



Department
of Energy &
Climate Change

**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)**

FINAL

***Project Title:* KENTISH FLATS OFFSHORE WIND FARM EXTENSION**

15 February 2013

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1. INTRODUCTION

Background

- 1.1 On 14th October 2011, Vattenfall Wind Power Ltd. ("the applicant") submitted an application to the Infrastructure Planning Commission, the functions of which were transferred to the Planning Inspectorate ("PINS") on 1 April 2012) for consent under Section 37 of the Planning Act 2008 (as amended) for the construction and operation of a 51 MW extension to Kentish Flats Offshore Wind Farm ("the KF wind farm extension" or "the project"). The application is for a Development Consent Order (DCO) that includes a Deemed Marine Licence
- 1.2 This is a record of the Habitats Regulations Assessment (HRA) undertaken by the Secretary of State for the Department of Energy and Climate Change (DECC) in respect of the DCO application. The Secretary of State is the competent authority for applications submitted under the Planning Act 2008 regime (as amended by the Localism Act 2011).
- 1.3 In England and Wales, offshore wind farms 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). The KF wind farm extension constitutes an NSIP due to its generation capacity in combination with the existing Kentish Flats Wind Farm which it is adjacent to. The existing wind farm has been operational since December 2005 and has a maximum installed capacity of 90 MW. The combined maximum installed capacity is, therefore, 141 MW, placing it within the Planning Act 2008 threshold.
- 1.4 Mr. Glyn Roberts was appointed by the IPC as the Examining Authority to assess the application and to make recommendations to the Secretary of State on its findings, namely, whether or not the application should be approved; the basis for its conclusions; and any conditions that ought to be attached, should the application be approved. Its examination of the application was completed on 20th August 2012 and its report was submitted to the Secretary of State on 29th November 2012.
- 1.5 The Secretary of State's conclusions on habitats and wild birds issues contained in this report have been informed by the Examining Authority's report to him and further information and analysis, including a Report on the Implications for European Sites (RIES) and written responses to it, as set out in paragraphs 1.15-1.16.

Habitats Regulations Assessment (HRA)

- 1.6 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") aim to ensure the long-term survival of certain species and habitats by protecting them from adverse effects of plans and projects.
- 1.7 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 called Natura 2000.

1.8 The Conservation of Habitats and Species Regulations 2010 (as amended) ("the Habitats Regulations") transpose the Habitats and Birds Directives into UK law as far as the limit of territorial waters. 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 the same protection as European sites.

1.9 Regulation 61 of the Habitats Regulations provides that:

"a competent authority, before deciding to... give consent, permission or other authorisation for... a project which is likely to have a significant effect on a European site [or Ramsar site]... (either alone or in combination with other plans or projects), and is not directly connected with or necessary to the management of that site, must make an appropriate assessment (AA) of the implications for that site in view of that site's conservation objective."

1.10 This project is not directly connected with, or necessary to, the management of a European site¹. However, it may affect European and Ramsar sites and so an HRA is required by Regulation 61, comprising a test of likely significant effects and if significant effects are identified then an appropriate assessment.

1.11 In considering the possible impacts of the proposed KF wind farm extension and reaching his conclusions, the Secretary of State has also taken into account duties and obligations provided for under the Conservation of Habitats and Species (Amendment) Regulations 2012, SI 2012 No. 1927, which came into force on 16th August 2012 and amend the Habitats Regulations, to confirm the transposition into UK law of requirements in the Birds Directive. In particular, new regulations 9(1) and 9A(1), (3) and (8) of the 2010 Regulations as inserted by regulation 8 of the 2012 Regulations are engaged when the Secretary of State exercises his functions in relation to granting consent for a new electricity generating station and applies Regulation 61(1). The key considerations in this context are securing compliance with the Wild Birds Directive relating to preserving, maintaining and re-establishing a sufficient diversity and area of habitat for wild birds in the United Kingdom; and using all reasonable endeavours to avoid any pollution or deterioration of habitats of wild birds.

1.12 This record should be read in conjunction with the following documents that provide extensive background information:

- Kentish Flats Extension Order – Examining Authority's Report to the Secretary of State, Glyn Roberts, 29 November 2012.
- Report on the Implications for European Sites (RIES): Proposed Kentish Flats Offshore Wind Farm Extension: An Examining Authority report prepared with the

¹ European site as defined in Regulation 8 of The Conservation of Habitats and Species Regulations 2010 (as amended).

support of the Planning Inspectorate Secretariat, June 2012. (and written responses to it) – “the RIES”

- Statements of Common Ground (SoCG) between Vattenfall Wind Power Ltd., Natural England, the RSPB and Kent Wildlife Trust. Burges Salmon, May 2012. – “SoCG”
- Kentish Flats Offshore Wind Farm Extension: Habitats Regulations Assessment (HRA) Report, Document Reference Number 3.4. Vattenfall Wind Power Ltd. October 2011. – the “applicant’s HRA”
- Kentish Flats Offshore Wind Farm Extension: Habitats Regulations Assessment Addendum Report. Appendix 8 to Document Ex3, Vattenfall Wind Power Ltd. June 2012. – “the applicant’s HRA addendum”
- Kentish Flats Offshore Wind Farm Extension: Environmental Statement (ES). Vattenfall Wind Power Ltd. September 2011. – “the ES”

1.13 Further relevant information and correspondence was submitted during the examination period and has been considered by the Secretary of State. This includes, but is not limited to:

- The Habitats Regulations Hearing, Marine Hotel, Whitstable, 31st May 2012
- Responses from Interested Parties to Rule 17 requests by the Examining Authority on 24th April, 6th June and 7th August 2012.

1.14 So far as is possible, the key information in these documents is summarised and referenced here, but not duplicated.

Consultation on the RIES

1.15 Under Regulation 61(3) of the Habitats Regulations, the competent authority must, for the purposes of the 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 RIES was published on the Planning Inspectorate’s planning portal website and circulated to interested parties on 28 June 2012 for a period of 21 days for the purposes of Regulation 61(3). Responses were received from the applicant, Natural England and Kent Wildlife Trust and have been taken into account in preparing this report. The findings of fact summarised in the RIES were accepted by all parties, with one important exception. Natural England highlighted an error in the explanatory footnote to Matrix 10, whereby the density increase resulting from the in-combination assessment had been substantially understated.

London Array application

1.17 After the close of the examination, London Array Ltd (LAL) submitted, on 24 October 2012, a proposal to the Secretary of State for further development at the London Array Offshore Wind Farm site in the Outer Thames Estuary SPA. Their application is to discharge a Grampian condition on their existing Section 36 consent to develop their site beyond an initial Phase 1 of 630MW, which is near completion. In support of that application, LAL provided a “Report to

Inform Appropriate Assessment (RIAA)” and other documents. The LAL Phase 2 application is for a capacity of up to 240MW, comprising up to 65 turbines of 3.6MW capacity each over an area of 41.8km.² It is 130MW below the remaining consented capacity of 370MW and excludes the part of the site supporting the highest densities of Red-throated Divers.

- 1.18 In view of the potential interaction between the two proposed projects and the fact that interested parties and the Examining Authority had not had the opportunity to comment on the London Array material, the Secretary of State asked the Planning Inspectorate to facilitate a short consultation after the close of the examination. Information relating to the LAL submission was posted on the KF wind farm extension pages of the Planning Inspectorate’s web portal in December 2012, and comments sought on it insofar as it relates to the KF wind farm extension.

East Anglia One application

- 1.19 On 14 December 2012, the Planning Inspectorate accepted an application for East Anglia One, an offshore wind farm of approximately 1,200 MW capacity off the coast of East Anglia. Whilst their proposed wind turbine array would lie some 7 km to the north of the Outer Thames Estuary SPA, the export cable would pass through the SPA. The applicant’s HRA (APEM Ltd, 2012) considers risk to the designated features of the Outer Thames Estuary SPA as a result of construction and operation of the East Anglia One wind farm, both alone and in combination.
- 1.20 The LAL and East Anglia One documents and consultation responses were not available to the Examining Authority, but are considered here insofar as the information is relevant to the Secretary of State’s consideration of the Kentish Flats Extension proposal.

Structure of this report

- 1.21 In addition to a description to the proposed project (**Section 2**) and its location (**Section 3**), this HRA comprises a Test for Likely Significant Effects (LSE) in respect of eight European sites (**Section 4**) and an Appropriate Assessment (AA) (**Section 5**) in respect of one of these - the Outer Thames Estuary Special Protection Area (SPA), where a risk of LSE could not be excluded. The AA is split into two sections covering the impacts of the project alone (**Section 6**) and in-combination effects with other plans and projects (**Section 7**). Decommissioning is briefly addressed in **Section 8** and a summary of conclusions is presented in **Section 9**.

2 PROJECT DESCRIPTION

- 2.1 The project will comprise up to 17 turbines, with a maximum installed capacity of 51 MW. The main components are:
- The offshore wind farm array (wind turbines and foundations);
 - Inter-array cabling;
 - Export cabling to shore;
 - Onshore transition pit; and
 - Onshore cabling.
- 2.2 Two export cables of up to 33kV will be buried under the sea carrying power to a cable transition pit located at a beachside car park adjoining Hampton Pier (between Whitstable and Herne Bay). It is anticipated that these will then connect to the existing onshore substation for Kentish Flats at Red House Farm, Herne Bay. The substation has sufficient capacity for the extra power and will not require upgrading or expansion. Full details of the offshore infrastructure likely to be used in the project and construction methodologies are detailed in the Environmental Statement (ES) – Section 5. Project Definition and the Project Design Statement (Document 7.2). See **Figure 1**. for the scheme layout.
- 2.3 A summary of the key offshore characteristics of the project is provided in **Table 1**.

Table 1 - Offshore project characteristics

Key project characteristics	
Maximum capacity	51MW
Number of wind turbines	10 to 17
Extension area	Approximately 7.8km ²
Minimum distance from to shore	Approximately 7.8km
Average water depth over wind farm site	Approximately 3 to 5m Chart Datum (CD)
Wind turbine capacity	Likely to be 3 to 4 MW
Maximum wind turbine rotor diameter	120m
Maximum wind turbine hub height	85m
Maximum wind turbine tip height	145m above mean sea level (MSL)
Minimum clearance above sea level	22m above mean high water level (MHW)
Foundation type	Monopile, 6m maximum diameter
Inter-array cables	To be confirmed
Export cables	Up to 2* 33kV
Onshore cable distance	Approximately 2km
Onshore cables	Up to 2* 33kV
Onshore connection	Red House Farm, Herne Bay

- 2.4 The precise layout of the turbines within the project area will depend upon the size of the wind turbine selected and site-specific issues, which may require micro-siting of individual turbines. Geotechnical site investigation surveys will be undertaken prior to construction to allow for the detailed design and installation planning for foundations, cables and jack-up operations.

