FIVE ESTUARIES
OFFSHORE WIND FARM

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VOLUME 5, REPORT 4.2: HABITATS REGULATIONS ASSESSMENT SCREENING REPORT

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Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
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FIGURES

DEFINITION OF ACRONYMS

Term	Definition
AA	Appropriate Assessment
ADD	Acoustic Deterrent Device
AoS	Area of Search
BAP	Biodiversity Action Plan
BGS	British Geological Survey
BTO	British Trust for Ornithology
CEA	Cumulative Environmental Assessment
CMACS	Centre for Marine and Coastal Studies
CPS	Cable Protection Systems
CRM	Collision Risk Modelling
DCO	Development Consent Order
EACN	East Anglia Connection Node
EFC	Essex Field Club
EIA	Environmental Impact Assessment
EMF	Electromagnetic Frequencies
EP	Evidence Plan
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
FEPA	Food and Environment Protection Act
GBS	Gravity Based Structure
GGOWF	Greater Gabbard Offshore Wind Farm
GGOWL	Greater Gabbard Offshore Wind Limited
Galloper OWF	Galloper Wind Farm
HR	Habitats Regulations
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
IRZ	Impact Risk Zones
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MMO	Marine Management Organisation

Term	Definition
MU	Management Unit
NSIP	Nationally Significant Infrastructure Project
ECC	Export Cable Corridor
OnSS	Onshore Substation
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PINS	Planning Inspectorate
pSPA	Proposed Special Protection Area
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
RSMP	Regional Seabed Monitoring Programme
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCANS	Small Cetacean Abundance in the North Sea and Adjacent Waters
SCI	Sites of Community Importance
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SNCB	Statutory Nature Conservation Body
SPA	Special Protected Area
TCCs	Temporary Construction Compounds
TJB	Transition Joint Bay
TWT	The Wildlife Trusts
UXO	Unexploded Ordnance
VE	Five Estuaries
VE OWFL	Five Estuaries Offshore Wind Farm Limited
WTG	Wind Turbine Generator
WWT	Wildfowl and Wetland Trust

1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

1.1.1 The Five Estuaries Offshore Wind Farm (OWF, hereafter referred to as VE) is a proposed extension project to the operational Galloper OWF off the southeast coast of England (Table 2.1). VE is a Nationally Significant Infrastructure Project (NSIP) under Section 15(3) of the Planning Act 2008 (as amended) (PA 2008) and therefore consented through a Development Consent Order (DCO). The Applicant for the DCO will be Five Estuaries Offshore Wind Farm Limited (VE OWFL).

1.1.2 The first version of this Habitats Regulations Assessment (HRA) Screening Report was provided in October 2021 to inform the HRA process for VE and was the focus of a five-week public consultation between October and November 2021. It provided the information required to enable the screening of VE's potential to have a likely significant effect (LSE) on European and Ramsar sites, both alone and in-combination with other plans or projects.

1.1.3 As a result of refined project design parameters and in response to comments received from consultees during the public consultation (particularly advice from Statutory Nature Conservation Bodies (SNCBs)) during the Evidence Plan (EP) Process, this document constitutes the second version of the VE HRA Screening Report. It presents the updated screening of the potential for LSE on European and Ramsar sites, both alone and in-combination with other plans or projects.

1.1.4 Therefore, the assessments provided in this document are based on the current understanding of the baseline environment and the scope and nature of the updated project activities. This updated HRA Screening Report (hereafter referred to as 'the HRA Screening Report') is based on project information associated with VE, desk-based information from relevant projects (including Galloper Wind Farm (Galloper OWF) and Greater Gabbard Offshore Wind Farm (GGOWF)), and site-specific information currently available.

1.2 PROJECT OVERVIEW

1.2.1 VE will be situated approximately 37 km from the Suffolk coastline (at its closest point) and will consist of:

- Northern and southern array areas (collectively known as the array areas);
- An offshore Export Cable Corridor (offshore ECC) within which micrositing of the offshore export cable will take place; and
- An onshore Red Line Boundary (RLB) including the landfall, onshore Export Cable Corridor (onshore ECC) two Substation Search Areas (SSAs) (within which the final Onshore Substation (OnSS) and the Temporary Construction Compounds (TCCs) will be located. Figure 1.1 presents the components of the onshore RLB.

1.2.2 It should be noted that since the first draft of the HRA Screening Report all aspects of the development (array area, offshore ECC, onshore ECC, and landfall areas) have been updated, as presented within Figure 1.2). The key project design parameters considered within this HRA Screening Report are described below.

1.2.3 A proposed maximum of 79 Wind Turbine Generators (WTGs) will be installed within the array areas, with a minimum blade tip height above Mean High Water Spring (MHWS) of 28 m and a maximum blade tip height above MHWS of 420 m. Electricity generated will be transported to the coastline via a maximum of 200 km of inter-array cables and up to 370 km of offshore export cables, each in their own trenches within the overall offshore ECC. Where the offshore export cables make landfall, the onshore export cables will continue to transport electricity to a new OnSS which will be required for VE sited north of the A120 on the east side of Colchester, this area has been chosen to facilitate ease of connection to the National Grid Electricity Transmission (NGET) East Anglia Connection Node (EACN) substation (Figure 1.1).

1.2.4 The foundation type used for the structures required (e.g., two Offshore Substation Platforms (OSPs) and 79 WTGs) depends on the site conditions (e.g., water depth and ground conditions) and supply chain possibilities. Given the uncertainty regarding these conditions and the final project design, no particular foundation type has been determined for the structures requiring foundations. At this stage, six types of foundation are being considered:

- Monopile;
- Multi-leg pin-piled jacket;
- Mono suction caisson;
- Multi-leg suction caisson jacket;
- Monopile Gravity Based Structure (GBS); and
- Multi-leg GBS jacket.

1.2.5 Scour protection will be put in place around the foundations (where relevant), with several methods considered including rock or gravel placement, concrete mattresses, flow energy dissipation devices, protective aprons or coverings (solid structures of varying shapes, typically prefabricated in concrete or high-density plastics), cladding or pipes and bagged solutions.

1.2.6 Several cable installation methodologies are being considered for the installation of inter-array and offshore export cables, which will be buried below the seabed wherever possible. Possible installation methods include:

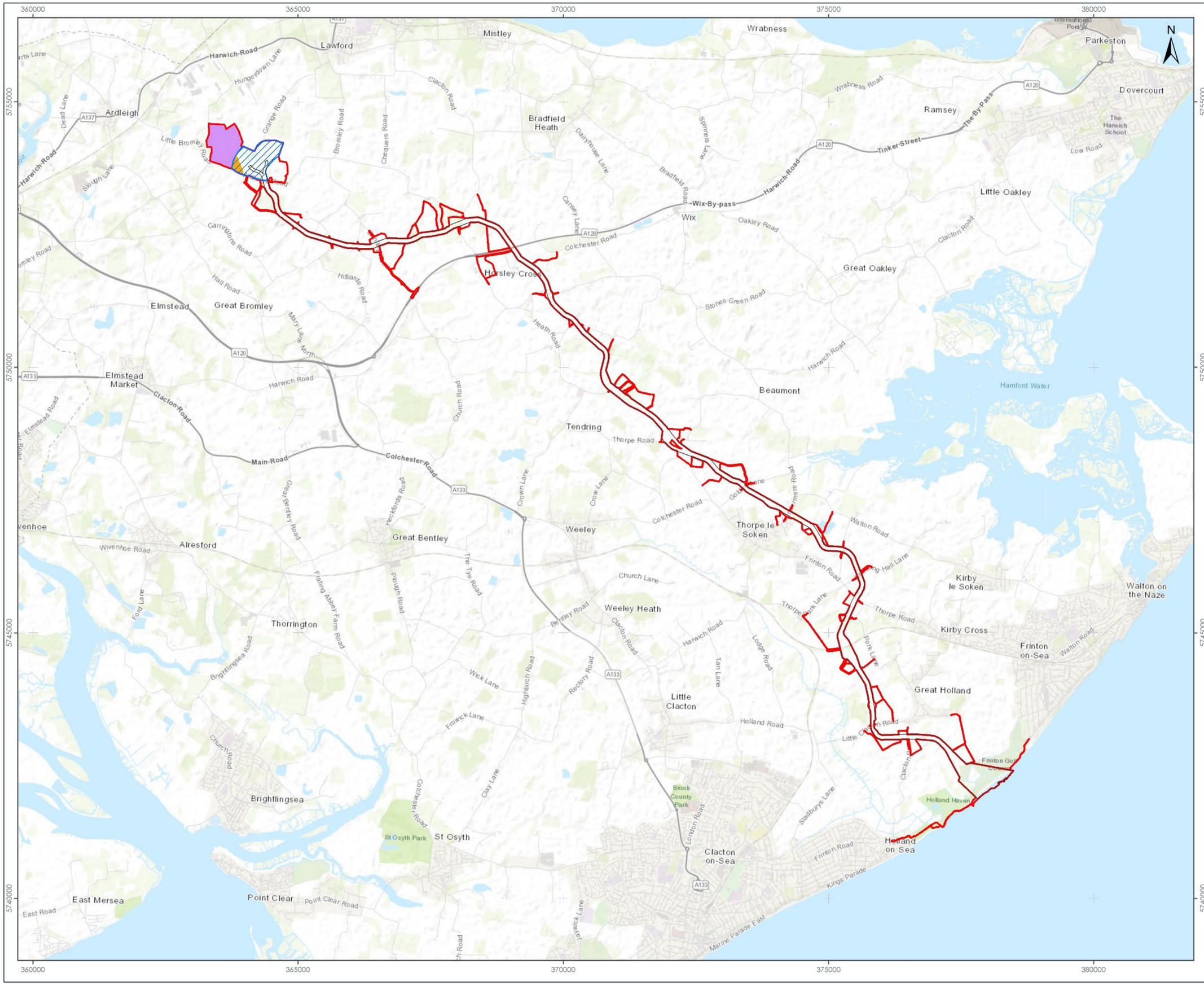
- Jet-trenching;
- Pre-cut and post-lay ploughing;
- Mechanical trenching;
- Dredging (trailing suction hopper dredger or water injection dredger);
- Mass flow excavation;
- Rock cutting; and
- Burial sledge.

1.2.7 Where it is not reasonably possible to bury cables (inter-array and export), it will be necessary to install cable protection to prevent scour and minimise the risk of damage to the cable. In this instance rock placement, concrete mattresses or other solutions such as Cable Protection Systems (CPS) or protective aprons may be used to protect cables from external damage. Cable protection may consist of one or more of the following methods:

- Rock placement;

- Concrete mattresses;
- Flow dissipation devices;
- Protective aprons, coverings, cladding or pipes; and/ or
- Rock bags.

1.2.8 It is necessary to cross existing cables in the area; where this is required, these will be subject to cable crossing agreements post-consent with the owners of existing assets. Cable crossings usually consist of a layer of protection over the existing asset (the separation layer) over which the VE cables would be installed. A secondary layer would then be installed over the VE cable for protection. Cable crossings may utilise rock protection or concrete mattresses or bridging typically of steel or concrete construction. The maximum design envelope includes sufficient contingency should this be necessary.



LEGEND

- Onshore Order Limits
- Onshore Export Cable Corridor
- Onshore Substation Works Area
- Substation Temporary Construction Compounds
- National Grid Substation Zone

0 0.5 1 2

Kilometers

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Onshore Order Limits and Components

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 1.1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:65,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

360000
380000
400000
420000
440000
5780000
5760000
5740000
5720000
N

LEGEND

ES Order Limits

0 2.5 5 10
Kilometers

Data Sources:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

ES Order Limits

VER	DATE	REMARKS	Drawn	Checked
1	05/03/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 1.2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:300,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

1.2.9 The onshore elements of VE will comprise the landfall, OnSS, TCCs haul roads, and onshore ECC (collectively, the "onshore infrastructure"). The landfall is where the offshore ECC will come ashore to meet the onshore ECC which will be located between Holland-on-Sea and Frinton-on-Sea on the Essex coast. The export cables will be joined at an onshore Transition Joint Bay (TJB). From this point, export cables will link the landfall/ TJB to the OnSS which will make the power generated by the wind farm suitable for transfer to the National Grid. Another electrical cable will link the OnSS to the EACN. The onshore sections of the export cable will be buried underground.

1.2.10 The works at the landfall include:

- Construction of the landfall compound;
- Horizontal Directional Drilling (HDD) works (or other suitable alternative trenchless techniques such as micro-boring, micro-tunnelling or auger boring) including temporary construction of sheet piled HDD exit pits in the intertidal or shallow subtidal;
- Construction of TJBs;
- Installation of offshore export cables (cable pulling);
- Installation of and jointing to onshore export cables; and
- Backfilling and re-instatement works.

1.2.11 The Screening presented here assumes the project is completed as detailed and described in the paragraphs above. As the project design has been refined (i.e., since the publication of the first version of this HRA Screening Report) the conclusions of screening made within this document have been amended to ensure that the LSE conclusions remain valid. All changes are clearly documented and will be fully assessed in the Report to Inform Appropriate Assessment (RIAA).

