffer) individuals per km². The Applicant's view was that this was well within the range of densities of red-throated divers observed within the Liverpool Bay SPA and therefore there is sufficient environmental carrying capacity available within the SPA to support this density of red-throated divers.
- 7.24 The Applicant was of the view that this density dependent mortality value was also similar to the levels established by the SoS's consents for the Gunfleet Sands (6.5%) and Kentish Flats Extension (9.3%).
- 7.25 The Applicant's view is that the number of red-throated divers which will suffer from mortality due to density dependent effects is not sufficient to reduce the number of birds below the level at which the SPA was designated. As such, the Applicant considers that the Burbo Bank Extension, in combination with other plans or projects, would not have an adverse effect upon the integrity of the Liverpool Bay SPA.
- 7.26 NE and NRW, noting that a P value of 0.75 would result in the death of 1 in 12 red-throated divers, maintained their view that the level of mortality as a result of the Burbo Bank Extension, in combination with other plans and projects, was sufficiently high enough to not be able to conclude no adverse effect upon the integrity of the Liverpool Bay SPA.

ExA's views on Liverpool Bay SPA

- 7.27 The ExA's view was that consenting of the Burbo Bank Extension would not take red-throated diver population below the level at which the site was designated. Neither would it make it that population size less sustainable at that level.
- 7.28 This view was based on the Burbo Bank Extension impacts lying within the envelope of acceptability established by the SoS in the appropriate assessment undertaken for the Kentish Flats project. The ExA (ExA report, para 5.71) felt that as the current red-throated diver population in the Liverpool Bay SPA was sufficiently higher than the designation level, there was sufficient scope for a downward fluctuation without having an adverse effect on the integrity of the site.

SoS's views on Liverpool Bay SPA

- 7.29 The SoS has carefully considered the information within the ExA's report and the documents upon which it is based. He particularly notes the disagreement between the Applicant and the Interested Parties (SNCBs and RSPB) and therefore feels that this matter merits particular consideration.

- 7.30 The SoS considers it appropriate to use the density displacement scenarios as used in the Percival study (2010) such that density dependent effects are considered within the Burbo Bank Extension and the 3 km buffer zone. The Percival study showed that there is the potential for displacement of red-throated divers to occur beyond the 2 km buffer. Whilst the SoS accepts that the approach used for the Percival study is for a different SPA and therefore not ideal, the SoS considers this study to be the best available evidence and suitable for application to this decision.
- 7.31 The SoS accepts the Applicant's calculations that the Burbo Bank Extension (with a 3 km buffer zone), in combination with other plans and projects (Burbo Bank, Rhyl Flats and Gwynt y Môr), could result in the mortality of approximately 84 red-throated divers per year ($P=0.77$).
- 7.32 The current population of the Liverpool Bay SPA is estimated at being 1188 birds with confidence limits ranging from 920 to 1534 birds (Bradbury *et al*, 2011), a loss of 84 would reduce the population to 1104. This is still well above the level at which the site was designated (922 red-throated divers). NE and NRW agreed that the site was likely to be in favourable condition at the point of designation. It therefore follows that the SPA will still be in favourable condition with a red-throated diver population of 1104 birds, it also leaves considerable precautionary head room above the figure for which the site is designated (922 birds).
- 7.33 The SoS notes the comparisons made with the Kentish Flats Extension and the Gunfleet Sands Offshore Wind Farms. Whilst the SoS is always mindful of decisions he has taken previously, in this case he considers that because they relate to different sites with different characteristics (the Outer Thames Estuary SPA as opposed to the Liverpool Bay SPA) he cannot use those decisions as a material basis for which to determine the Burbo Bank Extension project.
- 7.34 The SoS is of the view that the predicted red-throated diver mortality levels as a result of the Burbo Bank Extension in combination with other plans and projects would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the risk to red-throated divers as a result of displacement and density dependent effects would not take the population below the level at which the site was designated, which was at the time of designation considered to be in favourable condition.

8 Mersey Narrows and North Wirral Foreshore SPA and Ramsar site

8.1 The Mersey Narrows and North Wirral Foreshore SPA and Ramsar site is located approximately 6 km away from the Burbo Bank Extension. The site is located on the north-west coast of England at the mouths of the Mersey and Dee estuaries. The site comprises intertidal habitats at Egremont foreshore, man-made lagoons at Seaforth Nature Reserve and the extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high-tide roost site, as well as a nesting site for terns. North Wirral Foreshore supports large numbers of feeding waders at low tide and also includes important high-tide roost sites

8.2 A LSE was identified for breeding common terns (*Sterna hirundo*) to suffer as a result of from collision risk (from the project alone and in combination with other plans or projects) which might threaten the SPA population. The conservation objectives for the site are shown in Table 7.

Common terns – project alone

8.3 To determine whether the increased collision risk posed an adverse effect on the integrity of the site, the Applicant undertook CRM and then used PBR analysis to determine the effects at a population level. The Applicant concluded that the level of mortality from the project alone was small enough such that it would not represent an adverse effect.

8.4 Natural England disagreed with several aspects of the Applicant's approach; however sufficient common ground was reached between the 2 parties during the Examination process that Natural England was eventually satisfied with the methodology used and the conclusions reached such that they were able to agree a conclusion of no adverse effect (Natural England – rep 155).

Table 7. The Conservation Objectives for the Mersey Narrows and Wirral Foreshore SPA.