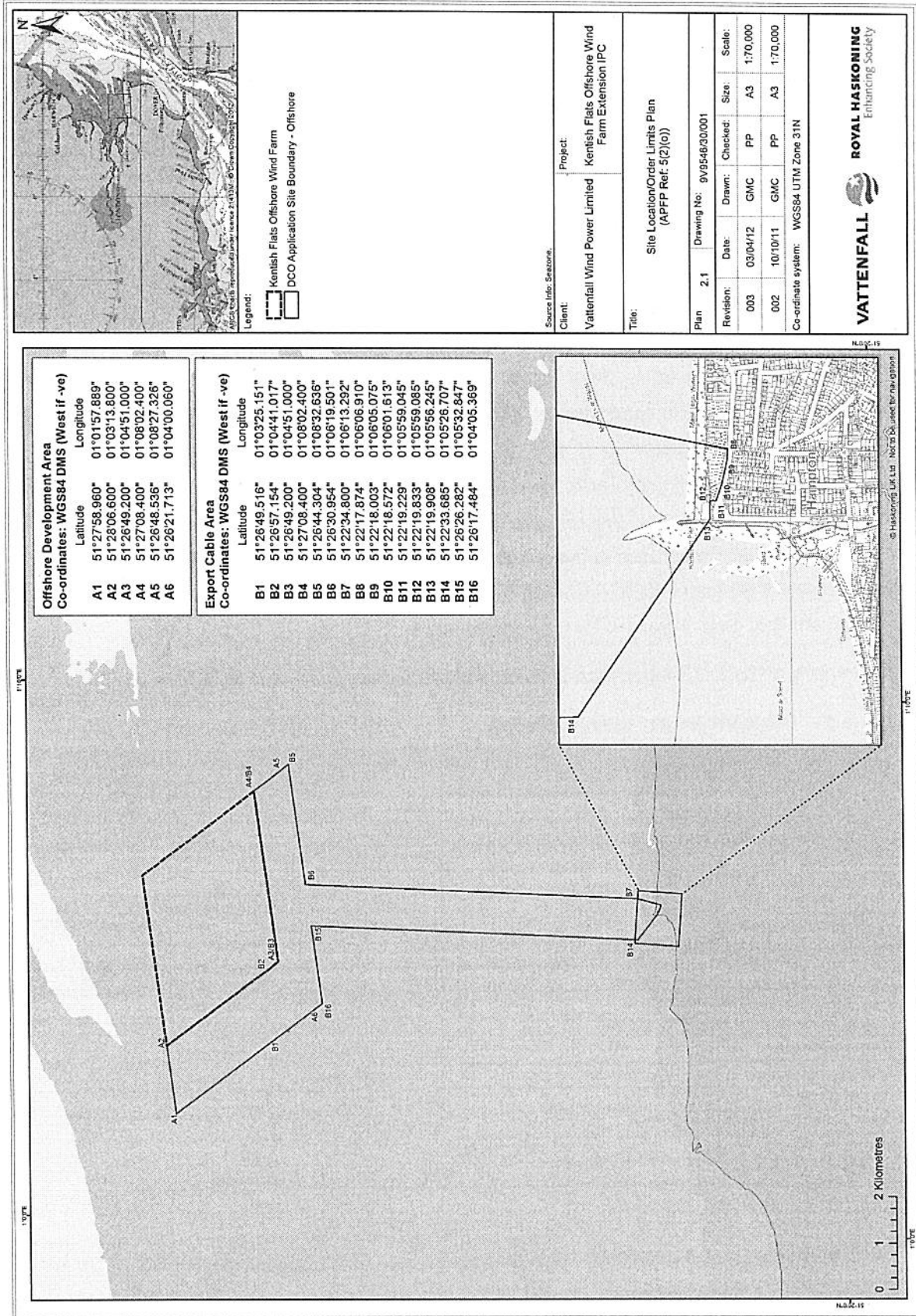


Figure 1. Scheme Layout

2.5 Onshore aspects of the development from the cable transition pit to the substation will be subject to a separate planning application to Canterbury City Council. It is anticipated that the onshore cable works will follow the route of the existing underground grid connection to the Red House substation, which is predominantly installed within the public highway.

2.6 The applicant advises that construction is expected to be completed in the following stages:

- Onshore construction works and prefabrication (wind turbines and foundations constructed on shore);
- Transportation (wind turbines and foundations floated or transported by transportation vessels);
- Offshore monopile foundation installation;
- Inter-array cabling;
- Wind turbine installation;
- Export cabling; and
- Commissioning.

2.7 **Table 2** sets out the major milestones anticipated by the applicant, assuming that consents for the project are received in early 2013.

Table 2 - Key project milestones

Milestone	Date
Consent application	Autumn 2011
Decision on consents	Early 2013
Final design & procurement (assuming consent granted)	Up to September 2013
Onshore construction works	July 2013 to March 2014
Offshore construction works	September 2013 to September 2014
Commissioning	September 2014

2.8 The operational life of the project is estimated to be 25 years and there is a requirement to either decommission or repower after this period. Decommissioning will involve the removal of all accessible installed components of the wind turbine including parts of the wind turbine foundation structures (those above seabed level) and the sections of the inter-array cables close to the offshore structures, as well as sections of the export cable(s). Decommissioning requirements are addressed further in **Section 8**.

3 PROJECT LOCATION AND DESIGNATED SITES

Location

- 3.1 The project is proposed to be located on the southern side of the Outer Thames Estuary off the North Kent coast, approximately 8.6 km north of Herne Bay and 9.5 km north of Whitstable. This is within the 12 nautical mile (nm) limit of English territorial waters. The Essex coastline lies some 20 km to the north. The project will be situated immediately adjacent to Kentish Flats Offshore Wind Farm, with the site boundaries adjoining.

Other offshore activities

- 3.2 Kentish Flats and its proposed extension lie within the Outer Thames Estuary SPA, where a number of other wind farms are located or are proposed to be located. The closest of these is the London Array (LA) Wind Farm, of which Phase 1 is under construction, and nearing completion, some 25 km to the north east. Other offshore activities in the area include aggregates extraction, dredging, commercial shipping and fisheries.
- 3.3 The closest licensed aggregate abstraction area to the project is Area 109-1, which is located approximately 40km north-east. The Marine Management Organisation (MMO) has highlighted the potential impact of recent applications to extract aggregates and potential for in combination impacts between the offshore wind and aggregates sectors in the Outer Thames Estuary (Phil McBride, pers comm.) The MMO has received a 15-month application to extract aggregate in Area 108 and a 15-year pre-application to extract aggregate in Areas 508/509/510. The MMO will undertake HRAs for these individual applications and propose to work collectively with both sectors to develop a Regional Appropriate Assessment in the longer term, to better understand the existing baseline on the SPA and impacts on it.
- 3.4 According to the applicant's ES, up to thirty "very part-time" fishermen, are reported as fishing Kentish Flats and the proposed extension. Netting and occasional trawling are considered to account for the majority of fishing activity in this area. The Outer Thames Estuary is also heavily used by commercial shipping. The Whitstable oyster beds to the south are dredged regularly. Dredging in the Thames Estuary is primarily carried out for the maintenance of navigation channels. A major shipping route passes some 2 km to the north of the project site at its nearest point, passing in an east-west direction.

European sites

- 3.5 The project lies within the Outer Thames Estuary SPA. This was designated in 2010, in recognition of the population of over wintering Red-throated Diver. Its export cable landfall lies adjacent to the Thanet Coast and Sandwich Bay SPA and Ramsar site. Six other European sites lie within 25 km of the wind farm and/or its export cable outfall. These are: Foulness SPA/Ramsar; the Swale SPA/Ramsar; Medway Estuary and Marshes SPA/Ramsar; Thames Estuary and Marshes SPA/Ramsar; Thanet Coast Special Area of Conservation (SAC); and Margate and Long Sands candidate (c)SAC

3.6 A summary of the qualifying features of each of these European sites and distance from the project (both array and landfall) is presented in **Table 3** and the location is shown in **Figure 2**.

Table 3. European sites within 25 km of the project

Designated site	Site qualifying features	Distance to windfarm/ km	Distance to export cable landfall / km
Outer Thames Estuary SPA	<i>Wintering:</i> red-throated diver	0	0
Thanet Coast and Sandwich Bay SPA/Ramsar;	<i>Wintering:</i> turnstone	8	0
Foulness SPA/Ramsar	<i>Breeding:</i> avocet, little tern, common tern, sandwich tern <i>Wintering:</i> avocet, bar-tailed godwit, golden plover, hen harrier, dark-bellied brent goose, grey plover, knot, oystercatcher <i>Passage:</i> redshank <i>Wintering assemblage</i> includes above plus curlew, black-tailed godwit, dunlin, lapwing, wigeon, shelduck, little grebe	9	20
The Swale SPA/Ramsar	<i>Breeding:</i> avocet, marsh harrier, Mediterranean gull <i>Wintering</i> avocet, bar-tailed godwit, golden plover, hen harrier, black-tailed godwit, grey plover, knot, pintail, redshank, shoveler <i>Passage:</i> ringed plover. <i>Wintering assemblage</i> includes above plus white-fronted goose, golden plover, grey plover, cormorant, curlew, dark-bellied brent goose, shelduck, wigeon, gadwall, teal, oystercatcher, lapwing, dunlin, little grebe	10	5
Medway Estuary and Marshes SPA/Ramsar	<i>Breeding:</i> avocet, little tern <i>Passage:</i> ringed plover <i>Wintering:</i> avocet, black-tailed godwit, dark-bellied brent goose, dunlin, grey plover, pintail, redshank, ringed plover, shelduck <i>Wintering assemblage</i> includes above plus little grebe, curlew, great crested grebe, cormorant, wigeon, teal, oystercatcher, lapwing, whimbrel	21	22
Thames Estuary and Marshes SPA/Ramsar	<i>Wintering:</i> avocet, hen harrier, ringed plover <i>Passage:</i> ringed plover <i>Wintering assemblage</i> includes redshank, black-tailed godwit, dunlin, lapwing, grey plover, shoveler, pintail, gadwall, shelduck, white-fronted goose, little grebe, ringed plover, avocet and whimbrel	20	25
Thanet Coast Special Area of Conservation (SAC)	<i>Annex 1 Habitat:</i> Reefs and submerged or partially submerged sea caves.	10	10
Margate and Long Sands candidate (c)SAC	<i>Annex1 Habitat:</i> Sandbanks slightly covered by seawater at all times.	0	3.7

Source: the applicant's ES, Section 9 and HRA Report, doc ref: 3.4.

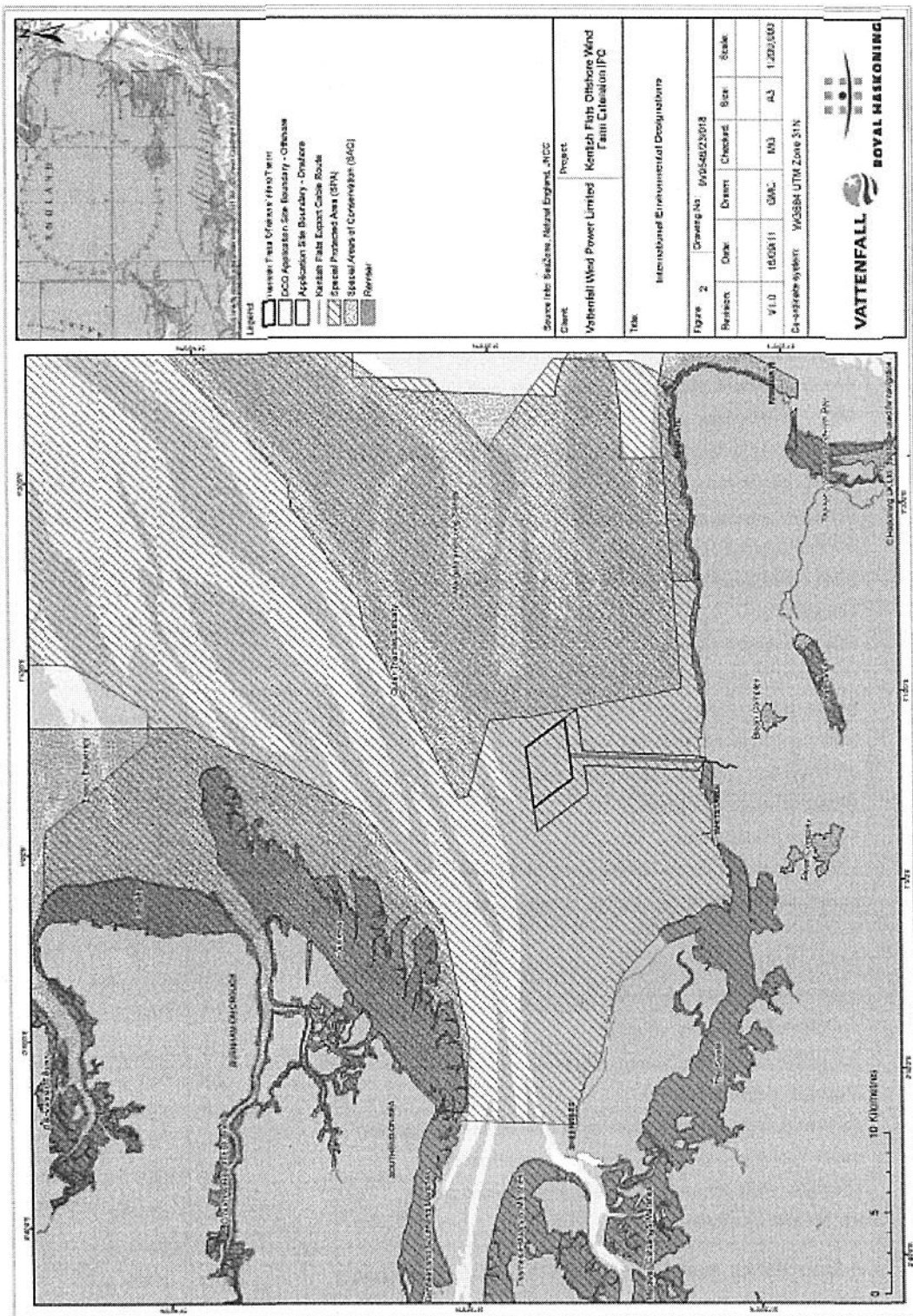


Figure 2. European sites close to the proposed project.