1.3 LEGISLATIVE CONTEXT

HABITATS REGULATIONS

1.3.1 A network of protected areas for specific habitats and species of importance (known as European sites) has been established by European Union (EU) member states under the Habitats and Birds Directives (Council Directive 92/43/EEC and Directive 2009/147/EC). In the UK, these are implemented through the Conservation of Habitats and Species Regulations 2017, as amended, and Offshore Marine Habitats and Species Regulations 2017 (the Habitats Regulations), which require that an appropriate assessment of the implications must be made by the relevant competent authority if a project (or plan) is likely to have a significant effect on a European site either alone, or in-combination with other plans or projects. The four-stage process of determining potential impacts to European sites under the Habitats Regulations is known as a HRA.

1.3.2 The requirement to undertake HRA is provided by Section 63(1) of the Habitats Regulations that specifies that:

"A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

Is likely to have a significant effect on a European Site or a European offshore marine 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 of the implications of the plan or project for that site in view of that site's conservation objectives."

1.3.3 As VE is not directly connected with or necessary to the management of a European site, a HRA is required.

1.3.4 The EU Exit Regulations (2019)[1] establish any EU Exit-related changes to the Habitat Regulations, with these considered to have no material implications on the requirement or process for a HRA of VE.

EUROPEAN SITES (POST-EU-EXIT)

1.3.5 The National Site Network comprises of European sites in the UK that already existed on 31 December 2020 (or proposed to the European Commission before that date) and established under the Nature Directives (formerly Natura 2000). Regulation 8 of the Habitats Regulations (2017) defines European sites as Special Areas of Conservation (SAC), Special Protection Areas (SPAs), Sites of Community Importance (SCI), and certain types of proposed sites (candidate SACs (cSACs) and proposed SPAs (pSPAs)).

1.3.6 The term 'European marine site' is interchangeable with European site and refers to SACs and SPAs covered by tidal water that protect marine and coastal habitats and species.

1.3.7 UK planning policy extended the protection given to European sites to proposed and designated Ramsar wetland sites of international importance, as underpinned by the Ramsar Convention 1971, as well as to potential SPAs and candidate SACs, and compensation sites which were created to compensate for impacts on European/ Ramsar sites. Defra has confirmed that following Brexit, Ramsar sites remain protected in the same way as SACs and SPAs by policy, but do not form part of the National Site Network by law (Defra, 2021).

1.4 THE HRA PROCESS

1.4.1 The Stages covered by HRA are referenced in the Planning Inspectorate (PINS) Advice Note 10[2]. HRA includes a three-stage process, as summarised below:

- **HRA Stage 1 – Screening:** Screening for potential Likely Significant Effect (LSE) (alone and/ or in-combination with other projects or plans);
- **HRA Stage 2 – Appropriate Assessment:** Assessment of implications of identified potential LSEs on the conservation objectives of a European site to ascertain if the proposal will adversely affect the integrity of a European site;
- **HRA Stage 3 – Derogation:** Where it cannot be ascertained that the proposal will not adversely affect the integrity of a European site, alternative solutions must be considered. Subsequently, where it can be demonstrated that there are no alternative solutions to the project, the project may still be carried out if the competent authority is satisfied that the scheme must be carried out for IROPI. The final part of Stage 3 is the

[1] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

[2] Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (Version 9, August 2022)

consideration of whether adequate compensatory measures can be secured.

1.4.2 The latter Stage 3 becomes relevant if the RIAA cannot exclude an adverse effect on integrity (AEoI). This stage will be addressed in the event that there is a negative outcome to the second stage (Appropriate Assessment (AA)). This report presents the conclusions of Stage 1 screening only, with Stage 2 to follow where potential for LSE is identified.

2 ENVIRONMENTAL BASELINE

2.1 INTRODUCTION

2.1.1 This section provides an overview of the environmental characteristics relevant to the receptors under consideration as part of the HRA screening process, specifically:

- Subtidal and intertidal benthic ecology;
- Marine mammals;
- Offshore and intertidal ornithology;
- Migratory fish; and
- Onshore ecology.

2.1.2 Baseline information relevant to the determination of LSE relates to the array areas, and the onshore and offshore ECCs (Figure 2.1) but also the wider search area across which sites are identified for consideration of potential LSE. The information presented here draws on the Environmental Statement (ES) for Galloper OWF (Galloper Wind Farm Limited, 2011) and other information provided by VE OWFL. It is intended to provide a brief summary only to inform this HRA screening exercise. A more exhaustive review of baseline data is not required for this HRA screening exercise, but has been completed to inform the Stage 2 assessments. Where site specific information is available this is highlighted. For example, two years of ornithological and marine mammal surveys have been collected, geophysical, benthic ecology (including intertidal ecology) and Preliminary Ecological Appraisal, with ground truthing surveys were undertaken in 2021, and additional protected species onshore surveys were carried out in the summer period of 2022 – a description of surveys and available reports is provided as part of Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation.

360000
380000
400000
420000
440000
5780000
5760000
5740000
5720000
N

LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits

0 2.5 5 10
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

2.1 ray Areas, Onshore ECC and Offshore ECC

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1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 2.1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:300,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

2.2 SUBTIDAL AND INTERTIDAL BENTHIC ECOLOGY

EXISTING DATA SOURCES

2.2.1 A detailed baseline description of benthic subtidal and intertidal ecology resources across the VE area is presented within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology. The benthic baseline survey reports were provided for consultation to Natural England to ensure their sufficiency. Full details of the provided consultation responses are provided in Section 4.1.

2.2.2 The following regional datasets provide the existing baseline for subtidal and intertidal benthic ecology:

- Regional Seabed Monitoring Programme (RSMP) (Cooper and Barry, 2017);
- Galloper OWF site (Centre for Marine and Coastal Studies (CMACS), 2010), including pre- and post-construction surveys;
- Environmental Statements from other OWF developments within the Outer Thames Strategic Area (Galloper, East Anglia One, Thanet Extension, Greater Gabbard and Gunfleet Sands OWF (CMACS, 2010; Marine Ecological Surveys Limited (MESL), 2012; Fugro, 2018; Greater Gabbard Offshore Wind Limited (GGOWL), 2005; RPS, 2007)); UKSeaMap (2019);
- The Outer Thames Estuary Regional Environmental Characterisation (Marine Aggregate Levy Sustainability Fund (MALSF), 2009);
- Information on species of conservation interest (Joint Nature Conservation Committee (JNCC), 2007);
- British Geological Survey (BGS) Marine Sediment Particle Size dataset sourced from the BGS GeoIndex Offshore portal; and
- VE site specific benthic survey data (August 2021 – Q4 2021).

2.2.3 The data was used to provide background for the area and support for site specific surveys conducted specifically for the Galloper OWF's EIA. A number of site-specific surveys were undertaken for the study area associated with the Galloper OWF site and the export cable corridor:

- CMACS benthic survey report (CMACS, 2010);
- Osiris geophysical survey report (Osiris projects, 2010a, 2010b); and
- Brown and May fish resource survey report (Brown and May Marine Ltd, 2009a, 2009b).

2.2.4 The site-specific survey data has been used to validate the existing regional datasets to ensure they are appropriate to supplement the characterisation of the baseline and will be a point of discussion - this has been agreed through the EP. Where data allows, consideration has been given as to potential natural variations in seabed habitats or species. However, in the absence of time-series data with appropriate replication it is not considered possible to undertake statistical analysis. The proposed sampling approach was approved at a lower level of replication than what was ultimately carried out (i.e., same number of samples over a much larger area of search). One sampling station was selected within the Margate and Long Sands SAC boundary which reflects the limited spatial overlap between the site and the cable corridor.

2.2.5 Using wider trends in the North Sea, consideration has also been given to the future baseline, in the absence of the development, which will account for natural change. This has been provided in the ES and has been used to inform the RIAA.

SITE SPECIFIC SURVEYS

2.2.6 The following geophysical and benthic ecology (including intertidal ecology) site-specific surveys of the VE array areas and offshore ECC were completed over the summer and autumn periods of 2021:

- Five Estuaries Offshore Site Investigation (UK Sector, North Sea). Fugro – WPM1, WPM2 & WPM3 – Main Array – Benthic Ecology Monitoring Report. 004032871 03 | 11 May 2022; and
- Five Estuaries Offshore Site Investigation (UK Sector, North Sea). Fugro – WPM2, WPM3 & WPM4 – ECR & Intertidal – Benthic Ecology Monitoring Report. 004032872 03 | 11 May 2022.

BASELINE

2.2.7 Margate and Long Sands SAC (for which *sandbanks slightly covered by seawater all the time* is the only qualifying feature) directly overlaps with the VE offshore ECC, whilst there are several SACs and Ramsar sites within the relevant tidal excursion range that could have connectivity with the VE site.

2.2.8 The biotopes found within the VE site (including the array areas and offshore ECC) include:

SS.SCS.OCS, Offshore circalittoral coarse sediment;

- SS.SSa.OSa, Deep circalittoral sand;
- SS.SMx.CMx, Circalittoral mixed sediment;
- SS.SSa.CmuSa, Circalittoral muddy sand;
- SS.SCS.CCS, Circalittoral coarse sediment;
- SS.SMX.OMx.PoVen, Polychaete-rich deep Venus community in offshore mixed sediments;
- CR.MCR.SfR.Pid, Piddocks with a sparse associated fauna in sublittoral very soft chalk or clay;
- SS.SMx.CMx.OphMx, *Ophiothrix fragilis* and/ or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment;
- SS.SSa.CMuSa.AalbNuc, *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment;
- SS.SCS.ICS.Glap, *Glycera lapidum* in impoverished infralittoral mobile gravel and sand
- CR.MCR.SfR.Pid, Piddocks with a sparse associated fauna in sublittoral very soft chalk or clay; and
- SS.SBR.PoR.SspiMx, *Sabellaria spinulosa* on stable circalittoral mixed sediment.

2.2.9 *S. spinulosa* biogenic reef areas have been considered within the ES. The benthic survey contractor has made an assessment of areas where *S. spinulosa* crusts are identified within the survey area, with the assessment based on Gubbay (2007) to determine if the numbers found would constitute reef. Consideration has been given to any crusts within Margate and Long Sands SAC, noting that this is not a qualifying feature of the Margate and Long Sands SAC.

2.2.10 The biotope *S. spinulosa* on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx), was only recorded at one station in the offshore eastern extents of the ECC during the VE site-specific surveys: station FE4_04 – which is not located within the SAC. This biotope was characterised by variable coverage of *S. spinulosa*, faunal turf (hydrozoa/ bryozoa), *Psammechinus miliaris*, *Alcyonium digitatum*, anemones (*Urticina sp*. and *Sagartiidae*) and *Asterias rubens*. Biogenic reefs such as *S. spinulosa* reefs were assessed in line with the criteria in Gubbay *et al.* (2007) and Hendrick and Foster-Smith (2006). *S. spinulosa* was also a common organism recorded during the grab survey of the Galloper OWF site, but it was not evenly distributed.

2.2.11 The UK Biodiversity Action Plan (BAP) priority habitat, piddocks with a sparse associated fauna in sublittoral very soft chalk or clay (CR.MCR.SfR.Pid) was recorded by seabed video data at one station in the north array and three stations in the offshore area of the ECC. This biotope included accompanying fauna including *A. rubens*, Paguridae and Ophiuroidea.

2.2.12 Three discrete aggregations of cobble habitat were recorded in the north array and scored as 'low' resemblance to Annex I habitat 'reef', as per the qualifying criteria set out in regulatory guidance (Irving, 2009 and Golding *et al*., 2020). Areas of heterogeneous coarse sediment inclusive of pebbles and cobbles are a component part of the mixed sediment seabed type that characterises this region of the North Sea.

2.2.13 The sediments observed throughout the survey area were identified as comprising of 'subtidal sands and gravels' which is a habitat of conservation importance in MCZs and a UK BAP priority habitat. However, this habitat is the most widely distributed subtidal habitat in the UK (JNCC, 2019).

2.2.14 The potential for designated Annex I habitat features to occur within the VE boundary is limited to the small section of the Margate and Long Sands SAC, designated for sandbanks which are slightly covered by sea water all the time, specifically where a small portion of the offshore ECC passes through the northerly tip of the SAC. Initial investigations under Magic Map identified the biotope in this area as being subtidal sand (SS.SSa.IMuSa.FfabMag), with the most northerly of the nine sandbanks identified within the SAC by the MMO[3] (Long Sands Head) being located just to the south of the offshore ECC.