Conservation Objectives	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;</p> <ol style="list-style-type: none"> 1. The extent and distribution of the habitats of the qualifying features; 2. The structure and function of the habitats of the qualifying features; 3. The supporting processes on which the habitats of the qualifying features rely; 4. The population of each of the qualifying features, and, 5. The distribution of the qualifying features within the site. <p>Qualifying Features:</p> <ul style="list-style-type: none"> ➤ Bar-tailed godwit (non-breeding); <i>Limosa lapponica</i>; ➤ Little gull (non-breeding); <i>Hydrocoloeus minutus</i>; ➤ Knot (non-breeding); <i>Calidris canutus islandica</i>; ➤ Common tern (non-breeding); <i>Sterna hirundo</i>; ➤ Common tern (breeding); <i>Sterna hirundo</i>; ➤ Waterbird assemblage
-------------------------	--

- 8.5 Having re-calculated the CRM and PBR analysis to NE's satisfaction, the Applicant's modelling predicted an annual mortality of 8 breeding common terns (Band model option 2, 98 % AR).
- 8.6 The PBR analysis carried out by the Applicant estimated that approximately 15 breeding birds ($f = 0.5$) could be sustainably removed from this site per year without affecting the SPA population in the long term.
- 8.7 Using the Band Model option 2, updated PBR parameters and further work to apportion the impacts to this breeding colony, the Applicant was able to demonstrate that the Burbo Bank Extension alone would not have an adverse effect upon the integrity of the site. This is because the annual predicted mortality level (8 breeding birds) is below the level which the population could sustainably lose (15 breeding birds) without suffering in the long term. Natural England agreed with this conclusion.
- 8.8 The SoS is of the view that the additional common tern mortality caused as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the predicted annual tern mortality level is lower than the population could withstand without experiencing a long term population decline.
- 8.9 The SoS, noting the low mortality rate of breeding common tern relative to the overall site population, and the agreement between parties that this would not constitute an adverse effect, is satisfied that the Burbo Bank Extension would not have an adverse effect upon the integrity of the Mersey Narrows and Wirral Foreshore SPA/Ramsar site.

Common terns – in combination

- 8.10 A LSE was also identified for this site when the impacts of the project were considered in combination with other plans or projects.
- 8.11 In their relevant representations, NE were concerned that no in combination assessment had been undertaken for four other OWFs. However following discussions with the Applicant, NE agreed that the only projects within the foraging range of common terns from the Mersey Narrows and Wirral Foreshore SPA were the Burbo Bank Extension and the original Burbo Bank project which has been operational since 2007.
- 8.12 The Applicant and NE agreed that the CRM data is likely to represent a precautionary worst case estimate of collision risk and that the north west corner of the Burbo Bank Extension is beyond the theoretical mean maximum foraging range of common terns from this SPA.
- 8.13 The Applicant calculated the per MW collision rate for the Burbo Bank Extension and extrapolated this figure to the original Burbo Bank project to generate a likely collision risk for this SPA. This resulted in an estimate of a further 1.3 breeding common terns at risk of collision due to the existing Burbo Bank project.
- 8.14 This gave a predicted annual mortality of 9.3 breeding common terns from the Mersey Narrows and Wirral Foreshore SPA as a result of the Project in combination with the existing Burbo Bank

wind farm. This is still below the estimated PBR threshold of 15 birds. NE was therefore satisfied that the Burbo Bank Extension project in combination with the Burbo Bank project will not have an adverse effect on the integrity of the SPA/Ramsar site.

8.15 The SoS is of the view that the additional common tern mortality caused as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the number of terns killed by the Burbo Bank Extension on an annual basis is much lower than the population could withstand without experiencing a long term population decline.

8.16 The SoS, noting the results of the CRM and PBR analysis and the agreement between NE and the Applicant, is satisfied that the Burbo Bank Extension in combination with other plans or projects will not have an adverse effect upon the integrity of the Mersey Narrows and North Wirral Foreshore SPA/Ramsar site.

9 Morecambe Bay SPA and Ramsar site

- 9.1 The Morecambe Bay SPA and Ramsar site lies approximately 42 km from the Burbo Bank Extension. The site is one of the largest estuarine systems in the UK and is fed by 5 main river channels. The large intertidal areas support abundant invertebrates which in turn provide food for a number of waders and waterfowl. The conservation objectives for the site are shown in Table 8.

Table 8. The conservation objectives for the Morecambe Bay SPA.

Conservation Objectives	<p>Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.</p> <p>Subject to natural change, to maintain or restore:</p> <ol style="list-style-type: none"> 1. The extent and distribution of the habitats of the qualifying features; 2. The structure and function of the habitats of the qualifying features; 3. The supporting processes on which the habitats of the qualifying features rely; 4. The populations of the qualifying features; 5. The distribution of the qualifying features within the site. <p>Qualifying Features:</p> <ul style="list-style-type: none"> ➤ Pink-footed goose (Non-breeding); <i>Anser brachyrhynchus</i> ➤ Common shelduck (Non-breeding); <i>Tadorna tadorna</i> ➤ Northern pintail (Non-breeding); <i>Anas acuta</i> ➤ Common eider (Breeding); <i>Somateria mollissima</i> ➤ Eurasian oystercatcher (Non-breeding); <i>Haematopus ostralegus</i> ➤ Ringed plover (Non-breeding); <i>Charadrius hiaticula</i> ➤ European golden plover (Non-breeding); <i>Pluvialis apricaria</i> ➤ Grey plover (Non-breeding); <i>Pluvialis squatarola</i> ➤ Red knot (Non-breeding); <i>Calidris canutus</i> ➤ Dunlin (Non-breeding); <i>Calidris alpina alpina</i> ➤ Bar-tailed godwit (Non-breeding); <i>Limosa lapponica</i> ➤ Eurasian curlew (Non-breeding); <i>Numenius arquata</i> ➤ Common redshank (Non-breeding); <i>Tringa totanus</i> ➤ Ruddy turnstone (Non-breeding); <i>Arenaria interpres</i> ➤ Lesser black-backed gull (Breeding); <i>Larus fuscus</i> ➤ Herring gull (Breeding); <i>Larus argentatus</i> ➤ Sandwich tern (Breeding); <i>Sterna sandvicensis</i> ➤ Common tern (Breeding); <i>Sterna hirundo</i> ➤ Little tern (Breeding); <i>Sterna albifrons</i> ➤ Waterbird assemblage <p>Additional Qualifying Features Identified by the 2001 UK SPA Review:</p> <ul style="list-style-type: none"> ➤ Sanderling (Non-breeding); <i>Calidris alba</i> ➤ Seabird assemblage
-------------------------	---