4 TEST FOR LIKELY SIGNIFICANT EFFECTS

What is the likely significant effects test?

- 4.1 An appropriate assessment (AA) is required if a plan or project is likely to have a significant effect on a European site, either alone or in combination. A likely significant effect (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.
- 4.2 **The purpose of this test is to identify likely significant effects on European sites that may result from the KF wind farm extension and to record the Secretary of State's conclusions on the need for an AA and his reasons for screening activities, sites or in combination plans and projects in or out of further consideration in the AA.** Having identified these, this section then describes the scope of the AA.
- 4.3 The Secretary of State has considered the potential construction, operational and decommissioning impacts of the project on the interest features of eight European sites located within 25km of either the wind turbine array and/or its landfall to determine whether or not there will be LSE. A radius of 25 km from the project was considered appropriate, taking into account the likely pathways for impact and receptors. The sites in question are:
- a) The Outer Thames Estuary SPA
 - b) Thanet Coast and Sandwich Bay SPA/Ramsar;
 - c) Foulness SPA/Ramsar;
 - d) The Swale SPA/Ramsar;
 - e) Medway Estuary and Marshes SPA/Ramsar;
 - f) Thames Estuary and Marshes SPA/Ramsar;
 - g) Thanet Coast Special Area of Conservation (SAC); and
 - h) Margate and Long Sands candidate (c)SAC.
- 4.4 These sites were agreed between the applicant and Natural England during the pre-application stage and were subsequently included in the applicant's HRA report.
- 4.5 The risks of LSE have been assessed as a result of the project alone and also considering possible interactions with other plans and projects. Predicted alone and in-combination effects are described briefly in this section, with more detailed coverage set out in Matrices 1-8 from the RIES.

Likely Significant Effects – project alone

- 4.6 Matrices 1-8 in the RIES show the potential interactions of each stage of the project (construction, operation, decommissioning) with the qualifying features of the eight sites listed in paragraph 4.3. In almost all cases, likely significant effects have been discounted as: there is no pathway for an impact to occur; the scale of impact is of negligible magnitude; the qualifying

species were not recorded in the project impact zone; and/or effects are predicted to be localised and temporary.

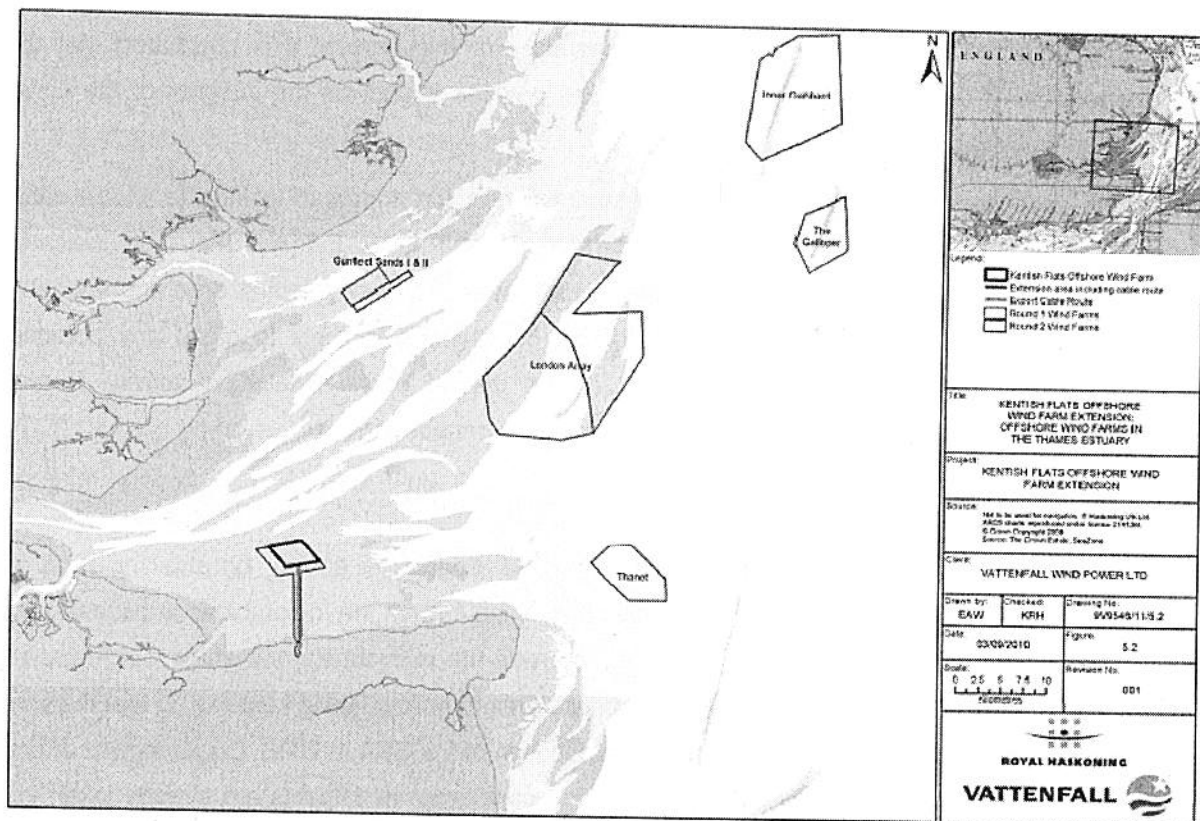
- 4.7 An exception to this is wintering Turnstone, *Arenaria interpres*, a qualifying feature of the Thanet Coast and Sandwich Bay SPA/Ramsar where a likely significant effect was identified. Disturbance to Turnstone may result from cable installation works. In order to conclude that there is no likely significant effect, the Secretary of State will require that mitigation to ensure that construction is halted during October to April (inclusive) to avoid the period two hours either side of high tide. This is contained within **Requirement 8 (1)** of the Deemed Marine Licence within the DCO.
- 4.8 The applicant has produced a No Significant Effects Report as part of its HRA covering seven of the sites listed in paragraph 4.3 (excluding the Outer Thames Estuary SPA). The Examining Authority and Natural England are content with the conclusions of this, subject to the implementation of mitigation for wintering Turnstone, as described above.
- 4.9 All parties agree that there is a risk of LSE on wintering Red-throated Diver *Gavia Stellata*, the qualifying feature of the Outer Thames Estuary SPA. This is primarily due to displacement during the construction, operational and decommissioning phases of the project. Surveys conducted by the applicant recorded a peak count of 174 birds in the project "impact" area (i.e. the site plus a 2 km displacement zone). This number represents around 2.7% of the SPA citation population of 6,466 birds (the applicant's HRA paras 5.3.1-3, Table 5 para 5.3.8).
- 4.10 Red-throated Diver were also recorded within the "wind turbine envelope" (the application area plus a 200m buffer) and could be considered at risk of collision. The Examining Authority recommend that this is taken forward for further assessment due to uncertainty and Natural England and the applicant agree with this.

Likely Significant Effects – project in-combination

- 4.11 All parties agree that there is a risk of LSE on Red-throated Diver in the Outer Thames Estuary SPA as a result of the project in combination with existing, under construction and planned wind farm projects and that an AA is required. There is disagreement in relation to which plans and projects to include in the in-combination assessment and there have been further developments since the close of the examination period on 20th August 2012. The current position is summarised below.
- 4.12 The following offshore wind projects and proposals have been included in the in-combination assessment carried out by the applicant: the existing Kentish Flats wind farm and its proposed extension; the existing London Array Phase 1 and also the area set aside in the consent for the build out of up to an additional 370 MW²; Thanet, Gunfleet Sands I and II; Greater Gabbard and Galloper. The location of these wind farms is shown in **Figure 3**.

²To be referred to as LA 2 (370MW)

Figure 3. Location of the project and other offshore wind farms



Treatment of wind farms outside the Outer Thames Estuary SPA

4.13 Thanet, Greater Gabbard and the proposed Galloper (not shown on map) wind farms lie within the Greater Thames Estuary area, but outwith the SPA boundary, in an area regarded as being "functionally connected" to the Outer Thames Estuary SPA. The Examining Authority focuses its assessment on the wind farm projects located or planned to be located within the boundaries of the SPA where there are higher concentrations of Red-throated Diver, although it is acknowledged that other wind farms will have some impact on SPA birds.

East Anglia One

4.14 As set out in paragraphs 1.19-1.20, the Planning Inspectorate accepted an application for East Anglia One offshore wind farm after the close of the KF wind farm extension examination period. The proposed East Anglia One turbine array lies some 7 km to the north of the Outer Thames Estuary SPA, with the export cable passing through a section of the SPA. The applicant's HRA (APEM Ltd, 2012) considers risk to the designated features of the Outer Thames Estuary SPA as a result of disturbance and displacement; collision mortality; and barrier effects to Red-throated Diver movements during the construction and operation of the East Anglia One wind farm. It considers alone and in-combination effects.

4.15 The East Anglia One HRA reports that the water depths at the East Anglia One site (30m and greater) are deeper than preferred by Red-throated Divers and the density of Red-throated Divers across the East Anglia One site is low (0.5 birds/km²), supporting the assumption that

the habitat is sub-optimal for winter foraging. The mean peak estimate of Red-throated Divers in the site occurs in spring, suggesting that divers pass through the site on migration, rather than forage there during the main winter period. For this reason, it is concluded that the operation of the wind farm will not result in an adverse impact on the integrity of the Outer Thames Estuary SPA.

- 4.16 The applicant's HRA also covers the potential construction impact of laying the export cable and presence of maintenance vessels within the Outer Thames Estuary SPA. This indicates that the area in the vicinity of the proposed cable route is a busy shipping area and suggests that a reduction in commercial vessels during construction is likely to offset any potential temporary disturbance and displacement effects due to cable installation activity. It also highlights that cable laying vessels are static for large periods of time.

Treatment of the existing Kentish Flats project

- 4.17 The Examining Authority disagrees with Natural England's advice on the inclusion of displacement data from the existing Kentish Flats wind farm in the in-combination assessment. It considers that this approach is not consistent with the relevant Europa guidance on project assessment, nor with planning practice in other plan and policymaking contexts, in that the wind farm was operational prior to the formal classification of the SPA in 2010. Displacement effects from it are, therefore, incorporated into baseline conditions. Its impacts are already taken into account in the JNCC survey data used for the classification of the Outer Thames Estuary SPA. The Examining Authority considers that Natural England has not presented sufficient well-justified reasons for the selection of a "pre-disturbance" baseline, and therefore further displacement effects from the existing Kentish Flats wind farm should be excluded from the in-combination assessment, to avoid double-counting. This view is in accordance with the approach previously taken by the Secretary of State in the AA for London Array Phase 1 (DTI, 2006)

Potential further development at the London Array site

- 4.18 In its submissions to the Examining Authority, the applicant argued that the effects of further development at the London Array site should not be taken into account as, at that time, no information was available on the number, the size nor the layout of the turbines and, hence, a realistic assessment of its likely impact was not possible. The applicant's view was that adopting a "worst case scenario" of the full development of the site would lead to an unrealistic overestimate of impacts.
- 4.19 The Examining Authority considers that its in-combination assessment necessarily included the "worst-case scenario" for the scale, extent and impact of for London Array 2, with its recommendation taking into account the potential risk of unfairness in adopting this approach. In the absence of an application for a further phase of the London Array development by the close of the examination period, the Examining Authority indicated this was not a matter on which it proved possible to take a view. It does, however conclude that a Phase 2 of London

Array “*must be regarded as a “planned” project and included within the cumulative assessment.*”

- 4.20 On 24 October 2012, after the close of the examination for the KF wind farm extension, London Array Ltd (LAL) submitted an application to the Secretary of State to discharge the Grampian condition in respect of their existing consent as described in paragraph 1.17. They also submitted a Report to Inform Appropriate Assessment (RIAA) in support of their application. This current Phase 2 application is for up to 240 MW of additional capacity – a shortfall of approximately 130 MW on the full consented London Array capacity of 1000 MW. For avoidance of confusion, this reduced London Array Phase 2 proposal of 240 MW will be referred to in this report as **LA2 (240MW)**. The maximum remaining consented capacity of the London Array site, as restricted by the Grampian condition and assessed by the applicant and the Examining Authority, will be referred to as **LA 2 (370MW)**.