2.3 MARINE MAMMALS

EXISTING DATA SOURCES

2.3.1 The following regional datasets provide the existing baseline for marine mammals:

- Monthly VE site-specific aerial surveys were undertaken between March 2019 and February 2021 (HiDef Aerial Surveying Ltd, 2020, 2021), focusing on gathering data relating to ornithological and marine mammal receptors (Appendix 1).
- Atlas of Cetacean Distribution in North-west European Waters 'Joint Cetacean Database' (Reid *et al*., 2003);

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/640430/The_MPA_assessment.pdfm

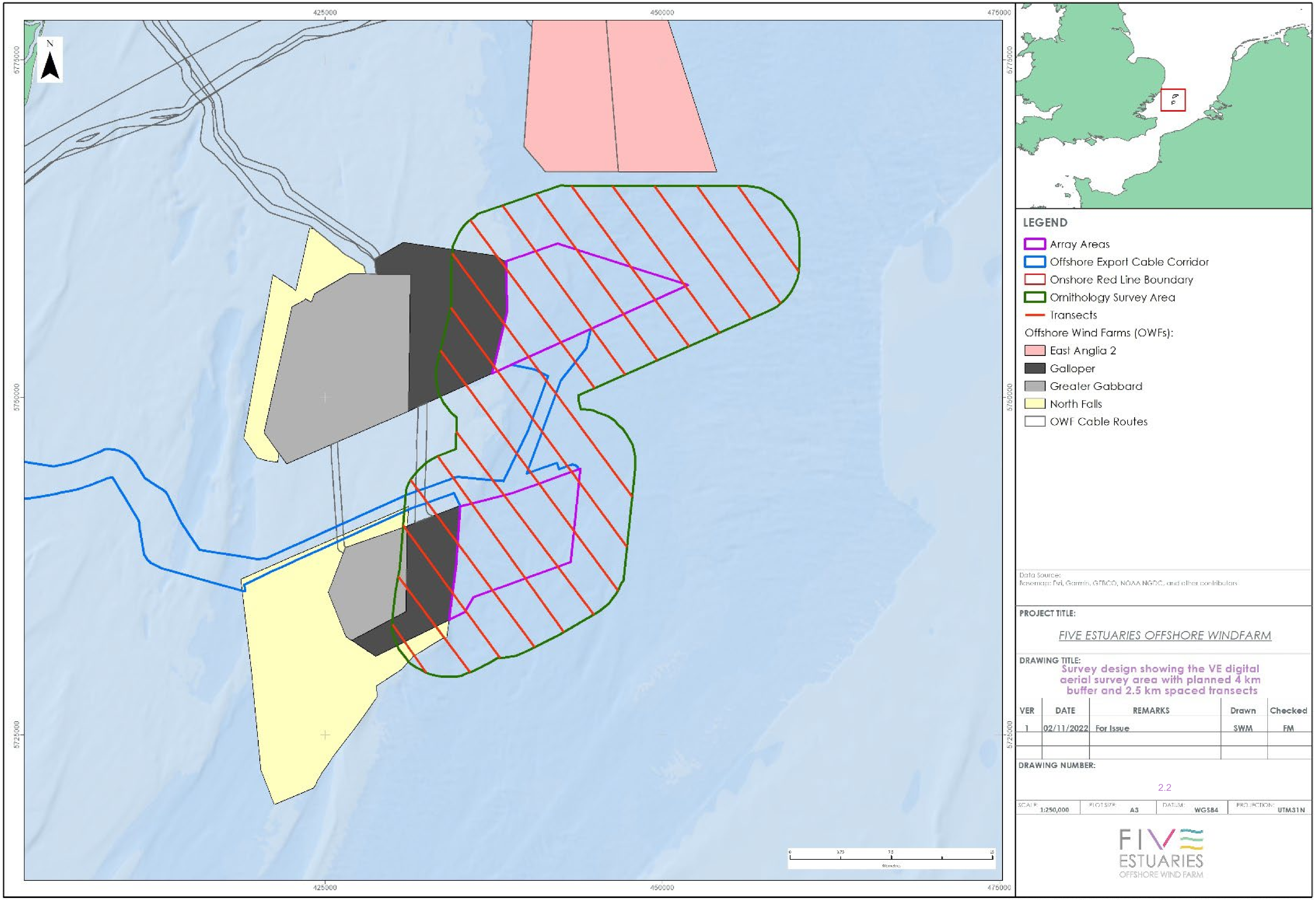
- Small Cetacean Abundance in the North Sea and Adjacent Waters (SCANS II and SCANS III) (Hammond *et al.,* 2002, 2017; 2021);
- Small Cetacean Abundance in the Atlantic and North Sea (SCANS II), (SMRU, 2006);
- JCP Phase III (Paxton *et al*., 2016) and JCP Data Analysis Tool;
- MERP (Waggitt *et al*., 2020);
- Seal haul-out data, grey seal pup counts and telemetry data (provided by SMRU);
- Seal haul-out data in the Greater Thames Estuary (Cox *et al*., 2020);
- Porpoise presence in the Thames Estuary (Cucknell *et al*., 2020);
- Carter, M., L. Boehme, C. Duck, W. Grecian, G. Hastie, B. McConnell, D. Miller, C. Morris, S. Moss, D. Thompson, P. Thompson, and D. Russell. 2020. Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78;
- EU telemetry data;
- Seawatch Foundation Sightings;
- Special Committee on Seals (SCOS Reports);
- Marine mammal species accounts (JNCC, 2013);
- Round 2 Offshore Wind Farm Development Strategic Environmental Assessment (SEA) (DECC, 2003); and
- Strategic Environmental Assessment (SEA) 3 (DECC, 2002).

2.3.2 Site specific surveys used within the Galloper OWF ES:

- Galloper OWF Baseline survey (2008-2010);
- Sightings data were collected alongside the Greater Gabbard Offshore Wind Farm pre-construction monitoring required under VE's Food and Environment Protection Act (FEPA) licence; and
- Greater Gabbard Offshore Wind Farm Baseline Survey (2004-2006). Site specific surveys.

2.3.3 Monthly VE site-specific aerial surveys were undertaken between March 2019 and February 2021 (HiDef Aerial Surveying Ltd, 2020, 2021), focusing on gathering data relating to ornithological and marine mammal receptors (Appendix 1). The transects were placed 2.5 km apart across the survey area, including a 4 km buffer around the array areas, resulting in a total survey area of 606 km^2. Each survey consisted of 17 strip transects, resulting in a total of 408 transect lines (Figure 2.2).

2.3.4 Acoustic noise propagation modelling associated with pile-driving during construction has also been undertaken for the ES to understand potential impacts to marine mammals and fish and shellfish; however, a review of the modelled outputs is not required for this HRA screening exercise and is not presented herein. Instead, it was be completed to inform the Stage 2 assessments presented in the RIAA.


425000
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N
LEGEND
Array Areas
Offshore Export Cable Corridor
Onshore Red Line Boundary
Ornithology Survey Area
Transects
Offshore Wind Farms (OWFs):
East Anglia 2
Galloper
Greater Gabbard
North Falls
OWF Cable Routes
Data Source:
Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors
PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM
DRAWING TITLE:
Survey design showing the VE digital aerial survey area with planned 4 km buffer and 2.5 km spaced transects
VER | DATE | REMARKS | Drawn | Checked
1 | 02/11/2022 | For Issue | SWM | FM
DRAWING NUMBER:
2.2
SCALE: 1:250,000
PLOT SIZE: A3
DATUM: WGS84
PROJECTION: UTM31N
FIVE ESTUARIES
OFFSHORE WIND FARM

BASELINE

2.3.5 The Southern North Sea SAC (for which harbour porpoise is the only qualifying feature) directly overlaps with the VE array areas and offshore ECC, whilst there are several SACs and Ramsar sites within the relevant species Management Units (MUs) that could have connectivity with the VE site. In order to understand utilisation of the VE site by marine mammal features, an understanding of the assemblages found in the area is required, as well as information on foraging ranges and known habitat utilisation.

2.3.6 A full Marine Mammal Baseline Characterisation is provided in Volume 6, Part 5, Annex 7.1: Marine Mammal Baseline Characterisation which presents details on site-specific surveys, datasets used to inform density estimates for harbour porpoise, seal telemetry tracks, seal habitat preferences and marine mammal MU information. Information of relevance to this HRA Screening Report is summarised below.

CETACEANS

2.3.7 The site-specific surveys showed that the density of harbour porpoise varied throughout the survey period, with a peak density of 8.48 animals/ km^2 in November 2019, equating to 5,160 animals (±95% CI 3,418 – 6,955). In the subsidiary peak in May 2020, the density was estimated at 5.2 animals/ km^2, equating to 3,148 animals (±95% CI 1,805 – 4,722). Outside of these months, absolute density ranged between 0.14 and 3.10 animals/ km^2, with population estimates ranging between 96 animals (±95% CI 0 - 245) and 1,865 animals (±95% CI 1,413 – 2,342).

2.3.8 Harbour porpoise had varied distributions throughout the survey area, with high densities observed in the north-east of the survey area in March 2019 and May 2020. In some months, low numbers of harbour porpoise were recorded, leading to no clear patterns in distributions in April and May 2019 and August 2020. Harbour porpoise were widespread across the survey area in many months, such as in March, April and September 2020. In January 2021, the species was primarily concentrated to the north and south-east of the survey area.

2.3.9 Results from baseline surveys undertaken between June 2008 and May 2010 and reported within the Galloper OWF Environmental Statement suggest that no other cetacean species are likely to occur within the Galloper OWF study area on a regular basis or in significant numbers (Royal Haskoning, 2011). The surveys covered the adjacent Galloper OWF site, with an additional maximum buffer of 4 km which overlaps with the VE array areas. Species such as white-beaked dolphin were occasional visitors to the site in low numbers, with apparent sightings in June (2008 and 2009). No baleen whales were recorded within the Galloper OWF study area over the entire survey period.

SEALS

2.3.10 The only other identified marine mammal observed by the site-specific surveys was the grey seal (*Halichoerus grypus*). No more than two individuals were observed per survey, appearing intermittently throughout the study period. Over the entire two-year period, eight grey seals were recorded. Some unidentified animals were also seen, with most partial identifications attributed to difficulties discerning between grey seals and harbour seals (*Phoca vitulina*) and identifying some of the cetacean sightings. Consequently, there were not enough sightings to calculate a density estimate for grey or harbour seals in the survey area.

2.3.11 The low number of grey seal sightings from the site-specific VE surveys is consistent with previous OWF site surveys in the area such as those conducted for the GGOWF, Galloper OWF and North Falls OWF. The latest August haul-out count for seals in Southeast England MU is from the 2021 survey where 7,694 grey seals were counted and 3,505 harbour seals were counted (SCOS, 2023).

2.3.12 Given the wide-ranging nature of grey seals (frequently travelling over 100 km between haul-out sites) (SCOS, 2021), and the large degree of movement between the north east and south east of England, it is not appropriate to consider the Southeast England MU as a discrete population unit in isolation, therefore the relevant population against which to assess impacts should be the combined Southeast and Northeast England MUs. The latest August haul-out count data for grey seals in Northeast England is from the 2022 survey where 6,517 grey seals were counted. The 20121 August haul-out grey seal count for the Southeast England MU combined with the 2022 count for the Northeast England MU (14,211 combined total) can be scaled by the estimated proportion hauled-out (0.2515; 95% CI 0.2145 – 0.2907) (SCOS, 2022) to produce an estimate of 65,505 grey seals in the Southeast and Northeast England MUs combined (95% CI: 48,885 – 66,252).

2.3.13 The Southeast England MU harbour seal count has varied considerably over time. The 2019 count for the Southeast England MU was 27.6% lower than the mean count between 2012-2018, which may represent the first indication of a population decline and SCOS recommend that research is required to determine the time course and potential causes of this reduction (SCOS, 2021). However, while the 2019 August count for harbour seals in the Southeast England MU showed a significant decline across the MU overall, the data for the Greater Thames Estuary area shows an overall increasing count between 2003 to 2019 at a rate of 8.99% per annum (Cox *et al*., 2020).

2.3.14 VE is located within the Southeast England MU for grey and harbour seals. Most grey seal haul-out sites within this MU are located in Donna Nook and Scroby Sands and most harbour seal haul-out sites are located either in The Wash or in the Greater Thames Estuary area. In the Northeast England MU, most grey seal counts are located within various haul-outs within the Farne Islands. There are no grey or harbour seal haul-outs located within the VE offshore boundary (Figures 25 and 34 in Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps). However, Long Sand haul out site is in proximity (~5 km) to the Offshore ECC where 77 grey seals were counted in 2018 and 22 in 2019, and 18 harbour seals were counted in 2018 and 2 in 2019.

2.3.15 There are also several haul-out sites located within the Greater Thames Estuary Area to the southwest of the development (within around 100 km from the offshore boundary) (Figures 25 and 34 in Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps). As a collective, all grey seal haul-out sites in the Greater Thames Estuary Area (Long Sand to Goodwin Sands/ Knoll) supported a count of 596 in 2018 and 775 grey seals in 2019, with all haul-out sites in the Greater Thames Estuary Area (Hamford Water to Goodwin Sands/ Knoll) supporting a harbour seal count of 738 in 2018 and 671 harbour seals in 2019.

2.3.16 In total, 64 grey seals have been tagged in the east England MUs (33 from the Southeast England MU and 31 from the Northeast England MU). These seals were tagged at the Farne Island, Donna Nook and Blakeney between 1988 and 2015. Data from the 64 seals indicate low use of the VE array areas, with most of the tagged grey seal activity being concentrated along the coastal part of the Offshore ECC (Figure 38 in Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps). Note, no grey seals have been tagged in the Thames Estuary and thus connectivity between the VE area and the Thames Estuary may be under-represented.