- 9.2 A LSE was identified for this site because of the potential for the Burbo Bank Extension (alone, and in combination) to affect breeding populations of LBBG and herring gulls (*Larus argentatus*) through a potential increase in collision risk mortality.

Lesser black-backed gulls – project alone

- 9.3 As with the LBBG from the Bowland Fells SPAs, the Applicant undertook CRM and PBR analysis to determine annual LBBG mortality levels and predict long term population impacts.
- 9.4 The CRM initially predicted that the Burbo Bank Extension would cause 6 breeding LBBG collisions per year (Band model option 2, 98 %AR) which is equivalent to 0.037% of the population from this site.
- 9.5 There was initially some disagreement between Natural England and the Applicant regarding which Band Model Option was appropriate and some of the parameters (f factor) to use in the PBR analysis; however these issues were resolved during the Examination once the Applicant updated their CRM.
- 9.6 Following the update to the figures, the Applicant estimated an annual mortality of 34 breeding LBBG from this SPA. The PBR analysis estimated that 443 birds (based on a recovery factor of 0.5) could be removed from the SPA population on an annual basis without affecting the population in the long term.
- 9.7 Natural England subsequently agreed with the Applicant's conclusions that the Burbo Bank Extension would not have an adverse effect upon the LBBG population of the Morecambe Bay SPA/Ramsar site.
- 9.8 The SoS is of the view that the additional LBBG mortality as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the estimated annual mortality of LBBG (34) is much lower than the population could withstand without experiencing a long term population decline (443 birds).
- 9.9 The SoS, noting the number of LBBG likely to be killed on an annual basis relative to the overall population size, and the agreement between NE and the Applicant, accepts the results of the CRM and PBR and therefore concludes that the Burbo Bank Extension (alone) will not have an adverse effect upon the integrity of the Morecambe Bay SPA/Ramsar site.

Lesser black-backed gulls – in combination

- 9.10 There was disagreement between NE and the Applicant over which projects to include within the in combination assessment, how to treat projects which had not yet entered the planning process and how to consider projects which had not been built to their consented capacity.
- 9.11 The Applicant subsequently submitted an updated assessment based on the approach recommended by NE.

- 9.12 The updated CRM results state that projects already consented will lead to an estimated 81 breeding LBBG collision mortalities a year, this number increases to 98 when the Walney extension (currently in planning) is included within the assessment. This generated PBR recovery factors of <0.1 which was sufficient for NE to be able to agree that the Burbo Bank Extension, in combination with other plans and projects, would not have an adverse effect upon the integrity of the Morecambe Bay SPA/Ramsar site.
- 9.13 The SoS is of the view that the additional LBBG mortality as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the predicted annual number of breeding LBBG mortalities (98) much lower than the population could withstand without experiencing a long term population decline (443 birds).
- 9.14 The SoS, noting the results from the CRM and the PBR analysis, and the agreement between the Applicant and NE, is satisfied that the Burbo Bank Extension (when considered with other plans and projects) will not have an adverse effect upon the integrity of the Morecambe Bay SPA and Ramsar site.

Herring gulls – project alone

- 9.15 The potential impacts upon herring gulls from the Morecambe Bay SPA/Ramsar site are similar to those for LBBG and as such the Applicant addressed them in the same way.
- 9.16 Collision risk modelling and PBR analysis was undertaken to determine annual herring gull mortality as a result of the Burbo Bank Extension project alone to determine whether that could lead to a detrimental effect upon the population in the long term.
- 9.17 There was initially some disagreement between Natural England and the Applicant regarding which Band Model Option was appropriate and some of the parameters to use in the PBR analysis; however these issues were resolved during the Examination. Natural England subsequently agreed with the Applicant's conclusions that the Burbo Bank Extension would not have an adverse effect upon the herring gull population of the Morecambe Bay SPA/Ramsar site.
- 9.18 The recalculated CRM results indicate an annual mortality of 8 breeding herring gulls (Band model option 2, 98 % AR) from the Morecambe Bay SPA. The PBR analysis indicated that the population could support the loss of 129 birds per year without suffering a detrimental effect in the long term.
- 9.19 The Applicant also submitted a clarification note (Deadline III clarification note on herring gull foraging range) which stated that the Burbo Bank Extension project is almost entirely beyond the published herring gull mean maximum foraging range (61.1 km, Thaxter *et al*, 2012). The Development lies 60.76 km from the colony at South Walney. This makes it unlikely that individual herring gulls from the colony would forage within the Burbo Bank Extension. This conclusion was accepted by NE.

- 9.20 The SoS is of the view that the additional herring gull mortality caused as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the number of LBBG killed by the Development on an annual basis is much lower than the population could withstand without experiencing a long term population decline.
- 9.21 The SoS, noting the distance between the Burbo Bank Extension and the herring gull colony, the predicted CRM and PBR results, and the agreement between NE and the Applicant, concludes that the Burbo Bank Extension will not have an adverse effect upon the integrity of the Morecambe Bay SPA and Ramsar site.