Conclusions on likely significant effects/screening

- 4.21 The Secretary of State agrees with the Examining Authority that there is a risk of likely significant effects on wintering Red-throated Diver, the qualifying feature of the Outer Thames Estuary SPA, as a result of the project alone and in combination with other plans and projects. As a consequence, an AA is required to determine the risk of adverse effects on the integrity of the Outer Thames Estuary SPA.
- 4.22 The AA should focus on the key areas of concern, namely impacts on wintering Red-throated Divers as a result of disturbance, displacement and collision risk during the construction and operation of the project. This view is supported by the applicant and Natural England. All other potential impacts, such as barrier effects and direct habitat loss, are screened out in the RIES.
- 4.23 The Secretary of State agrees with the Examining Authority that the relevant European sites to consider for screening are those listed in paragraph 4.3 and that there are no other likely significant effects on any of the interest features of those sites as a result of the KF wind farm extension alone or in combination with other plans or projects. These other sites will not be subject to any further assessment. This conclusion takes into account the mitigation, as set out in Requirement 8 (1) of the Deemed Marine Licence (part of the DCO) to prevent disturbance to wintering Turnstone, a qualifying feature of Thanet Coast and Sandwich Bay SPA/Ramsar site.
- 4.24 The Secretary of State has considered which offshore wind farms should be included in the in-combination assessment and the merits of each as set out in paragraphs 4.12 - 4.20. He agrees with the Examining Authority that the AA should focus on wind farms located in, or are proposed to be located in, the Outer Thames Estuary SPA, although he acknowledges that neighbouring wind farms will make some contribution to in combination effects. For reasons of c

- 4.25 The wind farms screened into the AA are:
- London Array Phase 1 (under construction);
 - LA Phase 2 (370 MW consented); and
 - Gunfleet Sands I, II (constructed) and III (under construction)
- 4.26 The wind farms screened out of the AA are:
- Thanet, Greater Gabbard and Galloper (outside SPA)
 - East Anglia One (outside SPA, apart from export cable)
 - Kentish Flats (operational prior to SPA classification in 2010)
- 4.27 The Secretary of State is satisfied that the existing Kentish Flats wind farm should be excluded from the consideration of in-combination effects since it was constructed in 2005 and its effects can be considered to be part of the baseline with regard to the Red-throated Diver population in the Outer Thames Estuary SPA.
- 4.28 He is satisfied that disturbance and displacement within the SPA as a result of the East Anglia One cable laying activity will be temporary and will be, at least partially, offset by a reduction in commercial vessels during this period and so he is content to screen this activity out of further consideration in the AA.
- 4.29 Whilst he is in agreement with the Examining Authority that the potential impacts of LA2 (370 MW) or any further development at the London Array site should be considered, he is of the view that this needs to be in the context of the powers of the London Array Grampian condition to limit adverse effects on the Outer Thames Estuary SPA.
- 4.30 Consent was granted in April 2012 to install two next generation 6 MW turbines adjacent to the existing Gunfleet Sands windfarm for test purposes (Gunfleet Sands III). These are currently under construction. The Secretary of State notes that neither the Examining Authority nor the interested parties have drawn his attention to Dong Energy's Gunfleet Sands III demonstration project. He considers that, whilst there is a strong case for considering then in his AA, the impacts of the demonstration project would be negligible and would not make a material difference to his decision on the KF extension project. He reaches this conclusion on the basis of the small size of the project (two turbines over an area of approximately 1 km²) and the fact that Red-Throated Divers were reported in Dong Energy's ES for the project as having declined in the area (RPS, 2010). For this reason, he will make any further assessment of Gunfleet Sands III.
- 4.31 In combination effects are considered further in **Section 7** of this report.

5 APPROPRIATE ASSESSMENT

5.1 An Appropriate Assessment (AA) is triggered when the competent authority, in this case the Secretary of State, determines that a plan or project may result in an LSE on a European site. Its purpose is to determine whether or not 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 (EC, 2000). **The purpose of this AA is to determine whether or not adverse effects on the integrity of the Outer Thames Estuary SPA, can be ruled out as a result of the KF wind farm extension alone or in combination with other reasonably foreseeable plans and projects. This is in view of the SPA's conservation objectives and using the best scientific evidence available.**

5.2 If the AA cannot ascertain the absence of an adverse effect on the site's integrity within reasonable scientific doubt, then under Regulation 49 of the Habitats Directive alternative solutions should be sought. In the absence of an acceptable alternative, the project can proceed if there are imperative reasons of overriding public interest (IROPI). These IROPI issues are beyond the scope of this AA and are not considered here.

The Outer Thames Estuary SPA

5.3 The Outer Thames Estuary SPA covers an area of 379,268 ha and lies entirely within UK territorial waters adjacent to the counties of Norfolk, Suffolk, Essex and Kent. It was classified by the Government in August 2010 on account of its importance for wintering Red-throated Divers and subsequently notified to the European Commission for inclusion in the Natura 2000 network of European sites. The basis for the classification is set out in a Natura 2000 Standard Data Form (JNCC, 2011). Red-throated Divers are listed in Annex 1 of the Birds Directive as requiring special conservation measures.

5.4 Aerial surveys have revealed much larger numbers of Red-throated Divers wintering in Britain than was previously thought – around 17,000 individuals (O'Brien *et al.*, 2008). Almost half (44%) were estimated to occur within the Greater Thames Estuary area, demonstrating the importance of the Estuary for the species. The final boundaries of the SPA were drawn so as to include some 38% of the Great Britain wintering population, based on the mean survey population count over the period 1989-2006/7.

5.5 The Outer Thames Estuary SPA consists of areas of shallow and deeper water, high tidal current streams and a range of mobile sediments. Large areas of mud, silt and gravelly sediments form deeper water channels, the main ones of which form the approach route to the ports of London and are continually disturbed by shipping and maintenance dredging. Sand in the form of sandbanks separated by troughs predominate in the remaining areas and the crests of some of the banks are exposed at mean low water. The waters are chemically variable due to the dynamic mixing of brackish river flows, seawater tidal flows and currents circulating, across sand banks and through channels. The dynamic flows of water influence the habitats

for prey species (sandeels, herring, sprats) whose populations may also be subject to considerable fluctuations due to conditions across much larger areas of the North Sea.

- 5.6 The seabed and waters of the site provide an important habitat over the wintering season for Red-throated Diver that feed on its fish populations. The Outer Thames Estuary SPA and surrounding waters provide both a seasonal residence and a stopover on longer migrations to and from its summer base in the north of Scotland and the Arctic to journeys south to other European over-wintering locations, including waters close to Belgium and the Netherlands. Red-throated Divers arrive at their wintering grounds in and around the SPA during late September and into October and there is strong evidence that the birds are mobile within their wintering areas in response to weather conditions and food supply (Lack, 1986). Some birds will be sustained and fattened in the Estuary through the winter months in preparation for the spring migrations northwards, whilst others may choose to travel on elsewhere.
- 5.7 Visual aerial surveys of the Greater Thames were carried out over 58 days during eight winter seasons between 1988/89 – 2006/07 to provide Red-throated Diver density estimates across the area. The SPA boundaries and citation population of 6,466 were derived on the basis of this estuary-wide density data (Webb *et al.*, 2009), with the SPA comprising areas of highest recorded Red-throated Diver densities.
- 5.8 The Outer Thames Estuary SPA population is subject to considerable spatial and temporal variation. Digital aerial photography undertaken on behalf of LAL in 2010/11 recorded a peak of 8,194 Red-throated Divers on a single day's observation in the London Array wind farm survey zone (APEM Ltd, 2011a). This was over an area of 393 km² (i.e. approximately 10% of the SPA), albeit in an area known to support high Red-throated Diver densities.
- 5.9 This apparent variance could be explained by one or a combination of factors. The changes in the survey methodology (visual aerial surveys being superseded by digital aerial photography) leading to more accurate recording, meaning that the citation population could be an underestimate; it could equally be accounted for by the significant year to year natural variability of the population. Evidence in support of this latter is evident within the dataset used to underpin the designation of the Outer Thames Estuary SPA in which the peak estimate of Red-throated Diver numbers within the entire Area of Search survey area was 10,884 in January 2003 (Webb *et al.*, 2009). Large-scale changes in the distribution of Red-throated Divers between seasons is unsurprising for a wintering species that feeds on fish, a widespread and mobile food resource. Peak numbers of Red-throated Divers in the Outer Thames Estuary SPA usually occur in late winter, although the precise timing varies between years.

Conservation Objectives

- 5.10 European Commission (EC) guidance 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 (EC, 2000). Section 4.6.3 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.”

- 5.11 Conservation Objectives outline the desired state for any European site, in terms of the interest features for which they have 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).
- 5.12 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 bases, depending on the designated feature and nature, scale and significance of the impact.
- 5.13 The following conservation objectives have been produced by the Joint Nature Conservation Council (JNCC) for Red-throated Divers in the Outer Thames Estuary SPA. This is the only European interest feature considered within the scope of this assessment.

Table 4. Conservation Objectives for Red Throated-Divers, Outer Thames Estuary SPA

<i>Conservation Objectives</i>	<p>Subject to natural change, maintain in favourable condition the internationally important populations of the regularly occurring Birds Directive Annex I species [red-throated diver] and its supporting habitats and prey species [shallow coastal waters and areas in the vicinity of sub-tidal sandbanks]. Specifically:</p> <ul style="list-style-type: none"> a) Maintain population on the site subject to natural fluctuations. There should be no permanent decline, only non-significant fluctuation around the mean to account for natural change: where the limits of natural fluctuations are not known (as currently in this case), maintain the population above 50% of that at designation; loss of 50% or more unacceptable”. b) Maintain the area of sandbanks in the site subject to natural change: No reduction in extent of sublittoral, shallow (<20m) sandbank habitat. c) Maintain the abundance and distribution of red-throated diver prey species subject to natural fluctuations
<i>Risks</i>	<p>Disturbance/displacement as a result of windfarm construction and operation and also shipping and boat movements associated with aggregate extraction and fishing. Oils, chemical spillages and discharges affecting food resources. Entanglement in static fishing nets (bycatch) is an important cause of death in UK waters.</p> <p>No significant reduction in numbers, in relation to baseline, subject to natural</p>

Target

change. The site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: Red-throated Diver *Gavia Stellata* 6,466 individuals, representing 38% of the wintering population in Great Britain (mean peak over the period 1989-2006/7).

Source: JNCC (2009 and 2011)

- 5.14 The Outer Thames Estuary SPA wintering population is identified as comprising some 6,466 individuals. The conservation objectives refer to a 50% decline in this population as being “unacceptable”. This figure reflects the high degree of natural variability and difficulty in measurement, and does not necessarily represent a tolerable impact level. Nevertheless, it is an indication that the populations can, in general, decline and recover from large fluctuations, and that populations can move geographically over time. It should be noted that, within the guidance available for undertaking Habitats Regulations Assessments, (such as EC 2000) there are no set thresholds (either numerical or percentage) at which impacts on site integrity are considered to be adverse upon designated features (either species or habitats), but are a matter for expert judgement.

Red-Throated Diver – Conservation Status, Distribution and Vulnerabilities

Conservation status

- 5.15 The Red-throated Diver is the smallest of the world’s four species of divers. Although not regarded as 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, though depleted (Natural England and JNCC, 2010). The most recent Great Britain wintering population is estimated to number some 17,000 individuals (O’ Brien *et al.*, 2008).