2.3.17 Telemetry data from 86 harbour seals tagged in the Thames Estuary and The Wash indicate little use of the VE array areas, with most of the tagged harbour seal activity being concentrated along the coastal part of the Offshore ECC (Figure 29 Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps).

2.3.18 Within a 50 km buffer of the VE site, there are telemetry tracks from 26 harbour seals and telemetry tracks of 7 grey seals. Of the grey seal tracks, 1 was tagged at the Farnes, 1 at Donna Nook and 5 at Blakeney indicating connectivity between the 50 km buffer of the VE array areas and the Humber Estuary SAC (4 grey seals) and the Berwickshire and North Northumberland Coast SAC (2 grey seals). 17 of the harbour seal tracks showed connectivity with The Wash SAC. The connectivity between the seals in the vicinity of VE and the SACs is be considered in the RIAA.

2.3.19 Data collected by Vincent *et al*. (2017), show clear evidence that grey seals exhibit wide-ranging movements, while harbour seals in France remained coastal and in close proximity to their respective haul-outs. Grey seals tagged in France and the Netherlands moved throughout the Wadden Sea and Southeast England MU, including the vicinity of the VE (Figure 39 Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps). Conversely, harbour seals tagged at French haul-out sites do not show connectivity with the Southeast England MU and other EU sites in the Netherlands, France and the Wadden Sea (Figure 30 in Volume 6, Part 5, Annex 6.3: Spawning Herring Heatmaps).

2.3.20 This large-scale grey seal movement suggests that there may be limitations of the current seal habitat maps which only include grey seals tagged in the UK and do not account for the presence of grey seals from France or the Wadden Sea. Therefore, it is likely that the seal habitat preference maps underestimate the true density of grey seals present in the vicinity of the VE. This is considered in the transboundary effects assessment for grey seals.

2.4 OFFSHORE AND INTERTIDAL ORNITHOLOGY

EXISTING DATA SOURCES

2.4.1 The following regional datasets provide the existing baseline for offshore and intertidal ornithology:

- 2004-06 surveys conducted to inform the EIA for the Greater Gabbard Offshore Wind Farm (GGOWF);
- 2014-2015 Pre-construction monitoring ornithological surveys covering the Galloper OWF site;
- June 2008 to May 2009 pre-construction surveys as part of the GGOWF monitoring requirements, which extended the survey area to cover the Galloper OWF site;
- June 2009 to May 2010 surveys, which covered the GGOWF and Galloper OWF sites, with construction activity commencing in the former site in August 2009;
- 2004/05 aerial surveys of the Thames Strategic Area (TH1-TH5 sectors) (DTI, 2006);
- 2005/06 aerial surveys of the Thames Strategic Area (TH1-TH7 sectors) (BERR, 2007);
- 2007/08 aerial surveys of part of the Thames Strategic Area (TH1) and Greater Gabbard area (GG1-4) (DECC, 2009);
- 2009 surveys of Round 3, Zone 5 (NS1-NS3) Wildfowl and Wetlands Trust (WWT) Consulting (2009);
- Digital video aerial surveys of red-throated diver in the Outer Thames Estuary SPA 2013 (Goodship *et al*., 2015); and
- Digital video aerial surveys of red-throated diver in the Outer Thames Estuary SPA 2018 (HiDef, 2018).

2.4.2 Post-construction monitoring has been undertaken for ornithology receptors at the adjacent Galloper OWF (*Green et al (2021). Assessing Movements of Lesser Black-backed Gulls using GPS Tracking Devices in Relation to the Galloper Wind Farm*). This has been used to inform the baseline.

2.4.3 Additional information on offshore ornithology receptors drawn on for this report are:

- Surveys of bird populations across the North Sea and the resultant atlases of bird distribution;
- Peer reviewed scientific papers; and
- Literature reviews including the baseline reports of other OWF developments.

2.4.4 The main sources of information on intertidal ornithology receptors drawn on for this report comprise:

- Periodic surveys of bird populations along the coast as part of national programmes organised by the British Trust for Ornithology (BTO) and the resultant web-based databases and atlases of bird distribution;
- Peer reviewed scientific papers;
- County bird reports and County avifauna; and
- Literature reviews including the baseline reports of other OWF developments.

SITE SPECIFIC SURVEYS

2.4.5 As described above in section 2.3, monthly offshore site-specific aerial surveys were undertaken for VE between March 2019 and February 2021 focusing on ornithological and marine mammal receptors (Appendix 1).

2.4.6 Additional intertidal wintering bird surveys have been undertaken between September 2021 and Spring 2022. This includes surveys of the intertidal area between Clacton and Frinton (Volume 6, Part 6, Annex 6.4.06: Wintering Bird Survey Report). The surveys took place from two suitable vantage point locations along the seawall, from which all waterbirds within at least 500 m of the relevant landfall zone (including birds on the sea) were recorded. Particular attention was paid to the identification of any high-tide roost sites, if present.

BASELINE

2.4.7 The Outer Thames Estuary SPA directly overlaps with the offshore ECC, whilst there are several SPAs that could have connectivity with the VE site based on known foraging ranges and migration routes. In order to understand utilisation of the VE site by ornithological features, an understanding of the assemblages found in the area is required.

2.4.8 Results from boat-based and aerial surveys recorded an avian assemblage typical of those recorded in wider surveys within the south North Sea (e.g., Stone *et al*., 1995) with a total of 76 species being recorded on boat-based surveys during 2008/09 and 2009/10 (full information can be found in the Galloper Wind Farm ES Chapter 11 Offshore Ornithology and Appendix 2 – Ornithological Technical Report).

2.4.9 In general, there were no clear patterns of spatial distribution recorded within the Galloper OWF survey area, with concentrations of seabirds considered likely to be an ephemeral occurrence in response to food resources, and often in association with fishing vessels releasing discards – particularly for gulls, gannets and fulmar. For auks and other species, varying distribution is likely to reflect broad-scale movements of fish stocks. Diver populations were thinly distributed but did show evidence of a west-east gradient in abundance, with largest numbers closer to the coast, and within the recorded main range of the species (up to 20 km).

2.4.10 Ornithological surveys have been undertaken across the VE site. Surveys began in March 2019 and completed, without any breaks, in February 2021 (24 months in total). Table 2.1 shows the months during which surveys were undertaken and Table 2.2 presents an overview of the species recorded along with their peak abundances and equivalent densities.

Table 2.1: Months when aerial surveys were conducted at VE.

MONTH	2019	2020	2021
January		X	X
February		X	X
March	X	X	
April	X	X	
May	X	X	
June	X	X	
July	X	X	
August	X	X	
September	X	X	
October	X	X	
November	X	X	
December	X	X	

Table 2.2: Species peak abundances and estimated densities recorded during VE surveys in both the array areas and 4km buffer between March 2019 and February 2021 (N = northern array area; S = southern array area; S.D = standard deviation).

Species	Location		Abundance	Estimated Density (S.D) Array areas and buffers combined
	ARRAY AREAS	**4KM BUFFER**		
Red-throated Diver	N, S	N, S	N buffers and array = 17 S buffers and array = 13	0.06 (0.04)
Fulmar	N, S	N, S	N buffers and array = 28 S buffers and array = 133	0.53 (0.22)
Gannet	N, S	N, S	N buffers and array = 575 S buffers and array = 383	2.12 (0.4)
Cormorant	S	S	S buffers and array = 21	0.08 (0.07)
Arctic skua		S	S buffers = 4	0.01 (0.01)
Great Skua	S	S	S buffers and array = 14	0.06 (0.02)

Species	Location		Abundance	Estimated Density (S.D) Array areas and buffers combined
Puffin		N, S	N buffers = 4 S buffers = 4	0.01 (0.01)
Razorbill	N, S	N, S	N buffers and array = 1270 S buffers and array = 649	4.68 (0.78)
Guillemot	N, S	N, S	N buffers and array = 1548 S buffers and array = 3302	17.18 (1.56)
Common Tern	N	N, S	N buffers and array = 4 S buffers = 13	0.05 (0.03)
Sandwich tern	S	N, S	N buffers = 4 S buffers and array = 4	0.01 (0.01)
Kittiwake	N, S	N, S	N buffers and array = 420 S buffers and array = 533	2.12 (0.56)
Black-headed Gull	S	N, S	N buffers = 24 S buffers and array = 17	0.07 (0.04)

Species	Location		Abundance	Estimated Density (S.D) Array areas and buffers combined
Little Gull	N	N, S	N buffers and array = 10 S buffers = 7	0.03 (0.03)
Common Gull	N, S	N, S	N buffers and array = 10 S buffers and array = 30	0.12 (0.03)
Lesser Black-backed Gull	N, S	N, S	N buffers and array = 519 S buffers and array = 1201	4.79 (3.46)
Herring Gull	N, S	N, S	N buffers and array = 38 S buffers and array = 49	0.14 (0.11)
Great Black-backed Gull	N, S	N, S	N buffers and array = 125 S buffers and array = 123	0.49 (0.21)

2.4.11 During the intertidal surveys, bird species which are qualifying interest features of nearby SPA and Ramsar sites were recorded. These were brent goose (on land and intertidal), mute swan (on land), shelduck (on land and intertidal), shoveler (on land), gadwall (on land), wigeon (on land and intertidal), teal (on land and intertidal), great crested grebe (at sea), avocet (on land), ringed plover (in flight only), curlew (on land and intertidal), black-tailed godwit (on land and intertidal), sanderling (intertidal), dunlin (intertidal), redshank (on land and intertidal) and cormorant (on land, intertidal and at sea). Hen harrier was also observed but only flying over the survey area.

2.5 MIGRATORY FISH

EXISTING DATA SOURCES

2.5.1 The following regional datasets provide the existing baseline for migratory fish:

- ES's from other offshore wind farm developments and aggregates dredging sites;
- Environment Agency fish pass counts;
- The Outer Thames Estuary Regional Environmental Characterisation (MALSF, 2009); and
- Information on species of conservation interest (JNCC).

2.5.2 Further information on the distribution and abundance of fish and shellfish species within the general area of the development was obtained from:

- Monitoring and surveys carried out as part of the GGOWF Food and Environment Protection Act (FEPA) licence (Licence 33097/07/0) including pre and post construction surveys for:
- Annual fisheries surveys; and
- Noise and Vibration monitoring during piling.

2.5.3 Site specific information was obtained for GGOWF from dedicated beam and otter trawl surveys carried out in the spring and autumn to target adult and juvenile fish within the proposed GGOWF site, offshore ECC and their immediate environs (Brown & May Marine Ltd, 2009a and 2009b).

SITE SPECIFIC SURVEYS

2.5.4 Extant data provides a comprehensive characterisation of fish species collected over a long-time series across the Outer Thames Estuary. On the basis that fish communities are well understood in the vicinity of VE no site-specific surveys were undertaken for migratory fish.

2.5.5 Nevertheless, baseline characterisation data on fish and shellfish spawning habitats were informed by the VE site specific benthic survey which has been used to determine spawning habitat suitability (Fugro, 2022a, b).

BASELINE

2.5.6 There are a number of Annex II species known to migrate through the Thames Estuary that were considered to be of conservation interest and of relevance to the Galloper OWF and GGOWF. These included Atlantic salmon, river and sea lampreys and the allis and twaite shads.

2.5.7 There are no European or Ramsar Sites within the VE offshore ECC or array areas that are designated for migratory fish. There are, however, several sites located in Belgium and the Netherlands designated for migratory fish that could have potential connectivity with the VE site; Vlaamse Banken SAC is the closest site at 34.75 km away, of which twaite shad is qualifying feature.

2.5.8 Mobile species exhibit varying spatial and temporal patterns, therefore the data collected during surveys outlined above represent snapshots of the fish and shellfish assemblage within the study area at the time of sampling whereby the fish and shellfish assemblages may vary considerably both seasonally and annually. Where Annex II species be absent from such surveys the outcome is not then to exclude consideration of these species from the RIAA. Rather, the baseline description draws upon (or defaults to) the wider literature, as this provides a more thorough, robust, and longer time series evidence base, which therefore ensures a more comprehensive and precautionary baseline, identifying all Annex II species that are likely to be present within the study area.

2.5.9 It should also be noted that the methods of surveying for fish and shellfish species vary in their efficiency at capturing different species. For example, otter and beam trawl surveys are ineffective at capturing information on pelagic fish species. This limits data utility in capturing relative abundances of species within the area.

ANNEX II SPECIES

2.5.10 Historically, salmon have been found to be distributed throughout the Thames estuary region and have been known to migrate to freshwater through the Thames estuary to spawn, and therefore have the potential to transit the study area. During migrations in coastal or offshore waters, salmon spend most of their time within 4 m of the surface, although frequent diving behaviour may also be observed (Malcolm *et al*., 2010).

2.5.11 Atlantic Salmon were recorded in the Stour, Duddon and Thames catchments from 2017-2019 (Environment Agency, 2020), although no Atlantic salmon were recorded in any of the monitoring surveys undertaken for offshore wind developments within the study area (noting that these surveys deployed demersal trawls only). Despite this, it is considered possible that this species will pass through the VE site on their migrations.