Herring gulls – in combination

- 9.22 A consensus on the potential for in combination effects upon herring gulls from the Morecambe Bay SPA and Ramsar site between NE and the Applicant was established after the Applicant submitted its clarification note on foraging ranges as described in paragraph 9.19.
- 9.23 The Burbo Bank Extension is only just inside the mean maximum foraging range for herring gulls (61.1 km). The colony at South Walney is 60.76 km away from the Development. It is therefore very unlikely there will be any in combination effects.
- 9.24 The SoS, recognising the distance between the colony and the Development lies outside of the mean maximum foraging range, is satisfied that the Burbo Bank Extension (when considered with other plans and projects) will not have an adverse effect upon the integrity of the Morecambe Bay SPA and Ramsar site.

10 Ribble and Alt Estuaries SPA and Ramsar site

10.1 The Ribble and Alt Estuaries SPA/Ramsar site lies approximately 6 km from the Burbo Bank Extension. The site consists of 2 estuaries which form part of a chain of western SPAs which fringe the Irish Sea. The site consists of extensive sand- and mud-flats and large areas of saltmarsh. These habitats in turn support a large number of species of birds. The site covers 12,361 ha and the conservation objectives are shown in Table 9.

Table 9. The conservation objectives for the Ribble and Alt Estuaries SPA site.

Conservation Objectives	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;</p> <ul style="list-style-type: none"> ➤ The extent and distribution of the habitats of the qualifying features ➤ The structure and function of the habitats of the qualifying features ➤ The supporting processes on which the habitats of the qualifying features rely ➤ The population of each of the qualifying features, and, ➤ The distribution of the qualifying features within the site. <p>Qualifying Features:</p> <ul style="list-style-type: none"> ➤ Bewick's swan (Non-breeding); <i>Cygnus columbianus bewickii</i> ➤ Whooper swan (Non-breeding); <i>Cygnus cygnus</i> ➤ Pink-footed goose (Non-breeding); <i>Anser brachyrhynchus</i> ➤ Common shelduck (Non-breeding); <i>Tadorna tadorna</i> ➤ Eurasian wigeon (Non-breeding); <i>Anas penelope</i> ➤ Eurasian teal (Non-breeding); <i>Anas crecca</i> ➤ Northern pintail (Non-breeding); <i>Anas acuta</i> ➤ Eurasian oystercatcher (Non-breeding); <i>Haematopus ostralegus</i> ➤ Ringed plover (Non-breeding); <i>Charadrius hiaticula</i> ➤ European golden plover (Non-breeding); <i>Pluvialis apricaria</i> ➤ Grey plover (Non-breeding); <i>Pluvialis squatarola</i> ➤ Red knot (Non-breeding); <i>Calidris canutus</i> ➤ Sanderling (Non-breeding); <i>Calidris alba</i> ➤ Dunlin (Non-breeding); <i>Calidris alpina alpina</i> ➤ Ruff (Breeding); <i>Philomachus pugnax</i> ➤ Black-tailed godwit (Non-breeding); <i>Limosa limosa islandica</i> ➤ Bar-tailed godwit (Non-breeding); <i>Limosa lapponica</i> ➤ Common redshank (Non-breeding); <i>Tringa totanus</i> ➤ Lesser black-backed gull (Breeding); <i>Larus fuscus</i> ➤ Common tern (Breeding); <i>Sterna hirundo</i> ➤ Waterbird assemblage ➤ Seabird assemblage
-------------------------	---

10.2 The RIES recorded a LSE (alone and in combination) for LBBG from the Ribble and Alt Estuaries SPA/Ramsar site because of the possible effects from increased collision risk.

Lesser black-backed gulls – project alone

10.3 The Applicant undertook CRM and PBR analysis to determine the effects of the Burbo Bank Extension project upon the Ribble and Alt Estuaries SPA/Ramsar site.

- 10.4 Following further discussion with NE during the Examination, the Applicant submitted additional information.
- 10.5 The updated CRM analysis predicted an annual mortality of 59 breeding LBBG from this site (Band model option 2, 98 % AR). The PBR analysis indicated that the Ribble and Alt Estuaries SPA/Ramsar site could support the loss of up to 224 breeding LBBG per year without suffering a detrimental population effect in the long term ($f = 0.5$).
- 10.6 Based on these updated CRM figures, NE was satisfied that the Burbo Bank Extension (alone) would not have an adverse effect on the site.
- 10.7 The SoS is of the view that the additional LBBG mortality as a result of the Burbo Bank Extension would not prevent the site from achieving favourable conservation status in line with the site's published conservation objectives. This is because the predicted annual number of breeding LBBG mortalities (59) as a result of the Burbo Bank Extension is much lower than the population could withstand without experiencing a long term population decline (224 birds).
- 10.8 The SoS, noting the predicted CRM results and the PBR analysis, and the agreement between NE and the Applicant, concludes that the Burbo Bank Extension will not have an adverse effect upon the integrity of the Ribble and Alt Estuaries SPA and Ramsar site.