Distribution

- 5.16 Red-throated Divers breed primarily in Arctic 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, from the Moray Firth to north, east Norfolk and Kent, with around 44% of the population within the Greater Thames Estuary area. The boundaries of the Outer Thames Estuary SPA have been drawn to contain some 38% of the wintering Great Britain population, with the second highest GB concentration being in Liverpool Bay (5.4%), based on the most recent population mean peaks (Natural England and JNCC, 2010).
- 5.17 On migration, large flocks of 200-1,200 individuals may form, with similar concentrations occurring on rich marine fishing grounds during the winter (del Hoyo *et al.* 1992). However, the species is most commonly observed singly, in pairs or in small scattered flocks during this season (Snow and Perrins, 1998).

Vulnerabilities

- 5.18 Red-throated Divers are long-lived birds with a high annual survival rate and a relatively low annual reproduction rate.
- 5.19 Its fish diet makes it vulnerable to persistent organic pollutants and heavy metals, both of which bio-accumulate, causing problems for long-lived species, such as divers, that can live up to 20 years. Impacts on the prey species as a result of sediment dredging and dumping activities can also be detrimental.
- 5.20 Red-throated Divers moult their feathers during September and October and become flightless for a short period and are vulnerable to oil pollution at this time. The species is highly vulnerable to coastal oil spills, especially in areas where large concentrations form (e.g. on rich fishing grounds) (del Hoyo *et al.* 1992).
- 5.21 They spend much of their time on the surface of the sea and beneath it, diving for prey, rather than in the air. As a consequence, the species suffers mortality at sea and on large lakes due to entanglement and drowning in inshore fishing nets (del Hoyo *et al.*, 1992). Entanglement in static fishing gear is reported to be one of the main causes of death in north west European and British waters (Okill, 2002, Erdmann *et al.*, 2005)
- 5.22 They are an extremely shy species, with acute vision and are especially sensitive to disturbance, for example by boat, turbine and aircraft movement. In a review of sensitivity of 26 species of seabird to the development of offshore wind farms, they had the second highest sensitivity score (Garthe and Huppopp, 2004). This was due to their low manoeuvrability, high sensitivity to disturbance by ships, low flexibility in habitat use, low population size and high conservation status. Red-throated Divers in the Outer Thames Estuary are also exposed to a range of other disturbance and displacement effects due to commercial shipping and boat movements associated with marine aggregates extraction, dredging and fishing.
- 5.23 As regards collisions, the birds typically make short low flights that are mostly below turbine height and are thus not highly susceptible to collisions with wind turbines. Recent guidance issued by the British Trust for Ornithology (BTO), on behalf of the Crown Estate, indicates that approximately 2% of flights by Red-throated Divers are likely to be at a height which places them at risk of collision with turbine blades (Aonghais *et. al.*, 2012). This was taken from a sample of 9,715 Red-throated Divers that were recorded during 22 studies of 18 offshore wind farm sites. As a comparison, the mean proportion of birds predicted to fly at the generic collision risk height window of 20 to 150 m above sea-level varied from 0.03% for the Little Auk to 33.1% for the Great Black-backed Gull. The fact that Red-throated Divers have been shown to actively avoid wind farms also places them at low risk of collision.

Evidence from other wind farm sites

- 5.24 Studies in German waters show that Red-throated Divers strongly avoid offshore wind farms (Diersche and Garthe, 2006). At the Horns Rev Offshore Wind Farm in Denmark, visual observations showed that none of the individual 84 Red-throated Divers recorded crossed transect lines into the wind farm. Two single divers tracked by radar, passed at a distance of 900m or made a U-turn 1 km before the wind farm. Several Red-throated Divers were, however, observed foraging at distances of 100-800m from the nearest turbine (Christiensen and Hounisen, 2004a; Christiensen *et al*, 2004b). Avoidance of wind farms post-construction has been suggested elsewhere e.g. Drewitt and Langston, 2006.
- 5.25 More recent analysis of the pre-construction and post-construction period (seven years to 2007 and during the 2008/09 and 2009/10 winter period) from Kentish Flats Wind Farm indicates a significant change in Red-throated Diver numbers within the array and buffer zone during the operational phase. This apparent decline occurred at a time when the wider population and control area (as determined by aerial surveys) appeared to have been relatively stable (Percival, 2009 and 2010). A statistically significant decrease in Red-throated Diver numbers within Kentish Flats and the immediate surrounds was observed, in addition to a shift in distribution away from the wind turbines, most markedly within a 500m radius of the array (Percival, 2009, 2010). The control zone numbers fluctuated prior to and immediately following construction, before showing a gradual rise.
- 5.26 Patterns of aerial data support this pattern, but do not cover the same extent of time. A review of historic data on offshore wind farms in the Outer Thames area between 2001-2010 indicates that the observed distributional shift away from wind farms is at odds with abundance data, which suggests that there is little change in numbers within the wind farm area, plus buffer once construction is complete (APEM Ltd, 2011b). The authors suggest that, although wind farm construction appears to have resulted in avoidance of the wind farm area, widespread displacement leading to significant decreases in the Red-throated Diver population at the local level does not seem to have occurred. One possible explanation that is given for this is that, following wind farm construction, birds become more "clumped", i.e. numbers are statistically similar to pre-construction levels, but are distributed across a different area. The report also illustrates that data collected by traditional visual aerial survey methods can be calibrated against more recent high resolution digital imagery data.

Habitat requirements

- 5.27 Red-throated Divers have specific habitat requirements. In the UK, they are associated with shallow ((between 0-20m deep) less frequently in depths of around 30m)) inshore waters, often occurring within sandy bays, firths and sea lochs, although open coastline is also frequently used (Skov *et al*.1995; Stone *et al.*, 1995). There is evidence of association with areas of salinity change and the boundary zone between open water and estuaries (Skov and Prins, 2001). Such areas tend to fluctuate with the state of the tide, volume of river flow and wind conditions.

5.28 Like all members of its family, the Red-throated Diver is primarily a fish-eater, though it sometimes feeds on molluscs, crustaceans, frogs, aquatic invertebrates, insects, fish spawn or even plant material. It seizes rather than spears its prey, which is generally captured underwater. Though it normally dives and swims using only its feet for propulsion, it may use its wings, if it needs to turn or accelerate quickly.

6 ASSESSMENT OF EFFECTS - PROJECT ALONE

Scope of assessment

- 6.1 The Secretary of State considers that KF wind farm extension, when considered alone, may have a likely significant effect on wintering Red-throated Diver because:
- a) The appearance and movement of wind turbines and vessels may **disturb and displace** the birds, resulting in an effective loss of habitat for foraging (all phases of the project);
 - b) Some uncertainty has been expressed around possible **collisions** with rotating turbine blades (operational phase only);
 - c) There may be effects on the bird's **food supply** (all phases of the project);
 - d) Bird flight lines could be affected (i.e. **barrier effect**), leading to an increased energetic expenditure for flights between roosting and foraging areas (all phases of the project); and
 - e) There will be some extremely minor direct **habitat loss** (construction and decommissioning phases).
- 6.2 These potential effects are highlighted in Matrix 1 and Matrix 10 of the RIES in **Annex A** and are described, quantified where possible, and assessed in turn below. Conclusions of the project alone assessment are presented at the end of this section in paragraphs 6.25 - 6.32.

Disturbance and Displacement

- 6.3 As highlighted in paragraphs 5.22 - 5.25, Red-throated Diver are known to be vulnerable to disturbance and displacement effects from offshore wind farms. Surveys conducted by the applicant recorded a peak count of 174 birds in the project "impact" area (i.e. the site plus a 2 km displacement zone around it). This number represents around 2.7% of the SPA citation population of 6,466 birds (Vattenfall HRA Report paras 5.3.1-3, Table 5, paragraph 5.3.8).

Assessment Methodology

Baseline population

- 6.4 Natural England advise that the JNCC dataset for the Outer Thames Estuary SPA (from Webb *et. al.*, 2009) is most appropriate to use to inform the assessment of the density of Red-throated Diver within the KF wind farm extension area compared to the rest of the SPA. This approach has been taken to ensure a common dataset to assess displacement levels for relevant wind farms in the SPA. It has been agreed in the Statement of Common Ground (SoCG, 2012) that this "JNCC dataset" provides the most comprehensive baseline data set available to the applicant for the whole SPA at that time.
- 6.5 A consequence of using this dataset is that extrapolation of the density data across the SPA gives a population figure of 6,250 birds (216 birds less than the citation number) due to a

conservative estimate of populations in the 1km x 1km blocks that lie only partially within the SPA boundary. However, it has been agreed that the difference between the two figures is not material for the purposes of this assessment (SoCG, 2012).

Choice of Displacement Model

- 6.6 Displacement models estimate the area over which displacement may occur and the magnitude of this. From this, it is possible to calculate the “interaction” value i.e. the number of divers displaced as a proportion of the overall SPA population (6,250 or 6,466). Three possible displacement models have been considered and these are described below:
1. **Model 1 - 1 km buffer model** - this is the same disturbance model as used for the London Array Appropriate Assessment (RPS 2006, DTI 2006). It assumes complete displacement of Red-throated Divers from within the wind turbine array and 50% displacement from a 1 km buffer around it. It was based on evidence available at that time (2005).
 2. **Model 2 - 2 km buffer proportionate model** - this uses the results from the Kentish Flats post-construction monitoring programme (Percival 2009, 2010, updated to include data from 2010-11), based on the observed proportionate changes in Red-throated Diver distribution across the survey area. It gives an 81% displacement within the wind farm site, 53% within a buffer of up to 500m from turbines; and 29% from 500m-1 km, but no displacement beyond that distance.
 3. **Model 3 - 2km buffer density model** - this model also uses the results from the Kentish Flats post-construction monitoring programme (Percival 2009, 2010a, updated to include data from 2010-11), but is based on the observed changes in Red-throated Diver densities across the survey area. It gives: a 94% displacement within the wind farm site; 83% within a buffer of up to 500m from turbines; 77% from 500m - 1 km; and 59% from 1km- 2km.
- 6.7 There are differences of opinion as regards the most appropriate model to use. Model 1 is not preferred by any party, as more recent and relevant data has been collected by post-construction studies since 2005. The applicant considers that Model 2 is most appropriate, because it takes into account the fact that the Red-throated Diver populations have been found to be variable between years around the Kentish Flats survey area, and standardises the results to take that into account. Natural England advise that using Model 3 provides the most appropriate precautionary approach, because it uses the raw numerical displacement observed at Kentish Flats.
- 6.8 Natural England and the applicant agree that, given the extent of the predicted impact of the KF wind farm extension relative to that of other sites, the choice of model does not significantly affect the outcome of the impact assessment for (SoCG, 2012).
- 6.9 The Examining Authority has considered the strengths and weaknesses of these models in light of written evidence submitted and oral evidence provided at the hearings and it considers that

Model 3 - the 2km buffer density model, is most appropriate to use, due to its scope, foundation on JNCC survey evidence and systematic methodology. It considers that Model 3 is likely to be the most robust and notes that, whilst the choice of model makes only a marginal difference to the assessment of the effects of the KF wind farm extension alone, it makes a much larger difference to the prediction of in-combination effects.

Displacement Calculation – using Model 3

- 6.10 Mean Red-throated Diver densities have been extracted from the JNCC data set for the Kentish Flats wind farm footprint, the KF wind farm extension and each of the 500m, 1 km and 2km buffer zones around it. The Red-throated Diver densities have then been multiplied by the area of the relevant wind farm or buffer zone to give an estimate of Red-throated Diver numbers in each zone. The predicted level of displacement in each zone has been calculated according to the observed levels given in Model 3, i.e. 94%, 83%, 77% and 59% in each zone respectively.
- 6.11 As the buffer zones around the project overlap with those around the existing Kentish Flats wind farm, the displacement effect for the extension alone was calculated by subtracting the number of birds displaced by the existing Kentish Flats wind farm (72) from the combined footprint of the existing wind farm, plus the proposed extension project (105).
- 6.12 This gives an estimate of **33** birds that are likely to be displaced as a result of the proposed project. These calculations are shown in **Table 5**.