2.5.12 Both river and sea lamprey appear to be re-establishing in the Thames, with sea lamprey being recorded within the summers of 2000 and 2001, and river lamprey recorded in autumn 2001 (Colclough, 2002). Nevertheless, neither river nor sea lamprey were recorded in any of the monitoring surveys undertaken for offshore wind developments within the study area (again noting that these surveys deployed demersal trawls only), although it is possible that these species will pass through the VE area on their migrations.

2.5.13 There are records of twaite shad in pre-construction fish surveys conducted for GGOWL in 2008 (Brown and May Ltd., 2009b), and beam trawl surveys conducted for the Galloper OWF (CMACS, 2010). Studies of thwaite shad in the southern North Sea have indicated an increase in the species' spawning population in recent decades (Magath and Thiel, 2013). No allis shad were recorded in any of the monitoring surveys undertaken for offshore wind developments within the study area (noting that these surveys deployed demersal trawls only).

SAC AND SPA PREY SPECIES

2.5.14 Impacts on herring and sandeel spawning areas are relevant given that they are key prey species for features of SACs and SPAs that have been shown to have potential connectivity with the VE site. The potential for LSE on SPA and SAC features as a result of impacts on prey species has been included in the relevant Sections within this report (see 'Changes to prey' impact in Section 4.3 and 'Changes in prey availability and behaviour' in Section 4.4).

2.5.15 Herring and sandeel have specific requirements in terms of spawning grounds, with seabed sediment being the primary determinant (Maravelias *et al*., 2000). Due to their reliance on specific substrates, they are particularly susceptible to seabed disturbance impacts (increased SSC and sediment deposition). In addition, as hearing specialists, spawning herring are considered to be a sensitive fleeing receptor. Data from Coull *et al*. (1998) and Ellis *et al*. (2010) suggests that the VE fish and shellfish study area lies within sandeel and herring spawning grounds.

2.5.16 Areas of potential herring spawning habitat have been identified using site specific particle size analysis data (Fugro, 2022a, b) and broadscale habitat mapping (EUSeaMap, 2021). Whist these data indicate the potential for herring spawning habitats within the northern array area, and the mid-section of the offshore ECC, historic data from Coull *et al*. (1998) and International Herring Larvae Surveys data indicate that areas of active herring spawning are located across the eastern extent of the study area, with high intensity spawning occurring within the English Channel.

2.5.17 A herring spawning ground intersects with the eastern side of the study area (Coull *et al*., 1998). Furthermore, there is a herring spawning ground located in the Blackwater estuary, approximately 10 km from the nearshore section of the offshore ECC.

2.5.18 There are also spawning grounds present across the study area for sandeel (Coull *et al*., 1998), these spawning grounds are significant in size, spanning large areas across the southern North Sea and the Channel.

2.6 ONSHORE ECOLOGY

EXISTING DATA SOURCES

2.6.1 For the purpose of this report, onshore ecology is defined by habitats and species occurring above mean low water springs. Existing data sources for onshore ecology that are relevant to the HRA include:

- Joint Nature Conservation Committee (JNCC) jncc.gov.uk website;
- Multi-agency Geographic Information Centre (MAGIC) website and Natural England's Designated Sites Viewer Magic.gov.uk/ and designatedsites.naturalengland.org.uk/ accessed 21 July 2021 and subsequently;
- Essex Field Club (EFC) data on protected and notable species for the Onshore ECC and the surrounding area, obtained 17 February 2022; and
- Data held by the British Trust for Ornithology, Wetland Bird Survey, to be obtained for later stages of the assessment if required.

SITE SPECIFIC SURVEYS

2.6.2 VE site specific surveys to inform the VE EIA and HRA commenced in September 2021. There is overlap with the proposed North Falls Offshore Wind Farm onshore infrastructure and therefore surveys associated with this proposed project have also been used to inform the baseline assessment for VE. The surveys (for VE or North Falls) encompass habitats, vegetation communities, rare and invasive non-native plants, Fisher's estuarine moth (food plant), terrestrial invertebrates at Holland Haven Marshes, amphibians, reptiles, breeding and non-breeding birds, bats, badger, water vole and dormouse. The surveys were undertaken in either 2021 or 2022, or span both years. The survey results for habitats, plants, invertebrates including Fisher's estuarine moth, and birds are of most relevance to the HRA.

BASELINE

2.6.3 There are no European or Ramsar Sites within the onshore ECC. However, Hamford Water SAC, SPA and Ramsar is close to the onshore ECC (at a distance of approximately 0.7 km away), while the Stour and Orwell Estuaries SPA and Ramsar, the Colne Estuary (Mid-Essex Coast Phase 2) SPA and Ramsar, Abberton Reservoir SPA and Ramsar, and Blackwater Estuary (Mid-Essex Coast Phase 4) SPA and Ramsar are at distances of approximately 3.1 km, 7.2 km, 11.5 km and 13.9 km away from the ECC, respectively. The Colne and Blackwater Estuaries are also part of the Essex Estuaries SAC. There are also European and Ramsar sites beyond this distance however these ae much less likely to be affected by VE.

Table 2.3 Distance to protected sites associated with Onshore Ecology

Site	Distance to edge of RLB (km)
Hamford Water SAC, SPA and Ramsar	0.7
Stour and Orwell Estuaries SPA and Ramsar	3.1
Colne Estuary SPA and Ramsar	7.2
Abberton Reservoir SPA and Ramsar	11.5
Blackwater Estuary SPA and Ramsar	13.9

2.6.4 A review of the data obtained to date (desk study and surveys) indicates that bird populations that are part of the qualifying interest of European and Ramsar sites may also make use of land within the onshore ECC. For example, Holland Haven Marshes, which is partly within the onshore ECC, is known to support large numbers of teal and wigeon, which are qualifying interest bird species for Hamford Water SPA and Abberton Reservoir SPA and Ramsar, respectively. Other qualifying interest bird species have also been recorded within the onshore ECC and within 250 m of it.

2.6.5 There is therefore a potential link between parts of the onshore ECC, and adjoining land, and the nearby European and Ramsar sites, with birds moving between these areas.

2.6.6 While most of the onshore ECC lies within the Holland Brook catchment, which does not drain into a European or Ramsar site, parts of the onshore ECC may be hydrologically linked to (i) Hamford Water SAC, SPA and Ramsar; (ii) the Stour Estuary, part of the Stour and Orwell Estuaries SPA and Ramsar (via the Wrabness Brook and/or Ramsey river catchments), and (iii) the Colne Estuary SPA and Ramsar/Essex Estuaries SAC (via the Tenpenny Brook Catchment). Ditches and rivers within the onshore ECC may therefore drain into the rivers that flow into these sites.

2.6.7 The qualifying interest features of the European and Ramsar sites within 15 km of the onshore ECC are bird populations, coastal habitats, scarce plants and invertebrates. The qualifying interest of these sites does not include bats or otters, for example, although these are known to be present in the onshore ECC.

3 SITE SELECTION

3.1 SITE SELECTION PROCESS

3.1.1 Given the nature and scale of VE and the number of European sites that could potentially be affected, the HRA Screening undertaken is fronted by an initial site selection process, to identify sites and features for consideration through Screening. This is achieved through a receptor-based approach with a source-pathway-receptor methodology, where a receptor can only be impacted by an effect if a pathway exists through which the effect can be transmitted between the source activity and the receptor.

3.1.2 This step to the process essentially provides a long list of designated sites identified on the basis of potential spatial connectivity to VE, to be taken forward for consideration of potential for LSE. The potential effects associated with the construction, operation & maintenance and decommissioning of VE are presented in Section 3.6.2.

3.1.3 A summary of all designated sites for each receptor group is provided in Section 3.6.2. Where some designated sites are designated for features covering multiple receptor groups, the site has been repeated in all relevant sections below, with only the features relevant to the specific receptor group presented in the relevant section. The Screening Matrices (Appendix 3) include all sites considered for screening, including all features for which the site has been designated.

3.1.4 The site selection process is described below on a receptor group basis.

3.2 SUBTIDAL AND INTERTIDAL BENTHIC SITE SELECTION

3.2.1 An initial site selection range of 50 km from VE was applied to identify all designated sites with intertidal and subtidal benthic features. A subsequent precautionary range of 22.5 km has been applied as the distance threshold for LSE, based on the tidal excursions presented in Figure 5.8 within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology which shows a maximum range of 22.5 km for any impacts caused by VE on sites with subtidal and intertidal benthic features. The impact with the largest zone of influence is considered to be increased suspended sediment concentrations and deposition.

3.3 MARINE MAMMALS SITE SELECTION

3.3.1 The marine mammal site selection process applied is dependent on the species in question and their relevant MUs. The site selection process is concerned with the four Annex II marine mammal species included for which SACs may be designated, with the relevant MUs defining the study area for each species, as described in Table 3.1 and shown in Figure 3.1.

Table 3.1: Marine mammal receptor management units.

Receptor Species	Relevant MU
Harbour porpoise (*Phocoena phocoena*)	North Sea MU
Bottlenose dolphin (*Tursiops truncatus*)	Greater North Sea MU
Grey seal (*Halichoerus grypus*)	South East England MU
	North East England MU
Harbour seal (*Phoca vitulina*)	South East England MU

-500000 0 500000 1000000

6500000 6000000 5500000

N

LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits

Management Units, Species:

- Northeast England, Grey Seals
- Southeast England, Seals
- North Sea, Harbour Porpoise
- Greater North Sea, B Dolphin

0 10 20 40
Kilometers

0 50 100 200
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

3.1 f marine mammal Management Units creening (SCOS, 2021; IAMMWG, 2022)

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 3.1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:6,000,000	A3	WGS84	UTM31N

FIVE ESTUARIES OFFSHORE WIND FARM

3.3.2 All designated sites for marine mammal species within these MUs are considered within the screening stage. Should wider connectivity be evident (beyond the range of the MU), then that will also be taken into consideration for screening.

3.4 OFFSHORE AND INTERTIDAL ORNITHOLOGY SITE SELECTION

3.4.1 Initial site selection for offshore and intertidal seabird ornithology identified all European sites with designated ornithology features located within a range defined by the criteria outlined in Table 3.2 below. Appendix 2: Ornithology screening tables considers all UK coastal SPAs and Ramsars and identifies those sites where a designated feature falls into these criteria, for those sites where no species are identified within the criteria outlined in Table 3.2, these are not taken through for consideration for screening and are greyed out. Appendix 2 also considered those sites that have been selected and will be considered within screening for all other European sites. The resulting sites screened in as shown in Appendix 2 are considered in Section 3.6.2 below. Site selection criteria for waterbirds are outlined in Section 2.4.

3.4.2 The bird species likely to occur in VE can be grouped into a series of categories for this high-level screening process. This categorisation is based on biological relationships related to breeding biology, feeding, habitat use and migratory pathways. The categories are:

- Breeding seabirds;
- Breeding waterbirds;
- Non-breeding seabirds;
- Passage waterbirds; and
- Wintering waterbirds.

Table 3.2 Screening site selection criteria for offshore and intertidal ornithology.

Criteria	Definition	Relevant distance / range to determine connectivity with qualifying features
Criteria 1A	European and Ramsar sites which have physical overlap with VE Array Areas.	Overlap between designated site and array area
Criteria 1B	European and Ramsar sites which have physical overlap with VE offshore ECC.	Overlap between designated site and offshore ECC
Criteria 2	European and Ramsar sites that occur within a defined range of effect (in this case the maximum foraging range and the mean-maximum foraging range +1 Standard Deviation, hereafter referred to as MMF+1SD), of VE OWF. This Criterion only identifies sites with receptors that are interest features in the breeding season since it is only at that part of the year that a numeric range can be stated based on foraging distances from the designated site. Consequently, only breeding features of relevant SPAs/ Ramsars are listed in Table 4.9 (with a full list of all features documented in Screening Matrices Appendix 3).	MMF+1SD, Woodward *et al*., (2019) provides the most up-to-date collation of seabird foraging ranges based on multiple individuals from numerous study colonies. Table 3.3 below provides an overview of Woodward *et al*., (2019) foraging ranges.
Criteria 3	European and Ramsar sites which occur within range of the maximum expected extent of displacement/disturbance due to Project activities.	Intertidal: 0.5 km Offshore: 10 km (ranges based on advice from SNCBs, 2022)
Criteria 4	Designated sites for breeding interest features that might pass through the array on migration or in winter. Relevant breeding SPAs for each species from colonies located along the Eastern seaboard of the UK. These SPAs (and Ramsars where relevant) have been carried forward to the determination of LSE stage.	Eastern seaboard of the UK.

Table 3.3: Mean-maximum foraging range, standard deviation and mean-maximum foraging range +1SD of UK breeding seabird species used to screen against Criteria 2 (Woodward *et al.*, 2019).