Lesser black-backed gulls – in combination

- 10.9 The Ribble and Alt Estuaries SPA/Ramsar site is subject to an additional pressure which affects the LBBG population. The LBBG population at the site is subject to a cull which keeps it at a lower level than it would be at naturally. NE's relevant representations initially advised that the Warton Gull Cull should be included within the in combination assessment.
- 10.10 The Consent to undertake the cull was issued by Natural England on 29 May 2013 to reduce the risk of bird strike to aircraft operating from the Warton Aerodrome. The aim of the cull is to maintain the LBBG population at a threshold level of 3,348 pairs, the Consent to undertake the cull permits the killing of 552 pairs. A monitoring plan is in place to ensure that the population does not decrease below this level and culling would be suspended if it did. The ExA's report (para 5.24) noted that there was an outstanding decision on a request from the RSPB for a Judicial Review, however on 21 May 2014 this request was dismissed in the High Court.
- 10.11 As the Examination progressed, NE and the Applicant agreed that since the cull will maintain the population at a specific level (3348 pairs); any additional mortality caused by the Burbo Bank Extension would see a reduction in the number of LBBG culled (so as to maintain the population at 3348 pairs) rather than taking the population below that level.
- 10.12 On that basis and to take into account the reduced population size rather than that listed on the SPA citation, the Applicant recalculated the CRM and updated the PBR analysis.
- 10.13 Whilst NE did not agree with all of the parameters used by the Applicant to calculate the updated PBR analysis, they agreed the results demonstrated that the impacts of the Burbo Bank Extension project in combination with other plans and projects (including the Warton Gull

cull) would not result in an adverse effect upon the integrity of the Ribble and Alt Estuaries SPA and Ramsar site.

- 10.14 In their representations, the RSPB took a different view, asking that further work be undertaken to understand what would happen to the LBBG population should the Warton Gull Cull finish in 2023, or alternatively, be extended beyond 2023. They recommended that an extended Population Viability Analysis is undertaken to determine the potential effects. The RSPB considered that the collision impacts of the Burbo Bank Extension project might further suppress the population (even if the culling ceased) and as such the project's impacts could constitute an adverse effect upon the integrity of the Ribble and Alt Estuaries SPA and Ramsar site.
- 10.15 In its report (para 5.93), the ExA found the Applicant's position to be 'strongly persuasive' and placed significant weight on the agreement between NE and the Applicant on the magnitude of impacts. The ExA concluded that the Burbo Bank Extension project, when considered both alone and in combination with other plans and projects, would not have an adverse effect upon the integrity of the Ribble and Alt Estuaries SPA and Ramsar site.
- 10.16 The SoS has carefully considered all of the representations made on this issue. The SoS considers that that the Burbo Bank Extension will not have an adverse effect upon the integrity of the Ribble and Alt Estuaries SPA and Ramsar site. This decision is based on the CRM and PBR results presented by the Applicant, and agreed with NE, which show that the additional mortality caused by the Burbo Bank Extension, in combination with other plans or projects, would not be sufficient to have a detrimental effect on the LBBG population in the long term.
- 10.17 The SoS notes the concerns raised by the RSPB about the potential population effects post 2023 (when the Warton Gull Cull is due to finish) but is of the view that when the Warton gull Cull Consent expires it will be for the Competent Authority (in this case Natural England) to lawfully determine whether the culling should be ceased, modified or renewed and this decision will need to be based on sufficient evidence at the time of consideration. Given that the legal status of the cull has now been settled, the SoS now considers this matter to have been determined and as such feel the approach the Applicant has taken to consider the Warton gull cull in its assessments to be sufficient.

11 River Dee and Bala Lake SAC

- 11.1 The River Dee and Bala Lake SAC is located approximately 32 km from the Burbo Bank Extension and is designated to protect the site's freshwater habitats and species and diadromous fish. Diadromous fish are species such as salmon and trout which are able to migrate between fresh and saltwater.
- 11.2 A likely significant effect was identified for the River Dee and Bala Lake SAC because of the potential for piling activity to prevent Atlantic salmon (*Salmo salar*) from undertaking their migration during construction work. Impacts upon sea lamprey were discounted as there is considerable uncertainty about their hearing ability and both NE and the Applicant thought it unlikely that there would be a significant effect (DONG Energy - Statement of Common Ground with Natural England (general matters)).
- 11.3 Piling can adversely affect populations of migratory fish if sound levels are sufficiently loud enough to cause harm to an individual or trigger a behavioural response. In this case, the concerns are that the noise would be so loud such that fish would exhibit a behavioural response which would prevent them from making their seaward migration.
- 11.4 The Conservation Objectives for this site with respect to Atlantic salmon are shown in Table 10; of most relevance are objectives 3, 4 and 5.

Table 10. Conservation objectives for the River Dee and Bala Lake SAC.

Conservation Objectives	<p>Avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features.</p> <p>Subject to natural change, to maintain or restore:</p> <ol style="list-style-type: none"> 1. The extent and distribution of qualifying natural habitats and habitats of qualifying species; 2. The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species; 3. The supporting processes on which qualifying natural habitats and habitats of qualifying species rely; 4. The populations of qualifying species; 5. The distribution of qualifying species within the site. <p>The qualifying features to which the conservation objectives refer are:</p> <ul style="list-style-type: none"> ➤ Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation; Rivers with floating vegetation often dominated by water-crowfoot ➤ Sea lamprey; <i>Petromyzon marinus</i> ➤ Brook lamprey; <i>Lampetra planeri</i> ➤ River lamprey; <i>Lampetra fluviatilis</i> ➤ Atlantic salmon; <i>Salmo salar</i> ➤ Bullhead; <i>Cottus gobio</i> ➤ Otter; <i>Lutra lutra</i> ➤ Floating water-plantain; <i>Luronium natans</i>
-------------------------	--

- 11.5 During the Examination there were sufficient discussions between the Applicant and the SNCBs to reach a mutually acceptable position (NE written summary of Issue Specific Hearing held on 28-30 January 2014).
- 11.6 The Applicant proposed a timing restriction for the driving of 8 m piles, secured through the DCO (and the DML), which prevented piling works during the key migration period (15 April to 31 May); this would allow salmon smolts to migrate out of the SAC and into the Irish Sea. If the piles installed are to have a smaller diameter than 8 m, than the Applicant will provide additional projected noise measurements for approval to the MMO before they can proceed.
- 11.7 The ExA considered that this mitigation would allow smolt migration to occur as such was able to rule out an adverse effect upon the integrity of this site.
- 11.8 The SoS agrees with the ExA's conclusion and is satisfied that the piling restriction requirement (numbered 17) within the DCO is sufficient to conclude that the Burbo Bank Extension, when considered alone, will not have an adverse effect upon the integrity of the River Dee and Lake Bala SAC.