Table 5 - Calculation of Red-throated Diver displacement from the project alone

Kentish Flats		Zone				Total
		wind farm	0-500m	500m-1km	1-2km	
Area/km2	A	9.9	7.5	9.1	22.8	
Mean density of diver birds/km2	B	2.09	1.94	2.1	1.94	
no. divers in zone	C=A*B	21	15	19	44	99
Displacement factor	D	94%	83%	77%	59%	
no. divers displaced	E=C*D	19	12	15	26	72
Kentish Flats + Extension		wind farm	0-500m	500m-1km	1-2km	total
Area	F	18.2	9.9	11.5	27.7	
Mean density of divers	G	2.1	2.11	2.15	2.03	
no. divers in zone	H=F*G	38	21	25	56	140
Displacement factor	I	94%	83%	77%	59%	
no. divers displaced	J=H*I	36	17	19	33	105
Kentish Flats Extension						
no. divers displaced	K=J-E					33

- 6.13 Using Model 3 and the JNCC dataset, the estimated Red-throated Diver displacement as a result of the project equates to around 0.5% of the Outer Thames Estuary SPA population (i.e. 33/6,250). This would result in a theoretical average increase in density of birds across the SPA of 1.7%, although it is acknowledged that in practice birds would not redistribute uniformly.

- 6.14 The applicant considers that this displacement effect is estimated “on precautionary assumptions” and would be “so small as to be negligible.” They state that the statistical assumptions inserted into the JNCC dataset for the Kentish Flats area overestimate the effects of the project.
- 6.15 Under examination, Natural England highlighted that there would still be a small effect and, as such, this needs to be taken into account in an in-combination assessment.

Fate of displaced birds

- 6.16 At the issue-specific hearing into habitats aspects, Natural England suggested that if patterns of enhanced mortality typical of displaced oystercatcher were replicated for Red-throated Diver, then a 30-60% increase in mortality could be anticipated for displaced Red-throated Divers. This is far less than the precautionary 100% mortality assumed in the applicant’s ES and HRA and would mean a potential additional mortality of 10-20 birds a year as a result of the project alone

Effective loss of habitat

- 6.17 The applicant has presented an analysis of Red-throated Diver habitat preferences in the vicinity of the KF wind farm extension to correlate Red-throated Diver distribution with a range of environmental variables (Appendix 9.2 of the ES). The analysis found that water depth; proximity to major shipping lanes; proximity to the coast; biotope and seabed sediment type all affected Red-throated Diver distribution. The main findings are as follows and are in accord with accepted Red-throated Diver habitat requirements as summarised in paragraph 5.27.
- a) Water depth – almost all of the survey area is within the birds’ preferred depth of < 20m.
 - b) Shipping lanes – Red-throated Divers showed an avoidance of the main shipping lane that is located on the northern edge of the Kentish Flats survey area.
 - c) Proximity to the coast – Red-throated Divers showed relatively high use of areas further from the coast, with a reduced use of the zone within 6 km from the coast.
 - d) Seabed sediment type – Red-throated Divers showed a strong preference for sand substrate, with a preference for fine sand.
 - e) Wind farm – the Red-throated Divers have shown a strong avoidance of the existing Kentish Flats wind farm, with reduced numbers within 500m.

A further analysis was then undertaken to investigate the relative importance of the potential “impact zone” around the KF wind farm extension and the likely ecological consequences of the effective loss of habitat due to displacement. This estimates that the potential impact zone (i.e. the site plus a 2 km buffer) constitutes 1.5% of the SPA and the Red-throated Diver’s preferred habitat of fine sand represents 1.1% of that in the SPA.

Collision Risk

- 6.18 Divers typically make short low flights that are below turbine height and also tend to avoid offshore wind farms – see paragraph 5.23. They are thus not highly susceptible to collisions with turbines. However, Red-throated Diver were recorded by the applicant within the “wind

turbine envelope" (i.e. the wind turbine footprint plus a 200m buffer) and were considered to be at risk of collision. Natural England advise that collision risk be included in the AA "because of uncertainty" and the Examining Authority agrees with this.

- 6.19 The applicant has modelled diver flight activity within a "collision risk zone." Based on survey data, the model input assumed 66 rotor passes/year, leading to an estimated 0.1 collisions per year. This is equivalent to a 0.01% increase over the existing SPA population baseline mortality. These calculations are in line with SNH Guidance (Band *et al.*, 2007) and assume an avoidance rate of 98% as advised by Natural England [Appendix 9.1 of the ES].
- 6.20 The collision risk assessment has been accepted by all parties and that there is a "*high level of consensus that the potential level of risk is unlikely to create effects that could lead to high mortality rates.*" The Examining Authority advises that the methodology used in the collision modelling and calculations is robust and the conclusions reached are reasonable.

Food Supply

- 6.21 Effects on Red-throated Diver food supply could occur if the project were to result in any adverse effects on fish populations during the construction or operation of the wind farm. Fish surveys carried out at Kentish Flats during the operational phase (for FEPA licence monitoring) have not indicated any adverse effects on fish populations as a result of the wind farm. The applicant's benthic and seabed monitoring confirms no significant change to benthic habitats within the existing project area and surrounds (apart from small areas of scour around structures).

Barrier Effects

- 6.22 Operational wind farms can cause disruption to important bird flight lines (barrier effects). Birds may see wind farms and divert around them. This can make certain feeding areas less attractive and also result in increased energy consumption by the bird as they commute between feeding and roosting areas.
- 6.23 Natural England has stated that the Outer Thames Estuary SPA is not on a migratory route and it does not see barrier effects from the project as giving rise to any adverse effect on the integrity of the site, based on evidence from previous projects/assessments. The distance needed to divert around the wind farm would be small, given the size of the project, and only a small number of Red-throated Divers would be affected.

Direct Habitat Loss

- 6.24 The application area, including the cable corridor, covers 0.4% of the Outer Thames Estuary SPA. Of that area, the worst case infrastructure footprint (i.e. area covered by the turbines) is 0.06%, which represents less than 0.003% of the SPA. The Examining Authority has considered the direct loss of habitat due to the presence of infrastructure, such as the turbine foundations and associated local scouring effects. It notes that it is common ground between the applicant and Natural England that the worst case scenario of total loss of habitat from

constructing turbine foundation would result in a negligible impact on habitat. Natural England advise that they consider that effects associated with the cable installation have been addressed satisfactorily and they have no concerns relating to direct habitat loss.

Conclusions – project alone

- 6.25 The Secretary of State considers that the KFE wind farm extension on its own will not have an adverse effect on the integrity of the Outer Thames Estuary SPA and this is the only European site where a likely significant effect was predicted. He has considered the evidence and representations put forward by the applicant, Natural England and other parties during the examination, as well as the conservation objectives of the site. This conclusion is supported by the Examining Authority, Natural England and the applicant.
- 6.26 He has considered possible pathways for impacts and the potential impacts of offshore wind farms on ornithology as set out in the National Policy Statement for Renewable Energy Infrastructure (EN-3, para 2.6.100) and in the scientific literature (e.g. de Lucas *et al.*, 2007). He has assessed potential impacts on Red-throated Diver as a result of the project due to: disturbance and displacement effects; collision risk with turbine blades; impacts on the birds' food supply; barrier effects; and direct habitat loss.
- 6.27 The Secretary of State agrees with the Examining Authority that Model 3, the 2 km buffer density model, is appropriate to predict Red-throated Diver displacement effects in this instance. He considers that the "JNCC dataset," on which the SPA classification was based, is sufficiently robust to inform displacement calculations and that these calculations are technically sound and precautionary.
- 6.28 He is satisfied that the 33 birds (0.5% of the SPA population) estimated to be displaced will not result in adverse effects on the integrity of Outer Thames Estuary SPA as result of effective habitat loss. These effects are acknowledged to be very small, especially when placed in the context of the recorded spatial and temporal fluctuations of the wintering SPA population of 6,466 individuals.
- 6.29 The Secretary of State accepts that a slight increase in density of birds in the SPA will lead to increased competition for food and other resources and that density development mortality effects could result which may be of the order of 10-20 birds.
- 6.30 The Secretary of State recognises that there are some uncertainties in interpretation of the available evidence and a lack of detailed understanding of how the carrying capacity of the SPA for Red-throated Diver may be influenced by a wide range of interacting factors, such as weather, tidal and current conditions together with availability of and access to prey species around the sandbanks and in shallower water.
- 6.31 The Secretary of State considers that displacement effects have been modelled using the best available data, but acknowledges that the dataset is small, especially when considered against the known large spatial and temporal variations in distribution of the wintering population.

6.32 In ruling out other impacts, as described in paragraphs 6.17-6.24, the Secretary of State has taken into account the small size of the proposed project; that it is not on a migratory route; the relative importance of the habitat in and around the KF wind farm extension site; and the low susceptibility of Red-throated Divers to collisions with wind turbines. He is mindful of the relatively small size and extent of the proposed extension - up to 17 turbines over an area of approximately 780 ha, as compared to the Outer Thames Estuary SPA area of 379,268 ha.

7 ASSESSMENT OF EFFECTS – PROJECT IN COMBINATION

Scope

- 7.1 Studies at and around the existing Kentish Flats wind farm and at other sites have indicated that the most likely in-combination effect on Red-throated Diver would be through disturbance, displacing them from within wind turbine arrays and a zone around them.
- 7.2 Natural England is of the opinion that "... *the only likely significant effect upon the coherence of the ecological structure and function of the Outer Thames Estuary SPA across its whole area is the cumulative displacement impact on Red-throated Diver that could arise from the Kentish Flats Extension in combination with other existing, consented and proposed wind farms that may also influence the birds within the SPA*".
- 7.3 The Secretary of State accepts this advice and for this reason, this section focuses largely on displacement with other wind farms, with some consideration given to collision risk as it is recommended to be taken forward for assessment by Natural England and the Examining Authority.
- 7.4 In-combination effects as a result of Red-throated Diver displacement by other wind farms; impacts on their food supply; barrier effects to flight; and direct habitat loss are summarised in Matrix 10 of the RIES. The Secretary of State accepts the Examining Authority's conclusion that these potential in-combination effects will not have an adverse effect on the integrity of the site and these matters are not assessed any further here.
- 7.5 In-combination effects with marine aggregate extraction and dredging are considered briefly in paragraphs 7.29 - 7.31.

Wind farms to be considered in-combination

- 7.6 There are six existing wind farms in the Greater Thames Estuary area that are either operational or under construction – see paragraphs 4.12 - 4.20. A seventh, LA2 (370MW) has been consented, subject to a Grampian condition and an eighth (Gallopier) is in the planning system. DECC expects to receive recommendations from the Examining Authority on the proposed Gallopier offshore wind farm no later than 1 March 2013. An application for East Anglia One offshore wind farm was accepted by the Planning Inspectorate on 14 December 2012.
- 7.7 Five of the nine wind farms lie within the boundaries of the Outer Thames Estuary SPA and the remaining four are located outside the SPA, but in areas that are functionally connected to it. **Table 6** shows the status and dimensions of each of those wind farms and whether they are located inside or outside of the SPA boundaries. London Array Phase 2 is shown as both the remaining consented capacity of up to 370 MW (LA2 (370MW)) and the current application that is with DECC (LA2 (240 MW)) as set out in paragraph 1.17.
- 7.8 At the time of writing, no decision has been taken on LA2 (240 MW) pending the outcome of an AA for that proposal. For the purposes of this assessment, the full LA2 (370MW) is

considered, as this is the consented capacity. However, the Secretary of State acknowledges that the reduced project would have a lesser impact if it were to go ahead. Calculations for both LA2(240MW) and LA2 (370MW) are presented in this report.