Species	Mean-max foraging range (km)	Standard deviation (km)	Mean-max +1SD (km)
Common eider	21.5	-	21.5
European storm-petrel	336	-	336
Northern fulmar	542.3	657.9	1200.2
Manx shearwater	1346.8	1018.7	2365.5
Northern gannet	315.2	194.2	509.4
European shag	13.2	10.5	23.7
Cormorant	25.6	8.3	33.9
Black-legged kittiwake	156.1	144.5	300.6
Black-headed gull	18.5	-	18.5
Mediterranean gull	20	-	20
Common gull	50	-	50
Great black-backed gull	73	-	73
Herring gull	58.8	26.8	85.6
Lesser black-backed gull	127	109	236
Sandwich tern	34.3	23.2	57.5

Species	Mean-max foraging range (km)	Standard deviation (km)	Mean-max +1SD (km)
Little tern	5	-	5
Roseate tern	12.6	10.6	23.2
Common tern	18.0	8.9	26.9
Arctic tern	25.7	14.8	40.5
Common guillemot	73.2	80.5	153.7
Razorbill	88.7	75.9	164.6
Atlantic puffin	137.1	128.3	265.4
Great skua	443.3	487.9	931.2

3.4.3 Additionally, for site selection of non-seabirds, all European sites with designated non-seabirds features that are at risk of collision with WTGs during migration have been considered. Those located within the migratory pathways identified by Wright *et al.,* (2012) which also coincide with the array areas from VE have been included in the site selection and considered for LSE in Table 3.4.

Table 3.4: Non-seabird SPA and Ramsar sites included in site selection.

Site code	Site name	Distance from Array (nearest KM)	Category of relevant Interest feature
UK9009112	Alde-Ore Estuary SPA	37	Wintering and passage waterbirds
UK11002	Alde-Ore Estuary Ramsar	37	Wintering and passage waterbirds
UK9009101	Minsmere-Walberswick SPA	42	Wintering and passage waterbirds
UK75	Minsmere-Walberswick Ramsar	42	Wintering and passage waterbirds
UK9009261	Deben Estuary SPA	48	Wintering and passage waterbirds
UK11017	Deben Estuary Ramsar	48	Wintering waterbirds
UK9009131	Hamford Water SPA	51	Wintering and passage waterbirds
UK11028	Hamford Water Ramsar	52	Wintering and passage waterbirds
UK9009121	Stour and Orwell Estuaries SPA	55	Wintering and passage waterbirds
UK11067	Stour and Orwell Estuaries Ramsar	55	Wintering and passage waterbirds

Site code	Site name	Distance from Array (nearest KM)	Category of relevant Interest feature
UK9009243	Colne Estuary (Mid-Essex Coast Phase 2) SPA	67	Wintering and passage waterbirds
UK11015	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	67	Wintering and passage waterbirds
UK9009245	Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	78	Wintering and passage waterbirds
UK11007	Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	78	Wintering and passage waterbirds
UK9009242	Dengie (Mid-Essex Coast Phase 1) SPA	74	Wintering and passage waterbirds
UK11018	Dengie (Mid-Essex Coast Phase 1) Ramsar	74	Wintering and passage waterbirds
UK9009131	Hamford Water SPA	51	Wintering and passage waterbirds
UK11028	Hamford Water Ramsar	52	Wintering and passage waterbirds

3.5 MIGRATORY FISH SITE SELECTION

3.5.1 Following the standard set by other OWFs in the region, a highly precautionary range of 100 km to the relevant estuary mouth was considered for the site selection process. Underwater noise is considered to be the impact with the largest range affecting migratory fish and a screening distance of 100 km is considerably greater than the potential noise footprint of VE; therefore 100 km is considered a precautionary and inclusive range for the screening process.

3.6 ONSHORE ECOLOGY

3.6.1 The initial study area comprised the onshore ECC plus 15 km, in line with standard practice. All European and Ramsar sites within this study area have been identified, together with their qualifying interest features. The initial study area based on 15 km is a pragmatic starting point and is based on existing guidance for plans rather than projects. It is precautionary and exceeds the Impact Risk Zones (IRZs) for designated sites that have been set by Natural England. Moreover, there are no hydrological links to European and Ramsar sites beyond this distance, no such sites designated for bats within 25 km (the nearest, Eversden and Wimpole Woods SAC, being over 70 km distant) and no such sites designated for pink-footed goose (a highly mobile forager) within 25 km (the nearest, the Wash SPA, being over 100 km distant).

3.6.2 Impacts occurring within the onshore ECC are not likely to be perceptible at designated sites beyond 15 km, however the possibility cannot be fully discounted and sites beyond this distance may need to be screened in if substantial impacts and clear pathways are identified at later stages of the assessment.

4 SCREENING FOR THE PROJECT ALONE

4.1 SCREENING CONSULTATION

4.1.1 Discussions regarding VE, including the approach to screening undertaken within the first version of this HRA Screening Report, have been held through the EP process. Expert Topic Group (ETG) meetings for relevant technical areas were held in January and February 2020 when the grid connection was expected to be in Friston in Suffolk. Whilst comments where relevant have been taken into account a subsequent round of ETGs was held in July and August 2021 to reconsult on the approach to scoping in light of the revised grid connection offer in Essex.

4.1.2 In October 2021, the first version of this HRA Screening Report was the focus of a five-week public consultation, during which formal technical reviews of the approach to the screening of impacts was provided.

4.1.3 Table 4.1 below summarises the comments received, or discussion held to date where they relate to the HRA Screening exercise and wider HRA process. Consultees involved in the EP meetings and/or consulted in writing include the following (in alphabetical order):

- Cefas;
- Environment Agency;
- Essex County Council;
- Marine Management Organisation (MMO);
- Natural England;
- Eastern IFCA;
- Royal Society for the Protection of Birds (RSPB);
- Tendring District Council; and
- The Wildlife Trusts (TWTs).

Table 4.1: Summary of consultation undertaken on the HRA Screening Report.

Consultee	Reference	Summary of discussions, agreements and applicant response
Cefas MMO Natural England TWT	Marine Mammal ETG Meeting 20 July 2021	No objections were received on the approach to HRA screening.
Cefas Environment Agency Essex County Council Marine Management Organisation	Physical processes, Benthic, Fish and Shellfish ETG Meeting 12/08/21	VE OWFL presented that approach to HRA screening for benthic and fish receptors. Any sites within benthic designated features were identified within 50 km of the offshore AoS and the Array Areas to identify a long list of sites. Once the long list had been identified then increases in suspended sediment concentrations were considered using a precautionary zone of influence (ZoI) of 20 km considered for connectivity. No transboundary sites with benthic qualifying features within the 20 km ZoI were identified. VE OWFL also summarised the approach for migratory fish species. The approach to screening considered a 100 km buffer and considered any upriver species of relevance to the assessment. No UK sites were identified but a number of transboundary sites designated for lamprey and shad were identified and have been considered further within this HRA screening document. No objections by attendees were raised.
Environment Agency Essex County Council RSPB	Onshore Ecology ETG meeting 12/08/21	VE OWFL presented the new onshore AoS to attendees and noted the rationale and process for site selection. VE OWFL confirmed there are no areas of direct overlap with the onshore AoS and any National Site Network or Ramsar sites. The onshore AoS is adjacent to the Hamford Water SPA, Ramsar and SAC. A 15 km buffer around the onshore ECC will be used to identify relevant designated sites for screening. More distant sites will be considered where an impact pathway is identified. VE OWFL presented the impact pathways identified and sites screened for LSE. Impact pathways considered for LSE: > Loss of bird habitat outside designated site; > Bird Disturbance/ Displacement outside designated site; > Water quality: pollution from site run-off affecting prey availability; > Impacts on supporting populations of plants and/or invertebrates. Designated sites noted for potential LSE: > Hamford Water SAC, SPA and Ramsar; > Stour and Orwell Estuaries SPA and Ramsar; > Colne Estuary SPA and Ramsar; > Abberton Reservoir SPA and Ramsar; > Blackwater Estuary SPA and Ramsar; > Dengie SPA and Ramsar. No objections were raised to the approach to HRA screening

Consultee	Reference	Summary of discussions, agreements and applicant response
Essex County Council Natural England MMO RSPB	Offshore Ornithology ETG 18/08/21	VE OWFL presented the new offshore AoS to attendees and noted the rationale and process for site selection. Apportioning of birds to SPAs will be undertaken based on connectivity and foraging ranges in accordance with the recent examples from nearby OWF projects. If the 1% threshold of populations affects is exceeded, then it is proposed that population models will be used to inform the assessment. VE OWFL presented the approach to HRA screening based on the screening criteria detailed in Section 3.4 and Table 3.2. Natural England noted that the most recent advice states that a 10 km displacement of red-throated diver should be considered, and this supersedes the previously published guidance. VE OWFL noted this would be considered within the HRA process but at the screening stage the Outer Thames Estuary SPA will be screened in. Natural England suggested that the minimum blade height (draught height) should be moved as high as possible as best practice to mitigate collision risk based on recent concerns on cumulative and in-combination effects. It was acknowledged that this would be considered during project development and assessment for the PEIR but will not be considered at the HRA screening stage. Queries were raised by stakeholders around when discussions on derogation matters would take place. It was confirmed that these would commence as early as possible but not in advance of the HRA screening exercise.
Natural England	Onshore Ecology ETG Catch Up 06/09/21	An additional onshore ecology meeting was held with Natural England to provide an opportunity for Natural England to provide feedback on any relevant components including the approach to HRA. VE OWFL reviewed the approach to HRA screening as discussed with the wider ETG members on the 12/08/21. NE were in broad agreement with the approach and raised no objections to the HRA screening strategy. Methodologies were also agreed to by NE for the proposed wintering bird surveys.
Natural England	Physical processes, benthic ecology and fish and shellfish, ETG Catch Up 13/09/21	An additional physical processes, benthic ecology and fish and shellfish ecology meeting was held with Natural England to provide an opportunity for Natural England to provide feedback on any relevant components including the approach to HRA. VE OWFL presented the approach to HRA screening as discussed with the wider ETG members on the 12/08/21. No further feedback was received on the approach.
HRA Public consultation response from: Natural England	Benthic ecology, marine mammals, offshore and intertidal ornithology, migratory fish, onshore ecology October-November, 2021	A five-week public consultation period was launched to invite comments on the first version of the HRA Screening Report. Natural England was the only consultee that provided detailed feedback, noting that there remained data gaps regarding species (receptors) and potential impacts both within, and around, the expected ZoI of the proposed development across both breeding and non-breeding seasons, particularly for ornithological features. Natural England requested that certain aspects of the report be addressed before their being able to agree that it was sufficient for inclusion within an application. Table 4.2 (Benthic and intertidal ecology), Table 4.3 (Offshore and intertidal ornithology), Table 4.5 (Marine mammals), Table 4.7 (Migratory fish) and Table 4.8 (Onshore ecology) outline the key concerns raised and how these have been addressed.

Table 4.2: Benthic and intertidal ecology comments submitted by Natural England on HRA Screening Report, October 2021

Comment	Summary of applicant response
ASSESSMENT OF NATURAL CHANGE > Natural England requested evidence supporting the assessment of natural change, including changes in biotope, communities and biogenic reef structures or distribution over the last 10 years. Evidence should include maps and statistics and consideration of identification of additional change, whether anthropogenic or natural.	> In the absence of time-series data with appropriate replication it is not considered possible to undertake statistical analysis, however the evolution of the baseline is discussed further in Paragraph 5.7.88 of Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology. See also paragraphs 2.2.4 to 2.2.5 above.
ROSS WORM, SABELLARIA SPINULOSA > Noted that this was a common organism recorded. Requested definition of reef, along with an understanding of what evidence definition is based on (to include abundance measures) and mapped records.	> The benthic survey contractor has made an assessment of any areas where *Sabellaria spinulosa* crusts are identified using Gubbay (2007). See paragraph 2.2.9.
SEDIMENT SIZE FRACTION ANALYSIS > There is a need to assess the 0.5-1.0mm size fraction as part of the survey planning and subsequent analysis in sediment grab sampling, analysis and reporting. Details on the planned sampling locations and which type of sampling equipment used is required.	> Sediment samples were analysed by Fugro using dry sieve analysis and laser diffraction. Dry sieve particle size distribution analysis was undertaken in accordance with Fugro in-house methods based on the North East Atlantic Marine Biological Association Quality Control (NMBAQC) scheme's best practice guidance document – Particle Size Analysis (PSA) for Supporting Biological Analysis: 2016, and British Standards (BS) 1377: Parts 1: 2016 and 2: 1990). Representative material > 1 mm was split from the bulk sub-sample and oven dried before being sieved through a series of sieves with apertures corresponding to 0.5 phi intervals between 63 mm and 1 mm as described by the Wentworth scale (Wentworth, 1922). The weight of the sediment fraction retained on each mesh was subsequently measured and recorded. Data was presented using the Folk sediment classification and also the Wentworth sediment descriptions See Appendix 5.1 and 5.2 of Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology for further details.
MARGATE AND LONG SANDS SAC > The cable corridor overlaps with sections of the Margate and Long Sands SAC designated site. Carefully consider designated habitats and species and note the advice provided previously on the concerns of impact to this designated site and the potential need for compensatory measures for any cable protection.	> The RIAA will present a full assessment of the potential for AEoI on Margate and Long Sands SAC as a result of cable protection.