12 Habitats Regulations Assessment Conclusions

- 12.1 The SoS has carefully considered all of the information presented before and during the Examination, including the ES, the Applicant's HRA, representations made by Interested Parties, and the ExA's report itself.
- 12.2 He considers that the Burbo Bank Extension, when considered both alone and in combination with other plans and projects, has the potential to have a likely significant effect upon 6 European sites protected by the Conservation of Habitats and Species Regulations 2010.
- 12.3 In accordance with Regulation 61 of the Habitats Regulations, the SoS has undertaken an appropriate assessment in respect of those 6 sites' Conservation Objectives to determine whether the project, either alone or in combination with other plans and projects, will result in an adverse effect upon the sites' integrity.
- 12.4 The SoS has determined that the Burbo Bank Extension will not have an adverse effect upon the sites' integrity either alone or in combination with other plans or projects. He has undertaken a robust assessment using all of information available to him, not least the views of the various Interested Parties.

Author: **Graham Horton, Environmental Manager
National Infrastructure Consents Team
Department of Energy and Climate Change**

Date: **26 September 2014**

13 References

Band, W. 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. SOSS-02 Project report to the Crown Estate.

Bradbury, G., Burt, L. and Hexter, R. 2011. Digital aerial surveillance of inshore waterbirds in Liverpool Bay Special Protection Area. HiDef Aerial Surveying Limited and Wildfowl and Wetlands Trust (Consulting) Ltd.

Cook, A.S.C.P., Johnston, A., Wright, L.J. and Burton, N.H.K. 2012. A review of flight heights and avoidance rates of birds in relation to offshore wind farms. BTO report commissioned by the Crown Estate.

Department of Energy and Climate Change. 2013. Record of the Habitats Regulations Assessment undertaken under Regulation 61 (1) of the Conservation of Habitats and Species Regulations 2010 (as amended) for an application under the Planning Act 2008 (as amended) for the Kentish Flats Extension.

Durell, S.E.A. Le V. dit, Goss-Custard, J.D., Clarke, R.T. and McGorrt, S. 2000. Density-dependent mortality in Oystercatchers *Haematopus ostralegus*. Ibis: 142 pp 132-138.

Durell, S.E.A. Le V. dit, Goss-Custard, J.D., Stillman, R.A. and West, A.D. 2001. The effect of weather and density dependence on oystercatcher *Haematopus ostralegus* winter mortality. Ibis: 143 pp 498 – 499.

English Nature. 1997. Habitats regulations guidance note 1.

European Commission. 2000. Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

Garthe, S. and Huppopp, O. 2004. Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology: 41 p 724-734.

Joint Nature Conservation Committee. Seabird Colony Register Counts. Site accessed 06/05/2014. Available at: <http://jncc.defra.gov.uk/smp/searchCounts.aspx>.

Natural England and JNCC (2012). Joint Natural England and JNCC Interim Advice Note – presenting information to inform assessment of the potential magnitude and consequences of displacement of seabirds in relation of Offshore Windfarm Developments.

O'Brien, S.H., Wilson, L.J., Webb, A and Cranswick, P.A. 2008. Revised estimate of numbers of wintering red-throated divers *Gavia stellata* in Great Britain. Bird Study 55: 152-160.

Percival, S. 2010. *Kentish Flats Offshore Wind Farm: Diver Surveys 2009-10*. Ecology Consulting report to Vattenfall.

Scottish Natural Heritage. 2010. Use of avoidance rates in the SNH wind farm collision risk model. SNH avoidance rate information and guidance note. Scottish Natural Heritage, Inverness, UK.

Thaxter, C., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W, and Burton, N.H.K. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*. Doi:10.1016/j.biocon.2011.12.009.

Webb, A., Dean, B.J., O'Brien, S.H., Sohle, I., McSorley, C., Reid, J.B., Cranswick, P.A., Smith, L.E. and Hall, C. 2009. The numbers of inshore waterbirds using the Greater Thames during the non-breeding season; an assessment of the area's potential for qualification as a marine SPA. JNCC Report, No 374.

ANNEX A: European Sites identified for the purposes of the HRA and their qualifying features (Source: RIES Matrices 1 to 33)