Table 6 - Wind farms the Greater Thames Estuary Area

Wind Farm	Area/ km ²	No. turbines	Capacity / MW	Status	Location with respect to OTE SPA boundaries	Developer	Screening decision – See Section 4
1. Thanet	34.8	100*3 MW	300	Operational	9 km from boundary	Vattenfall	OUT
2. Kentish Flats I	9.9	30*3 MW	90	Operational	In SPA	Vattenfall	OUT
3. Gunfleet Sands I	12.7	30*3.6MW	108	Operational	In SPA	DONG Energy	IN
4. Gunfleet Sands II		18*3.6MW	64.8	Operational	In SPA	DONG Energy	IN
5. Gunfleet Sands III – <i>demo project</i>	1	2*6MW	12	Under construction	In SPA	DONG Energy	IN – but no data / negligible impact
6. Greater Gabbard	145.7	140*3.6MW	504	Operational	8 km from boundary	SSE and RWE	OUT
7. London Array 1	122	175*3.6MW	630	Under construction	In SPA	DONG, E.on and Masdar	IN
8. London Array - LA2(370 MW)	103.7	Up to 166*3.6MW	Up to 370	Consented, subject to Grampian	In SPA	DONG, E.on and Masdar	IN
a) London Array – LA2(240 MW)	41.8	up to 65*3.6MW	Up to 240	Application with DECC	As above	As above	N/A
9. Galloper	173.9		Up to 504	In planning	Outside SPA	SSE and RWE	OUT
10. East Anglia ONE	300	Up to 325	Up to 1,200	Application accepted	Array outside SPA, but export cable passes through	Vattenfall and Scottish Power Renewables	OUT

- 7.9 Thanet, Greater Gabbard and its proposed extension, Galloper and East Anglia One are located outside of the boundaries of the SPA and have been screened out of this AA for reasons set out in Section 4, although there will be some displacement effects on SPA birds. The Examining Authority considered that wind farms known to him at that time, outside the SPA boundary were not likely to contribute to any adverse effect on the Outer Thames Estuary SPA, given the relatively low density of birds in those areas, although it is recognised that they are in an area that is regarded as being functionally connected to the SPA. The applicant has estimated some 132 Red-throated Divers could be displaced as a result of those wind farms combined.
- 7.10 The Examining Authority makes no reference to East Anglia One, as this application had not been accepted by the Planning Inspectorate before the close of the KF wind farm extension examination period – see paragraphs 1.19-1.20. It seems reasonable to apply the same logic, taking into account the information supplied in the East Anglia One HRA and to screen out East Anglia One, with the exception of the proposed export cable route which would pass through the SPA. The HRA for East Anglia One estimates Red-throated Diver displacement for that project as an additional 105 birds during the wintering season (APEM, 2012).

In combination displacement effects with existing wind farms

- 7.11 The displacement effects for the KF wind farm extension with existing relevant wind farms in the SPA have been calculated using the same 2 km buffer density model as outlined in **Section 6**. These are Gunfleet Sands I and II and London Array Phase 1. Gunfleet Sands has been excluded for the reasons set out in paragraph 4.30. The results are summarised in **Table 7**

Table 7. Displacement impact with existing wind farms

Wind farm	Area of wind farm/ km ²	Number divers displaced	% SPA pop'n
KF wind farm extension	8.3	33	0.5%
Gunfleet Sands I & II	12.7	61	1.0%
London Array 1	122	486	7.8% ³
TOTAL	143	580	9.3%

- 7.12 The in-combination displacement effect of the KF wind farm extension with existing relevant wind farms located within the SPA is estimated to be some **9.3%** of the SPA population or 580 Red-throated Divers. Phase 1 of the existing London Array development can be seen to be the key site for consideration in the in-combination assessment contributing 7.8%, with a lesser contribution from Gunfleet Sands I and II (1.0%)

³Updated number (from 9.2%) as supplied by LAL and reported in paragraph 3.18 of the applicant's HRA addendum report. These lower actual displacement figures have been accepted by NE for use in the in-combination assessment

In combination displacement effects with existing wind farms PLUS LA 2 (370 MW)

- 7.13 **Table 8** shows the effect of building out the entire London Array site its maximum remaining capacity of 370 MW. In this event, Phase 2 (LA2 370 MW) would result in a displacement of 13.5% using the same methodology and data.

Table 8. Displacement impact with existing wind farms PLUS LA2 (370 MW)

Wind farm	Area of wind farm/ km ²	Number divers displaced	% SPA pop'n
Kentish Flats Extension	8.3	33	0.5%
Gunfleet Sands I & II	12.7	61	1.0%
London Array 1	122	486	7.8%
LA2 (370 MW)	103.7	843	13.5%
TOTAL	246.7	1,423	22.8%

- 7.14 The resulting current and potential future displacement level could be 22.8% of the SPA population (9.3%+13.5%) or 1,423 Red-throated Divers, using the same methodology.
- 7.15 The Examining Authority is of the view that further development at the London Array site should be regarded as a "planned project" and included within the in-combination assessment. It concludes that the agreed HRA evidence anticipates significant in-combination adverse disturbance effects upon the over wintering Red-throated Diver population and upon distribution of Red-throated Divers within the SPA, if London Array were built out to its maximum 1 GW consented capacity i.e. LA1+LA2 (370 MW). Under these circumstances, it is of the view that an adverse effect on integrity cannot be ruled out.

London Array Phase 2 (LA2 (240 MW)) and the RIAA

- 7.16 As outlined in paragraph 1.17, the Secretary of State has since received an application for a reduced London Array Phase 2 (LA2 (240 MW)) and this is currently subject to an AA to inform the Secretary of State's decision on whether to allow this application to proceed. The LAL application was accompanied by a Report to Inform an Appropriate Assessment (RIAA), a Statement of Common Ground from Natural England and a Statement of Concerns submitted by the Royal Society for the Protection of Birds (RSPB).

RIAA Diver displacement calculations

- 7.17 The London Array RIAA provides an updated assessment of the numbers of Red-throated Divers predicted to be displaced by LA1 and LA2 (240 MW) alone and in combination with other plans and projects. The RIAA is based on a different reference population for Red-throated Divers, as derived from LAL's habitat suitability modelling (5,992 birds) and also uses two different displacement models. So, unsurprisingly, there are some differences in the RIAA assessment results compared to the applicant's. However, as a soundness check, it is helpful to compare the displacement results obtained from the different datasets and models to identify similarities and differences.

- 7.18 It is of note that the RIAA predicts a similar in-combination displacement effect for the KF wind farm extension with existing wind farms. The RIAA calculations predict displacement levels for existing SPA wind farms, plus the KF wind farm extension, of between 6.7% and 11.7%, depending on the model used. This is comparable to the applicant's calculation of 9.3%.
- 7.19 The most pronounced difference between the two assessments is the displacement levels for London Array Phase 2. The RIAA calculations are based on the reduced and current LA2 (240 MW) application. For this, it predicts an alone displacement of 4.5%-7%, leading to an in combination displacement of between 11.2% and 18.7%. This compares to the applicant's LA2 (370 MW) displacement figure of 13.5% (alone) and 22.8% (in combination). LAL's RIAA and the applicant's calculations are shown below in **Table 9** to give a broad brush comparison. This table should be treated with some caution, given the different baseline data and models used.

Table 9 - % SPA population displaced using different models and data

Wind farm	applicant	LAL's conservative model ⁴	LAL's preferred model ⁵
KF Extension	0.5%	2.10% combined	0.7% Combined
Kentish Flats ⁶	(1.2%)		
Gunfleet Sands I & II	1.0%		
London Array 1	7.8%	9.6%	6.0%
Impact of KFE + existing	9.3%	11.7%	6.7%
LA2 (370 MW) Grampian	13.5%	-	-
LA2 (240MW) application	-	7.0%	4.5%
TOTAL ALL	22.8%	18.7%	11.2%

- 7.20 In its response to DECC's consultation on the RIAA, Natural England indicate that it is appropriate for LAL's displacement calculation for LA 2 (240 MW) to be considered here (i.e. 4.5% - 7.0%). Natural England does, however, have a number of concerns with the robustness of LAL's preferred model (the EIA Scenario) and also the magnitude of the in-combination displacement, given that this is in excess of previously accepted levels for Red-throated Divers in the Outer Thames Estuary SPA.

Fate of displaced Red-throated Divers

- 7.21 The RIAA presents quantitative modelling undertaken by LAL with regard to the fate of displaced divers using a potential biological removal (PBR) model based on a 15-year study of oystercatchers over wintering in the Exe Estuary after Durell *et al.* (2000), Durell *et al.* (2001) and Goss-Custard & Durell (1984). This presents scenarios for additional density dependent mortality, assuming that displaced birds will distribute to alternative habitats within the SPA.

⁴ Termed "Kentish Flats displacement scenario" in the RIAA

⁵ Termed "EIA displacement scenario" in the RIAA

⁶ The applicant includes a displacement figure for Kentish Flats agreed with Natural England, but following advice from the Examining Authority, it has been excluded here – see paragraph 4.17

The RIAA report also presents evidence that the wintering SPA Red-throated Divers are part of a wider biogeographic North Sea population.

- 7.22 Reference is also made to the inherent data bias that boat-based surveys, such as those conducted at Kentish Flats, introduce and the need to correct for non-uniform detectability. Red-throated Divers are notoriously shy birds and could be “flushed” away from the survey vessels, potentially leading to double counting.

Responses to the DECC consultation on the LAL documents

- 7.23 A consultation process was undertaken by DECC on the RIAA and LAL documents after the conclusion of the examination. This is described in paragraphs 1.17 and 1.18. Substantive written responses were received from: the applicant; Natural England; Kent Wildlife Trust; and LAL and can be accessed at <http://infrastructure.planningportal.gov.uk/projects/south-east/kentish-flats-extension/?ipcsection=decc>

- 7.24 These can be summarised as follows:

The applicant – maps in the RIAA show that Kentish Flats and the proposed KFE wind farm extension lie within an area of lower habitat suitability for Red-throated Divers.

- There is broad similarity between the interaction values calculated by the applicant and contained in the RIAA.
- The proposed KF wind farm extension, Kentish Flats and Gunfleet Sands wind farms make very small contributions to the overall in-combination impact.
- The applicant’s 2km buffer proportionate model is the most appropriate and LAL’s criticism of the KF boat survey data is incorrect.
- Agree with the RIAA’s conclusion that it is unlikely that the SPA is at a critical carrying capacity.

Natural England - the new information does not change NE’s conclusions on the likelihood of adverse in-combination effects.

- It is appropriate to consider the smaller LA2 (240 MW) project, rather than the LA2 (370MW) project assessed by the applicant for assessment of in-combination effects.
- It is unlikely that 100% of displaced birds will die, even given strong density-dependent relationships, however, whether or not displaced birds survive outside the SPA is not the relevant test.
- Any “flaws” in the Kentish Flats boat-based survey methodology would be consistent throughout the period of the survey and would not provide an explanation for changes in observed Red-throated Diver densities over time.

Kent Wildlife Trust (KWT) – report useful to clarify the level of in-combination effects.

- Concerns that the SPA cannot accommodate increased Red-throated Diver numbers within the available habitat.
- Its view that in-combination impacts are likely to affect the integrity of the SPA are unchanged.

LAL – The RIAA should be viewed in the context of the Ornithological Review Panel (ORP) if it is to be used in respect of the AA for the KF wind farm extension.

- The inclusion of the KF displacement scenario was included at the request of the ORP and LAL consider their “EIA Scenario” [termed “Model 1” in Section 6 of this report] to be the most appropriate.
- Request that comments made by interested parties are limited to the KF wind farm extension application and not LAL’s phase 2 development proposal.

7.25 Responses to the RIAA and other LAL documents demonstrate that, whilst LAL have used different data and models for calculating their in-combination displacement of existing wind farms, the results are broadly similar to the applicant’s. Unsurprisingly, the RIAA’s displacement level calculated for their reduced LA 2 (240MW) application is less than the levels calculated by the applicant for LA 2 (370MW), before the size of the current application was known.

7.26 Natural England and KWT indicate that, whilst the RIAA provides helpful new data, it does not change their views on the potential in-combination impact of the KF wind farm extension application.

In-combination collision risk

7.27 In-combination collision risk and the population consequences of additional mortality from collision have been considered by the applicant in their ES. The Examining Authority considers that the KF wind farm extension would only add a small amount to the overall cumulative collision risk (0.01%) and for the collision risk of other wind farms can also be considered to be not significant. Natural England agree that the applicant’s collision risk calculations appear to have been carried out in a standard way and are based on sufficient data.

7.28 As previously stated, Red-throated Diver sensitivity to collision is very low, given their observed behaviour of generally flying below rotor height and high level of avoidance behaviour. Assuming that the majority of birds are displaced from the wind turbine array footprint, the effect of displacement is to preclude collision.

In-combination effects with marine aggregate extraction and dredging

7.29 The effect of dredging is almost certainly more than a simple displacement effect; the benthos will be smothered and altered which may have a knock on effect on fish and consequently its value as feeding grounds for Red-throated Diver. What is important is the area affected per year and the rate at which recovery takes place. There is a considerable body of evidence on the effects of seabed disturbance from dredging, dumping and aggregates extraction, and its recovery, in the southern North Sea that demonstrates that the highly dynamic, sediment-rich

waters, together with largely opportunistic benthic species, lead to rapid re-establishment of the fauna, e.g. within months or by the following year (e.g. Newell et al, 2004 and MMS, 1999).