Table 4.3: Offshore and intertidal ornithology comments submitted by Natural England on HRA Screening Report, October 2021

Comment	Summary of applicant response
Baseline data sources > Existing data sources should include reference to Outer Thames Estuary SPA surveys and GPS tagging data from Alde-Ore Estuary SPA undertaken as part of the Galloper OWF post consent monitoring. > Further information on the species densities that have been recorded on site should be presented. > Inclusion of a description of the site-specific intertidal baseline surveys that will be used in the assessment should be provided.	> Confirmation that these three reports will be used to inform the ornithological baseline is provided in Section 2.4. > Table 2.2 summarises the abundances and estimated densities of species recorded over 24 months in the VE site ornithological surveys presented in Volume 6, Part 5, Annex 4.1 to 4.7). > Section 2.4 describes further details of the intertidal baseline surveys.
Breeding season connectivity > The Mean Maximum Foraging ranges (MMF) + 1SD if used in isolation could be expected to wrongly screen out a certain percentage of colonies with maximum foraging ranges that exceed the mean value (c 16%). Recommended that a two-step process is applied to screening: 1. Woodward *et al*. (2019) MMF +1 SD for each relevant species; and then 2. Cross checking against colony specific foraging ranges to ensure no relevant colonies are missed from being screened in.	> In the assessment presented in the RIAA, the use of MMF+1SD represents a precautionary approach to screening in sites (the NatureScot guidance recommends only MMF). In addition, the apportioning equation is weighted by the square of distance, meaning that impacts are attributed to closer colonies, and those beyond roughly 100km get very little weighting. The sites and species screened in, and data used to inform the RIAA, were presented and discussed at the Offshore Ornithology ETG on 17/11/22 attended by Natural England and other participants – no changes or additional sources were proposed by participants, and no further sites of concern were raised.
Red-throated diver > Criteria 3 (displacement). Recent evidence suggests that red-throated diver can be displaced from operational OWFs out to 10km or more and therefore, screening of designated sites with red-throated diver should be based on a minimum of 10km from the development. > Red-throated diver not within breeding foraging range so does not fit under Criteria 2. > Depending on the port location for operation and maintenance vessels there may be the potential for an LSE for disturbance/displacement of red throated diver at the Outer Thames Estuary SPA from O&M vessel movements if they may have to travel through the SPA to reach the Five Estuaries site.	> Red-throated diver has already been screened in for displacement. No changes made. > Removed red-throated diver from Table 3.3. > Red-throated diver has already been screened in for displacement from vessels. No changes made.
Disturbance/displacement during construction > Disagreement with the assumption that there is no LSE for direct disturbance and displacement due to the presence of turbines during the construction phase. This is because as construction progresses, more turbines and built, the spatial scale increases until the entire array is built (although not yet operational) but still presents the same displacement stimulus as an operational farm. For assessment of construction phase displacement, we advise the Applicant considers the pragmatic method employed at Dogger Bank Creyke Beck A&B and Teesside A&B by calculating operational displacement per species and reducing by 50% during the construction period (to broadly reflect reduced spatial and temporal scale) across the range of displacement mortality advised by Natural England for a particular species. We recommend this approach is taken for construction displacement assessments for red-throated diver, gannet and auks.	> Potential for LSE from direct disturbance and displacement due to the presence of turbines identified during construction for red-throated diver of Outer Thames Estuary SPA, gannet and auks of Flamborough and Filey Coast SPA. Table 4.14 updated.
Lesser black-backed gull, non-breeding > LSE for Alde-Ore Estuary SPA and Ramsar should not be ruled out for collision risk for all seasons for lesser black-backed gull and the year-round collision impact should be considered further.	> Changes made to Table 4.14 so that lesser black-backed gull is now screened in for LSE in non-breeding season for collision risk.

Comment	Summary of applicant response
Gannet, non-breeding > LSE for Flamborough and Filey Coast should not be ruled out for displacement and collision risk for all seasons for gannet and the year-round collision and displacement impact should be considered further. In addition, the combined impacts from displacement and collision should also be considered for this feature.	> Changes made to Table 4.14 so that gannet is now screened in for LSE for displacement and collision risk (plus the combined impact) in both breeding and non-breeding seasons.
Little gull > Little gull has not been considered as a qualifying feature for Greater Wash SPA – it should be considered.	> Changes made to Table 4.14 so that Little gull is now screened in for LSE.
Auks of Farne Islands SPA, Coquet Island SPA and Flamborough and Filey Coast SPA, non-breeding season > Consider SPAs where there is an impact pathway in the non-breeding season (even if there is no impact pathway in the breeding season). Given the potential for all three auks to winter in the North Sea, this would therefore include consideration of the Farne Islands SPA (guillemot and the seabird assemblage feature, which includes razorbill and puffin), Coquet Island SPA (seabird assemblage feature, which includes puffin) and guillemot and razorbill of Flamborough and Filey Coast SPA.	> Changes made to Table 4.14 whereby guillemot and razorbill of these SPAs are now screened in.
Non-seabird collision risk > Recommended that assessment of collision risk to intertidal features are assessed through use of a migration modelling approach (e.g. SOSS-MAT as described in Wright *et al*. 2012, or the APEM developed migropath tool), with the resultant predicted numbers put through the migrant collision risk tab of the Band (2012) spreadsheet (as was done by Norfolk Boreas). Consideration should also be given to in-combination collision assessment for these qualifying features of sites for Five Estuaries in-combination with North Falls, Greater Gabbard and Galloper as a minimum.	> Collision risk modelling has been used to inform the RIAA. Updates made to confirm that appropriate features are now screened in in Table 4.16.
In-combination assessment > Disagreement that projects that are built and operational at the time the site was designated should be classified as part of the baseline condition. > Note that some offshore wind projects located within the North Sea and Channel that have potential for connectivity have been omitted for the list of projects to be included in the in-combination assessment. Furthermore, refined impact calculations are available for Hornsea 4, Dudgeon and Sheringham Shoal Extension projects and Rampion 2 are now available and should be used to inform in-combination assessment impacts of VE.	> It is noted in Advice Note 17 (PINS, 2019) that where other projects are expected to be completed before the construction of the proposed NSIP and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline and have been considered as part of assessment in the construction and operational phase (noting that the assessment should clearly distinguish between projects forming part of the baseline and those in the Cumulative Effects Assessment). No changes made. > The draft RIAA will use the most up to date published information at the time of assessment for incorporation into the in-combination ornithological assessment. The list of projects and associated numbers will be agreed through the ornithology ETG. Round Four projects to be included are updated in Section 5.4.

Table 4.4: Offshore and intertidal ornithology Section 42 comments submitted by Natural England on RIAA, June 2023

Comment	Summary of applicant response
Breeding kittiwake populations > Breeding kittiwake population from Lowestoft is not included in the EIA, but VE array lies within the mean-max foraging range of the species. NE advise adding this population to the list IOFs and include it in the CEA.	> The Lowestoft populations of kittiwake will be added to the list of IOFs and included in the CEA.
Red-throated diver – Outer Thames Estuary SPA > The assessment of impacts on Outer Thames Estuary SPA RTD from construction and operational effects is focussed on potential mortality. NE considers the potential for construction phase disturbance during cable installation and construction/O&M vessel movements warrants consideration in terms of disturbance levels in the SPA and the loss of supporting habitat within the site within a given winter period. Several OWF have adopted NE's advised best practice protocol for vessel movements within diver SPAs and NE consider this a minimum requirement. Depending on the analysis of the duration and extent of supporting habitat loss, NE may seek a seasonal restriction (or other mitigation measures) to cable-installation activities within the SPA.	> Changes made to Table 4.14 so that red-throated diver is now screened in for LSE for loss of supporting habitat and disturbance during construction phase and O&M vessel movements.

Table 4.5: Marine mammal comments submitted by Natural England on HRA Screening Report, October 2021

Comment	Summary of applicant response
Seal mUS (connectivity and ranges) > Information provided in the baseline should be sufficient to inform the screening exercise (e.g., on the movement, foraging, connectivity, ranges and haul out sites for seals). > The screening report should include a figure showing the extent of the MUs being used for screening, including references to demonstrate where the MUs have come from. This should also include maps of telemetry, to demonstrate the appropriateness of the MUs screened in for seals. > It is important that the MUs and the key SACs in those MUs are screened in consistently. The North East England should be screened in if the Berwickshire and North Northumberland Coast SAC is screened in, given that it is the key SAC in the North East England MU. > Further information should be provided on connectivity of seals to the transboundary sites included in Table 5.5.	> Further information on the movement, foraging ranges, connectivity and haul out sites for seals has been provided in Section 2.3. > Figure 3.1 presents the MUs used to inform screening of marine mammal designated sites. A full Marine Mammal Baseline Characterisation is provided in Volume 6, Part 5, Annex 7.1 which presents full details on site-specific surveys, datasets used to inform density estimates for harbour porpoise, seal telemetry tracks, seal habitat preferences and marine mammal MU information. Baseline information of relevance to this HRA Screening Report is summarised in Section 2.3. > Addition of Figure 3.1 and updated to Table 3.1 to include the North East England Management Unit. > Further information on the potential for connectivity of seals to transboundary sites has been provided in Section 2.3.
Underwater noise impacts > Consider and acknowledge different pathways resulting from underwater noise (i.e., barrier effects, potential for Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS), and disturbance).	> Disturbance/ TTS, barrier effects and PTS all are now considered as impact pathways resulting from underwater noise for the sites in Table 4.12 that are noted to have connectivity with the VE site.
Changes to prey, habitat loss and disturbance > Natural England advise that 'changes to prey and habitat loss' cannot be screened out for seal sites at this stage based on the distance only. If there is connectivity with the site, there is a potential for foraging and as such it cannot be screened out before assessing the potential for LSE.	> Changes to prey, habitat loss and disturbance impacts have been screened in for the sites in Table 4.12 that are noted to have connectivity with the VE site. > Disturbance at haul out locations has been screened in for the sites in Table 4.12 that are noted to have connectivity with the VE site.

Comment	Summary of applicant response
> Similarly, ‘disturbance at haul out sites’ cannot be screened out for seal sites until more information is known about port use and vessel traffic.	

Table 4.6: Marine mammal comments submitted by Natural England on RIAA, June 2023

Comment	Summary of applicant response
Habitat loss impacts > Natural England advise that habitat loss needs to be included as an impact pathway for all relevant sites. There is a clear overlap with the Southern North Sea Special Area of Conservation (SNS SAC). Habitat loss should be taken through to the Appropriate Assessment stage unless a clear justification can be made that there would be no Likely Significant Effect (LSE) either alone, or in-combination with other projects with footprints within the SNS SAC.	> Noted. Relevant sections (Section 4.3,) updated.
Vessel disturbance impacts > Natural England seeks clarification as to why vessel disturbance during the operation and maintenance phase was not screened in for Southern North Sea Special Area of Conservation (SNS SAC). Provide justification why this impact pathway was not screened in, considering that there is a potential for disturbance and vessel collision due to the presence of vessels during the operation and maintenance phase.	> Noted. Relevant sections (Section 4.3) updated.

Table 4.7: Migratory fish comments submitted by Natural England on HRA Screening Report, October 2021

Comment	Summary of applicant response
species selection > Herring and Sandeel are key prey species for SPA/SAC species (i.e., for terns). Herring are known to use the greater Thames estuary as a spawning and nursery ground which is within the 100km buffer used to screen sites. As herring are a hearing specialist they should be considered for inclusion in assessments of LSE, specifically for underwater noise impacts during construction and for in-combination impacts on SPAs. > Sandeels should also be considered for inclusion as they are a key prey species for a number of bird and cetacean species that have been screened in for LSE and are known to use the vicinity of the OWF for spawning and nursey areas. Their benthic habits means that populations are sensitive to local impacts such as habitat loss, habitat change, and underwater noise. This species should also be considered for inclusion in LSE assessments during construction and when assessing in-combination impacts on SACs.	> Section 2.5 describes the baseline for migratory fish. The potential for LSE on SPA and SAC features as a result of impacts on prey species has been addressed in the relevant Section within this report (see 'Changes in prey availability and behaviour' in Section 4.4, and 'Changes to prey' in Section 4.5).

Table 4.8: Onshore ecology comments submitted by Natural England on HRA Screening Report, October 2021

Comment	Summary of applicant response
Disturbance pressures > Requested further clarification of disturbance pressures to include noise, light, vibration, trampling and presence of people and structures.	> Table 4.19 updated with these pathways under disturbance.
Air quality impacts > Ensure potential air quality impacts to designated sites are considered throughout.	> Table 4.19 and Table 4.20 have been updated and sites have now been screened in for LSE as a result of potential air quality impacts.
Water Quality and Quantity > It may be necessary to consider dewatering and the effect on water tables and water quality and quantity in relation to designated sites and features within the water catchments. Ensure potential water quality/quantity impacts are considered against conservation objectives and targets for each feature.	> Table 4.19 and Table 4.20 have been updated with 'decreases in water quantity', 'water quality: pollution from site run-off affecting habitat quality' and 'water quality: pollution from site run-off affecting prey availability' impact pathways. LSE has been identified for Hamford Water SPA, Ramsar and SAC, Stour and Orwell Estuaries SPA and Ramsar, Abberton Reservoir SPA and Ramsar and Blackwater Estuary SPA and Ramsar.
Missing Ramsar features > The Stour and Orwell Ramsar invertebrate assemblage and plant assemblage do not appear to have been assessed for LSE.	> Assessed noteworthy and nationally important invertebrate assemblage and flora species for LSE in Table 4.10 and Table 4.20.