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
Aberdaron Coast and Bardsey Island SPA	Manx shearwater (breeding) Chough (breeding and wintering)	180 km
Bowland Fells SPA	Lesser black backed gull (breeding) Hen harrier (breeding) Merlin (breeding)	55 km
Cardigan Bay SAC	Grey seal Bottlenose dolphin Sea lamprey River lamprey Sandbanks which are slightly covered by sea water all the time Reefs Submerged or partially submerged sea caves	240 km
Copeland Islands SPA	Manx shearwater (breeding) Arctic tern (breeding)	200 km
The Dee Estuary SPA	Common tern (breeding) Little tern (breeding) Sandwich tern (on passage) Bar-tailed godwit (over wintering) Redshank (on passage) Black-tailed godwit (over wintering) Curlew (over wintering) Dunlin (over wintering) Grey plover (over wintering) Knot (over wintering) Oystercatcher (over wintering) Pintail (over wintering) Redshank (over wintering) Shelduck (over wintering) Teal (over wintering)	6 km
The Dee Estuary Ramsar	Waterfowl assemblage including cormorant Ramsar criterion 5: Assemblage of wintering waterbirds	6 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
	<p>Ramsar criterion 6: redshank (spring/autumn peak counts)</p> <p>Teal (winter peak counts)</p> <p>Shelduck (winter peak counts)</p> <p>Oystercatcher (winter peak counts)</p> <p>Curlew (winter peak counts)</p> <p>Pintail (winter peak counts)</p> <p>Grey plover (winter peak counts)</p> <p>Knot (winter peak counts)</p> <p>Dunlin (winter peak counts)</p> <p>Black-tailed godwit Iceland (breeding)</p> <p>Bar-tailed godwit</p> <p>Redshank</p> <p>Estuaries</p> <p>Mudflats and sandflats not covered by seawater at low tide</p> <p>Salicornia and other annuals colonising mud and sand</p> <p>Annual vegetation of drift lines</p> <p>Vegetated sea cliffs of the Atlantic and Baltic coasts</p> <p>Embryonic shifting dunes</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')</p> <p>Fixed dunes with herbaceous vegetation ('grey dunes')</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)</p> <p>Humid dune slacks</p> <p>Breeding colonies of natterjack toad</p>	
Dee Estuary SAC	<p>Mudflats and sandflats not covered by seawater at low tide</p> <p>Salicornia and other annuals colonising mud and sand</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)</p> <p>Estuaries</p> <p>Annual vegetation of drift lines</p> <p>Vegetated sea cliffs of the Atlantic and Baltic coasts</p> <p>Embryonic shifting dunes</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')</p> <p>Fixed dunes with herbaceous vegetation ('grey dunes')</p> <p>Humid dune slacks</p> <p>Petalwort</p> <p>Sea lamprey</p> <p>River lamprey</p>	6 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
The Duddon Estuary SPA	<p>Sandwich tern (breeding) Ringed plover (passage) Sanderling (passage) Knot (wintering) Pintail (wintering) Redshank (wintering)</p> <p>Waterfowl assemblage (wintering) Knot (wintering) Pintail (wintering) Redshank (wintering) Natterjack toad</p> <p>Nationally important numbers of breeding Sandwich tern and Little tern Internationally important numbers of wildfowl in winter Nationally important numbers of wildfowl on spring/autumn passage</p>	75 km
The Duddon Estuary Ramsar	<p>Common (harbour seal)</p> <p>Red-throated diver (over wintering) Common scoter (over wintering) Sandwich tern (subject to review) Common tern (subject to review) Little gull (subject to review) Cormorant (subject to review) Arctic tern (subject to review) Little tern (subject to review)</p>	450 km
Eileanan agus Sgeiran Lios mór SAC	<p>Grey seal Bottlenose dolphin Otter</p> <p>Sandbanks which are slightly covered by seawater all the time Estuaries Coastal lagoons (Priority feature) Large shallow inlets and bays Reefs Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonising mud and sand</p>	0 km
Liverpool Bay SPA	<p>Grey seal Bottlenose dolphin Otter</p> <p>Sandbanks which are slightly covered by seawater all the time Estuaries Coastal lagoons (Priority feature) Large shallow inlets and bays Reefs Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonising mud and sand</p>	115 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
Menai Strait and Conwy Bay SAC	<p>Atlantic salt meadows (<i>Glauco-Puccinellietaliae maritimae</i>) Submerged or partially submerged sea caves Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Reefs Large shallow inlets and bays Submerged or partially submerged sea caves</p>	31 km
Mersey Estuary SPA	<p>Golden plover (wintering) Redshank (on passage) Ringed plover (on passage) Dunlin (over winter) Pintail (over winter) Redshank (over winter) Shelduck (over winter) Teal (over winter)</p>	16 km
Mersey Estuary Ramsar	<p>Over winter assemblage (> 20,000 waterfowl) including great crested grebe. Shelduck (peak counts spring/autumn) Black-tailed godwit (peak counts spring/autumn) Redshank (peak counts spring/autumn) Teal (peak counts in winter) Pintail (peak counts in winter) Dunlin (peak counts in winter)</p>	20 km
Mersey Narrows and North Wirral Foreshore SPA	<p>Winter waterfowl assemblage of international importance Common tern (breeding and passage) Little gull (passage) Bar-tailed godwit (wintering) Knot (migratory)</p>	6 km
Mersey Narrows and North Wirral Foreshore Ramsar	<p>Waterbird assemblage including cormorant Common tern (passage) Little gull (passage) Knot (wintering) Bar-tailed godwit (wintering)</p>	6 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
<p>Morecambe Bay SPA</p>	<p>Waterbird assemblage >20,000 individuals Lesser black-backed gull (breeding) Herring gull (breeding) Sandwich tern (breeding) Little tern (breeding) Bar-tailed godwit (wintering) Golden plover (wintering) Ringed plover (on passage) Sanderling (on passage) Curlew (over wintering) Dunlin (over wintering) Knot (over wintering) Grey plover (over wintering) Pintail (over wintering) Redshank (over wintering) Shelduck (over wintering) Oystercatcher (over wintering) Pink-footed goose (over wintering)</p> <p>A breeding season assemblage > 20,000 seabirds A wintering assemblage > 20,000 waterfowl</p>	<p>42 km</p>
<p>Morecambe Bay Ramsar</p>	<p>Lesser black-backed gull (breeding) Herring gull (breeding) Sandwich tern (breeding) Great cormorant (peak count in spring/autumn) Shelduck (peak count spring/autumn) Pintail (peak count spring/autumn) Eider (peak count spring/autumn) Ringed plover (peak count spring/autumn) Oystercatcher (peak count spring/autumn) Grey plover (peak count spring/autumn) Sanderling (peak count spring/autumn) Curlew (peak count spring/autumn, breeding) Oystercatcher (peak count spring/autumn) Redshank (peak count spring/autumn) Turnstone (peak count spring/autumn)</p>	<p>42 km</p>