- 7.30 It is also possible that the current Red-throated Diver population has already adapted to such operations as, unlike wind farms, they have been undertaken over long periods historically and can be taken to be part of the baseline. Whether they cause impacts or not, the continuation of dumping and aggregates extraction at historical rates should not be expected to cause a decline in bird numbers, as these numbers exist alongside such operations. The assessment of in-combination effects, therefore, should consider whether these operations are continuing at historic rates and whether combining these effects with wind farms would somehow exacerbate the effects of either. It is expected that any such exacerbation would only occur when there was a concentration of activity in a single year, e.g. during construction of the wind farm. It is not possible to predict future pressures from dumping and extraction, but it is clear that they are increasingly subject to environmental assessment and control. The Marine Management Organisation (MMO) propose to undertake a Regional Appropriate Assessment (RAA) of licensable offshore activities in the Outer Thames Estuary during 2013, having regard to likely impacts on Red-throated Diver (McBryde, P. pers. comm. 2012). It is reasonable to conclude that this will provide a robust means to ensure that environmental impacts in combination will not worsen and the RAA will prove a mechanism for a strategic assessment of both industries and control through the marine licensing process.
- 7.31 It is concluded that the in-combination effects of the proposed KF wind farm extension with the ongoing effects of dumping and extraction will create in-combination effects that are no greater than the 'in-isolation' effects of the wind farm. As marine aggregate extraction is not expected to significantly reduce habitat availability for Red-throated Divers and dredging will be largely limited to existing channels that they are known to avoid, these are considered to not result in adverse effects on integrity of the Outer Thames Estuary SPA.

Conclusions – project in-combination

Existing wind farms

- 7.32 The Secretary of State considers that there will not be adverse effects on the integrity of the Outer Thames Estuary SPA as a result of the project in-combination with existing wind farms. A list of these and reasons for the screening certain wind farms out of this assessment is given in **Section 4**, particularly paragraphs 4.24 - 4.27. The displacement effects as a result of the project in-combination with existing relevant wind farms equates to some 580 divers or 9.3% of the SPA, with the majority of the displacement impacts attributable to other wind farms.
- 7.33 This level of displacement will not adversely affect the integrity of the Outer Thames Estuary SPA as:
- There is no set threshold at which displacement impacts can automatically be considered adverse. The Conservation Objectives for the SPA seek to protect a natural fluctuation of the order of 50% around a mean of 5,466 birds. Natural England advise that the

increased displacement resulting from the project does not represent a “tipping point” in terms of the capacity of the SPA.

- It is agreed that displacement effects are not the same as direct mortality, although it is accepted that it can lead to a density-dependent increase in mortality. This could be of the order of 30-60%.
- Published scientific literature and evidence presented at the examination indicates that Red-throated Diver numbers in the Outer Thames Estuary SPA are subject to large spatial and temporal fluctuations, consistent with a highly mobile wintering population.
- Recent digital aerial surveys of the study area appear to be consistent with localised displacement of Red-throated Divers around operational wind farms, whilst maintaining population numbers across the overall surveyed area. However, it is difficult to be certain about population trends, given the large natural fluctuation.
- There is evidence that the population is not discrete, but forms part of a wider biogeographic North Sea population, with resulting immigration and emigration.

Existing and planned wind farms

- 7.34 A further issue that the Secretary of State has considered is the possibility of further development at the consented London Array Offshore Wind Farm site. The consent granted to LAL permits the construction of a Phase 1. However, a Grampian condition on the consent restricts development beyond this point, until it can be demonstrated and, the Secretary of State is satisfied, that there will be no adverse impact on the integrity of the Outer Thames Estuary SPA. Should the Grampian condition be fully discharged at some point in future, and the London Array site built out to its maximum capacity this could, in theory, equate to a cumulative impact of up to 1,423 Red-throated Divers displaced, or 22.8% of the Outer Thames Estuary SPA population, using the data and analysis provided by the applicant and accepted by the Examining Authority (see Table 8).
- 7.35 Should the current LAL application (LAL2 (240MW)) be consented and built, this could lead to an estimated in-combination impact of 11.2% – 18.7%, based on LAL’s calculations in their RIAA (see Table 9). The Secretary of State is currently undertaking his own AA for this and will form a judgement on the acceptability of the LA2 (240MW) application when he has completed this and fully considered all of the evidence.
- 7.36 Despite these apparently large numbers of displaced birds, the Secretary of State considers that there is no risk of adverse effects on the integrity of the Outer Thames Estuary SPA as a result of the KF wind farm extension alone and in combination with other plans and projects – both present and planned. The reasons for this conclusion are set out below:
- a) An AA would be required for future development of London Array and this would be required to take into account the (albeit negligible) impacts of the KF wind farm extension (if consented).

- b) The Secretary of State is the decision maker for any further phases of development at the London Array site (LA2 (240 MW) and LA2 (370) MW)). As such, it would be unlawful for him to approve a proposal, either from LAL or any other wind farm application, where he could not rule out adverse effects on integrity of the Outer Thames Estuary SPA.
- 7.37 The Examining Authority records Natural England's position as being that *"an adverse in-combination effect on the integrity of the SPA as a result of the KF wind farm extension cannot be discounted, particularly when the effect of London Array Phase 1 and any potential future developments at that site are taken into account."*
- 7.38 The Secretary of State acknowledges that there are different modelled figures showing the extent of the likely displacement effect on Red-throated Divers as a result of offshore wind farms in the Outer Thames Estuary; that there is disagreement as to how limited information should be interpreted; and there remains uncertainty surrounding the precise fate of displaced Red-throated Divers. Nevertheless, he is satisfied that his conclusions are based on the best available evidence and that the displacement modelling is sufficiently robust and precautionary to inform this decision.
- 7.39 The Secretary of State has also considered potential in-combination impacts as a result of in-combination collision risk and interactions with marine aggregates extraction and dredging and is satisfied that they will not result in adverse effects on integrity.
- 7.40 Natural England's advice is that in combination displacement effects would lead to increases in Red-throated Diver density across the SPA. Population levels are affected by density and increases would lead to additional mortality. The Examining Authority accepts that there are reasonable scientific grounds for Natural England's views. It notes, however that the majority of the effects relate to the impact of the London Array project (Phase 1 and Phase 2) and highlights that the Secretary of State, as competent authority, has control over any future effects arising from this.

8 DECOMMISSIONING

- 8.1 The project falls within the scope of the Energy Act 2004 which includes decommissioning provisions. Broadly speaking, the Secretary of State 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 Secretary of State can approve, modify or reject a decommissioning programme.
- 8.2 Decommissioning activities will need to comply with all relevant UK legislation at the time. Such legislation currently includes The Conservation of Habitats and Species Regulations 2010 (as amended). The person(s) responsible for the wind farm will produce and agree a decommissioning programme with DECC and in consultation with the MMO, JNCC and Natural England, or their respective successors.
- 8.3 Decommissioning will take place at the end of the lifetime of each wind farm. All of the wind turbines and substations (including foundations) will be removed. There is potential for wind farms to be re-powered but any such re-powering would be the subject of a new application consent which would require fresh assessment under the Habitats Regulations.

9 CONCLUSIONS ON SITE INTEGRITY

- 9.1 Based on the environmental information submitted during the examination, the Examining Authority's report and published data from other sources, the Secretary of State is satisfied that sufficient information is available to enable him to carry out an Appropriate Assessment (AA) which sets out matters covered in Regulation 61 of the Habitats Regulations. Natural England confirm that the applicant's survey methodology and analysis is robust and that the data can be relied on to undertake this AA.

Project alone

- 9.2 The Secretary of State considers that there will be no adverse effects on the integrity of the Outer Thames Estuary SPA as a result of the project alone. This is based on an assessment of 33 Red-throated Divers being displaced by the project, representing some 0.5% of the SPA citation population of 6,466. The Examining Authority and Natural England agree with this conclusion. This can be considered to be a very small or negligible impact.
- 9.3 Studies of Red-throated Diver distribution in the Outer Thames Estuary SPA show that the habitat in the vicinity of Kentish Flats, both the existing wind farm and the extension, is not of especially high value to Red-throated Divers, due in part its proximity to the existing Kentish Flats wind farm; the suitability of its habitat; and the presence of a shipping lane to the north.

Project in combination with existing wind farms

- 9.4 The Secretary of State considers that there will not be an adverse effects on the integrity of the Outer Thames Estuary SPA as a result of the project in combination with existing wind farms in the SPA. The displacement effects as a result of the project in combination with existing relevant wind farms equates to some 580 divers or 9.3% of the SPA, with the majority of the in-combination displacement impacts occurring as a result of the other wind farms.
- 9.5 He notes that it is Natural England's position that an adverse in-combination effect on the integrity of the SPA as a result of the KF wind farm extension cannot be discounted, particularly when the effect of London Array Phase 1 and any potential future developments at that site are taken into account.
- 9.6 However, in his view, this level of displacement will not adversely affect the integrity of the SPA as:
- There is no set threshold at which displacement impacts can automatically be considered adverse. The Conservation Objectives for the SPA seek to protect a natural fluctuation of the order of 50% around a mean of 5,466 birds. Natural England advise that the increased displacement resulting from the project does not represent a "tipping point" in terms of the capacity of the site

- It is agreed that displacement effects are not the same as direct mortality, although it is accepted that it can lead to a density-dependent increase in mortality. This could be of the order of 30-60%.
- Published scientific literature and evidence presented at the examination indicates that Red-throated Diver numbers in the Outer Thames Estuary SPA are subject to large spatial and temporal fluctuations, consistent with a highly mobile wintering population.
- Recent digital aerial surveys of the study area appear to be consistent with localised displacement of Red-throated Divers around operational wind farms, whilst maintaining population numbers across the overall surveyed area. However, it is difficult to be certain about population trends, given the large natural fluctuation.
- There is evidence that the population is not discrete, but forms part of a wider biogeographic North Sea population, with resulting immigration and emigration.

Project in combination with existing and possible future wind farms

- 9.7 A further issue that the Secretary of State has considered is the possibility of further offshore wind development at the consented London Array Offshore Wind Farm site. The LAL consent granted in 2006 permits the construction of a Phase 1, which has been taken into account in the above assessment. However, a Grampian condition on the consent restricts development beyond 630MW, until it can be demonstrated and, the Secretary of State is satisfied, that there will be no adverse impact on the integrity of the Outer Thames Estuary SPA. Should the Grampian condition be fully discharged at some point in future, and the London Array site built out to its maximum capacity, this could, in theory, equate to up to 1,423 divers displaced, or 22.8% of the SPA population, using the data and analysis provided by the applicant and accepted by the Examining Authority.
- 9.8 Should the current LAL application (LAL2 (240MW)) be consented and built, this could lead to an estimated in-combination impact of 11.2% – 18.7%, based on LAL's calculations in their RIAA. NE have indicated their concerns (see para 8.8). The Secretary of State is currently undertaking his own AA for this and will form a judgement on the acceptability of the LA2 (240MW) application when he has completed this and fully considered all of the evidence.
- 9.9 Despite these apparently large numbers of displaced birds, the Secretary of State considers that there is no risk of adverse effects on the integrity of the Outer Thames Estuary SPA as a result of the project alone and in combination with other plans and projects – both present and planned. The reasons for this conclusion are set out below:
- a) An AA would be required for any further development at the London Array site and this would be required to take into account the impacts (albeit negligible) of the KF wind farm extension (if consented).
 - b) The Secretary of State is the decision maker under the LAL consent for any further phases of development at the London Array site (LA2 (240MW) and/or LA2 (370MW)).

The terms of the Grampian condition would prevent him from discharging that condition where he could not rule out adverse effects on integrity of the Outer Thames SPA.

- 9.10 The Secretary of State acknowledges that there are different modelled figures showing the extent of the likely displacement effect of Red-throated Divers as a result of offshore wind farms in the Outer Thames Estuary; that there is disagreement as to how limited information should be interpreted; and there remains uncertainty surrounding the precise fate of displaced divers. Nevertheless, he is satisfied that his conclusions are based on sound evidence and that the diver displacement modelling is sufficiently robust and precautionary to inform this decision.

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