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
	<p>Lesser black-backed gull (peak count spring/autumn) Great crested grebe (peak counts in winter) Pink-footed goose (peak counts in winter) Wigeon (peak counts in winter) Goldeneye (peak counts in winter) Red-breasted merganser (peak counts in winter) Golden plover (peak counts in winter) Lapwing (peak counts in winter) Knot (peak counts in winter) Dunlin (peak counts in winter) Bar-tailed godwit (peak counts in winter) Internationally important for passage ringed plover</p>	
Murlough SAC	<p>Internationally important wintering waterfowl assemblage > 20,000 birds</p> <p>Common seal Marsh fritillary butterfly Fixed dunes with herbaceous vegetation ('grey dunes') Atlantic decalcified fixed dunes (Calluno-Ulicetea) Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Embryonic shifting dunes Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes') Dunes with <i>Salix repens</i> spp. <i>argentea</i> (<i>Salicion arenariae</i>)</p>	190 km
Pembrokeshire Marine SAC	<p>Grey seal Otter Shore dock Sea lamprey River lamprey Allis shad Twaite shad Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Submerged or partially submerged sea caves Coastal lagoons * Priority feature</p>	250 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
<p>Ribble and Alt Estuaries SPA</p>	<p>Common tern (breeding) Ruff (breeding) Lesser black-backed gull (breeding) Bar-tailed godwit (over wintering) Bewick's swan (over wintering) Golden plover (over wintering) Whooper swan (over wintering) Ringed plover (on passage) Sanderling (on passage) Black-tailed godwit (over wintering) Dunlin (over wintering) Grey plover (over wintering) Knot (over wintering) Oystercatcher (over wintering) Pink-footed goose (over wintering) Pintail (over wintering) Redshank (over wintering) Sanderling (over wintering) Shelduck (over wintering) Teal (over wintering) Wigeon (over wintering)</p> <p>Breeding seabird assemblage > 20,000 individuals Waterfowl assemblage > 20,000 individuals</p>	<p>6 km</p>
<p>Ribble and Alt Estuaries Ramsar</p>	<p>Wintering waterfowl (peak mean count 222038) Lesser black-backed gull (breeding) Ringed plover (peak counts in spring/autumn) Grey plover (peak counts in spring/autumn) Knot (peak counts in spring/autumn) Sanderling (peak counts in spring/autumn) Dunlin (peak counts in spring/autumn) Black-tailed godwit (peak counts in spring/autumn) Redshank (peak counts in spring/autumn) Lesser black-backed gull (peak counts in spring/autumn) Bewick swan</p>	<p>6 km</p>

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
	<p>Pink-footed goose (peak counts in winter) Whooper swan (peak counts in winter) Tundra swan (peak counts in winter) Shelduck (peak counts in winter) Wigeon (peak counts in winter) Teal (peak counts in winter) Pintail (peak counts in winter) Oystercatcher Bar-tailed godwit Natterjack toad Sea lamprey River lamprey Atlantic salmon Brook lamprey Bullhead Otter Floating water-plantain Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachion vegetation Embryonic shifting dunes Shifting dunes along the shoreline with Ammophila arenaria ('white dunes') Fixed dunes with herbaceous vegetation ('grey dunes') Dunes with Salix repens ssp. argentea (Salicion arenariae) Humid dune slacks Atlantic decalcified fixed dunes (Calluno-Ulicetea) Petalwort Great crested newt Sandbanks which are slightly covered by sea water at all times Reefs Harbour porpoise Sandbanks slightly covered by sea water all the time Reefs Partially submerged sea caves Manx shearwater (breeding) Chough (breeding) Short-eared owl (breeding)</p>	
River Dee and Bala Lake SAC		32 km
Sefton Coast SAC		9 km
Shell Flat and Lune Deep SAC		38 km
Skerries and Causeway SAC		300 km
Skokholm and Skomer SPA		290 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
	<p>Storm petrel (breeding) Lesser black-backed gull (breeding) Puffin (breeding)</p>	
South-East Islay Skerries SAC	Breeding seabird assemblage > 20,000 birds Common (harbour) seal	330 km
Strangford Lough SAC	<p>Common (harbour) seal Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Large shallow inlets and bays Reefs Annual vegetation of drift lines Perennial vegetation of stony banks Salicornia and other annuals colonising mud and sand Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)</p>	180 km
The Maidens SAC	<p>Grey seal Sandbanks slightly covered by sea water all the time Reefs</p>	260 km
Upper Solway Flats and Marshes SPA	<p>Bar-tailed godwit (over wintering) Barnacle goose (over wintering) Golden plover (over wintering) Whooper swan (over wintering) Ringed plover (on passage) Curlew (over wintering) Dunlin (over wintering) Knot (over wintering) Oystercatcher (over wintering) Pink-footed goose (over wintering) Pintail (over wintering) Redshank (over wintering)</p>	150 km
Upper Solway Flats and Marshes Ramsar	<p>Overwintering waterfowl assemblage >20,000 birds. Includes scaup, great crested grebe, cormorant, shelduck, mallard, golden eye, ringed plover and the species listed above. Red-throated diver Natterjack toad Peak mean count of 135720 waterfowl in winter</p>	150 km

Designated site	Site qualifying features	Distance to the Burbo Bank Extension
	<p>Whooper swan, (over wintering) Pink-footed goose (over-wintering) Barnacle goose (over-wintering) Internationally important counts of spring/autumn oystercatcher Pintail (wintering) Scaup (wintering) Knot (wintering) Bar-tailed godwit (wintering) Curlew (breeding) Redshank (wintering)</p>	