4.2 SUBTIDAL AND INTERTIDAL BENTHIC ECOLOGY SCREENING

4.2.1 The study area for subtidal and intertidal benthic ecology for this project with respect to Stage 1 Screening is defined by the maximum range of relevant effects from VE. Initial site selection identified all sites with designated benthic features located within a 50 km range of the array areas.

4.2.2 The potential effects to be considered are identified in Table 4.9:, including the types of activity that could result in such effects at different stages of development. The maximum range of all such effects is defined as 20 km (as described in Chapter 9 Benthic and Intertidal Ecology of the VE Environmental Impact Assessment: Scoping Report (VE OWFL, 2021)); a precautionary value to fully encompass the maximum range of relevant effects as identified in the Galloper ES (typically defined by dispersion of suspended sediment).

Table 4.9: Benthic ecology receptor group potential effects from the project alone.

Potential Effect	Activities potentially resulting in effect		
	Construction	Operation and Maintenance	Decommissioning
Physical habitat loss/ disturbance	> Installation of structures; > Seabed preparation; > Seabed dredging; > Sediment disposal; > Installation of scour or cable protection; > Vessel movements/ anchoring; and > All in-combination effects.	> Physical presence of structures; > Maintenance of structures; > Presence of scour or cable protection; and > All in-combination effects	> Anticipated to be less than during construction.
Suspended sediment/ deposition	> Installation of structures; > Seabed preparation; > Seabed dredging and sandwave clearance; > Sediment disposal; > Installation of scour or cable protection, and > All in-combination effects	> Maintenance of structures; and > All in-combination effects	> Anticipated to be less than during construction
Accidental Pollution	> Release of contaminants; > Release of sediment (via all activities listed for suspended sediment/ deposition above); and > All in-combination effects		> Anticipated to be less than during construction
Invasive Non-Native Species (INNS)	> Vessel movements on and off site; > Installation of solid structures; and > All in-combination effects.	> Vessel movements on and off site; > Maintenance Activities; > Physical presence of structures; and > All in-combination effects.	> Anticipated to be less than during construction
EMF	> N/A	> Generation of EMF from installed cables.	> N/A
Changes to physical processes	> Installation of Structures.	> Physical presence of structures > Installation of cable and scour protection (where required).	> N/A

4.2.3 Stage 1 Screening (as presented in Table 4.10:) determines the potential for a pathway to exist between VE and each designated site identified through the initial site selection process during construction, operation & maintenance and decommissioning. Where potential for a pathway exists, potential for LSE is concluded. All sites where potential for LSE has been concluded for benthic receptors are depicted in Table 4.10 below.

Table 4.10: Potential for LSE for subtidal and intertidal benthic ecology from the project alone[4]

Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Vlaamse Banken SAC	34.75	40.43	83.76	Reefs Sandbanks which are slightly covered by sea water all the time	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (specifically marine mammals Table 4.12:)				
Thanet Coast SAC	56.14	45.43	46.28	Reefs Submerged or partially submerged sea caves	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*

[4] The screening range used for VE is taken from the tidal excursions presented in Figure 5.8 within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology which shows a maximum range of 22.5 km.

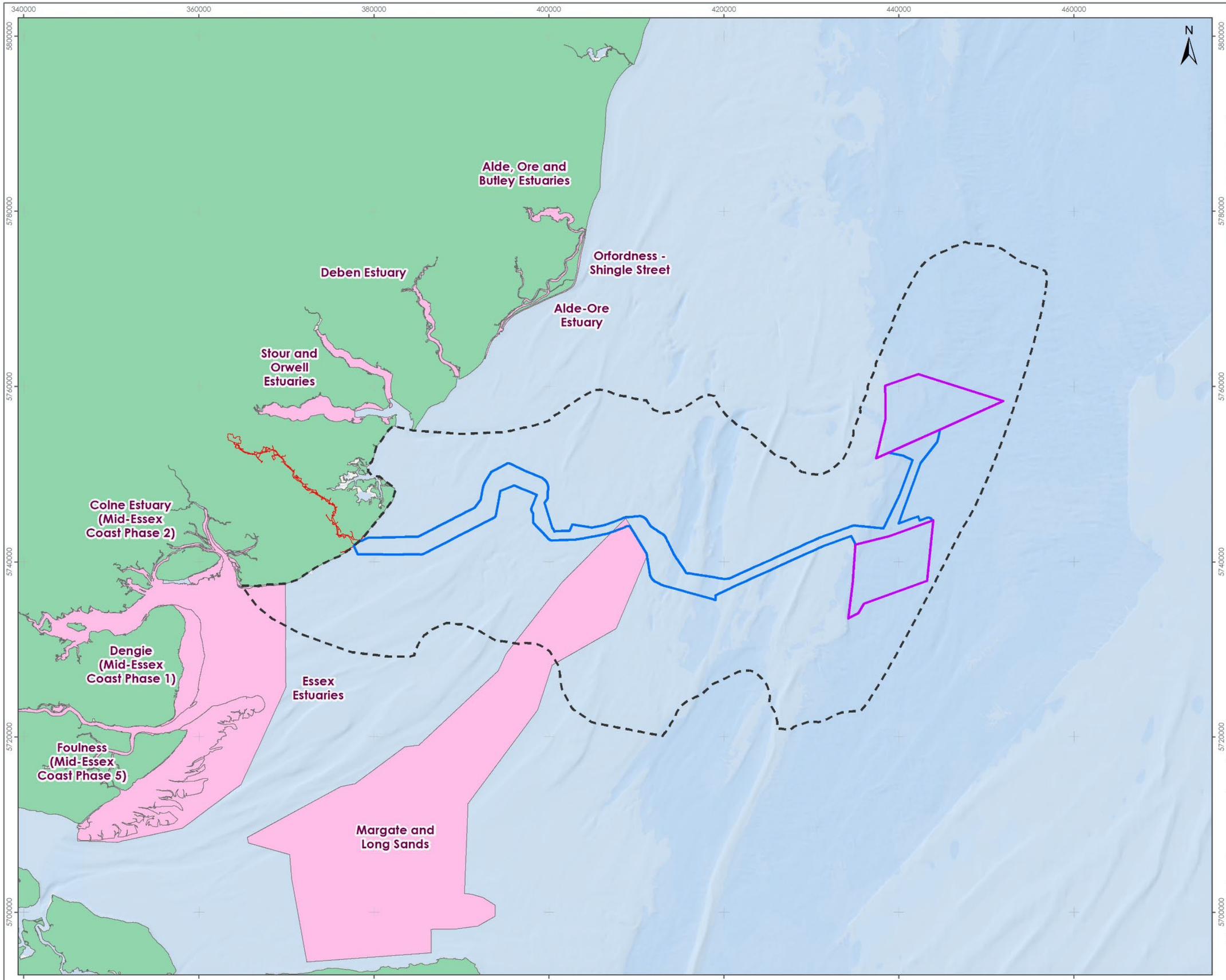
Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Bancs des Flandres SAC	49.11	52.62	78.32	Sandbanks which are slightly covered by seawater at low tide	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (specifically marine mammals Table 4.12:)				
Margate and Long Sands SAC	23.61	0	21.07	Sandbanks which are slightly covered by sea water all the time	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*Effects cannot be screened out at this stage and therefore there is a potential for LSE.*
Alde, Ore and Butley Estuaries SAC	37.44	15.11	27.42	Estuaries Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*

Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Orfordness – Shingle Street SAC	37.31	12.18	23.86	Coastal lagoons Annual vegetation of drift lines	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				Perennial vegetation of stony banks. (Coastal shingle vegetation outside the reach of waves)	As above	As above	As above	*Feature located outside the reach of waves and at distance from project boundary. No potential for LSE.*
Essex Estuaries SAC	64.27	7.41	7.21	Estuaries Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonizing mud and sand Spartina swards (*Spartinon maritimae*) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruitocosi*) Sandbanks which are slightly covered by sea water all the time	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*Effects cannot be screened out at this stage and therefore there is a potential for LSE.*

Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Deben Estuary Ramsar	48.32	11.28	19.92	Ramsar criterion 2: *Vertigo angustior* For ornithological criteria see Table 4.16:.	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (specifically ornithological receptors in Table 4.16:)				
Dengie (Mid-Essex Coast Phase 1) Ramsar	73.63	17.96	17.79	Criterion 1 – saltmarsh Criterion 2 – rare plant species and invertebrates Criterion 3 – saltmarsh species For ornithological criteria see Table 4.20:	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (see Table 4.20: for ornithological criteria)				

Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Stour and Orwell Estuaries Ramsar	54.67	12.62	3.10	Ramsar criterion 2: *Zostera noltei* *Spartina maritima* Other noteworthy and nationally important flora species: *Puccinellia rupestris* *Sarcocornia perennis* *Limonium humile* *Zostera angustifolia* Noteworthy invertebrate fauna of national importance: *Phaonia fusca* *Haematopota grandis (Meigen)* *Arctosa fulvolineata* *Baryphyma duffeya* Other Ramsar criteria addressed under Table 4.20:)	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (see Table 4.20: for ornithological criteria)				
Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	66.51	9.28	7.21	Ramsar criterion 1 (saltmarsh) Ramsar criterion 2 (12 species of nationally scarce plants and invertebrate species) Ramsar criterion 3 (full and representative sequences of saltmarsh plant communities covering range of variation in Britain) Other Ramsar criteria addressed under Table 4.20:	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening onshore under relevant receptor groups (see Table 4.20:)				

Designated Site	OVERLAP AND/OR RANGE			FEATURE(S) TO CONSIDER FOR POTENTIAL LSE	POTENTIAL EFFECTS			POTENTIAL FOR LSE
	ARRAY (KM)	OFFSHORE ECC (KM)	ONSHORE ECC (KM)		CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING	
Alde-Ore Estuary Ramsar	37.31	12.18	23.86	Ramsar criteria 2 (a number of nationally-scarce plant species and British Red Data Book invertebrates). Other Ramsar criteria addressed under Table 4.14 and Table 4.16:.	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (see Table 4.20 and Table 4.16:)				
Foulness (Mid-Essex Coast Phase 5) Ramsar	67.34	18.78	18.77	Ramsar Criteria 1 (saltmarsh) Ramsar Criteria 2 (a number of nationally-scarce plant species and British Red Data Book invertebrates) Ramsar Criteria 3 (full and representative sequences of saltmarsh plant communities covering range of variation in Britain)	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition Accidental Pollution INNS Changes to physical processes	*No potential for LSE as the site sits beyond the benthic subtidal study area as defined by the secondary Zone of Influence (ZoI) and therefore has been screened out.*
				All other features considered through screening under relevant receptor groups (noting that other features of this site have not been identified through site selection or screening)				



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Benthic Ecology Study Area
- Screened Benthic Designated Sites

0 5 10 20
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Screened Benthic Sites and Benthic Ecology Study Area

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Information	BPHB	BJ

DRAWING NUMBER: 4.1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

4.3 MARINE MAMMAL SCREENING

4.3.1 Table 4.11 presents the potential activities and resulting effects considered for the marine mammal receptors identified in Table 3.1.

Table 4.11: Marine mammal receptor group potential effects from the project alone.

POTENTIAL EFFECT	ACTIVITIES POTENTIALLY RESULTING IN EFFECT		
	CONSTRUCTION	OPERATION AND MAINTENANCE	DECOMMISSIONING
Underwater Noise (disturbance/TTS, barrier effects and PTS)	> Piling; > Unexploded Ordnance (UXO); > Construction vessel noise; > Other construction activities; > Acoustic/ geophysical surveys; > Acoustic Deterrent Devices (ADD); and > All in-combination effects	> Acoustic/ geophysical surveys; > Vessel noise; > Operational noise; and > All in-combination effects.	> Anticipated to be less than during construction
Vessel Disturbance	> Construction vessel movements; > Survey vessel movements; and > All in-combination effects.	> Maintenance vessel movements; > Survey vessel movements; and > All in-combination effects.	> Anticipated to be less than during construction
Collision Risk	> Vessel collision risk; and > All in-combination effects.		> Anticipated to be less than during construction
Accidental pollution and changes in water quality	> Release of contaminants; > Release of sediment (via all activities listed for suspended sediment/ deposition in Table 4.9:); and > All in-combination effects		> Anticipated to be less than during construction
Changes to prey	> Generation of underwater noise from construction/ maintenance activities; > Loss of supporting habitats (via all activities listed for physical habitat loss/ disturbance in Table 4.9); > Vessel movements; > EMF; and > All in-combination effects.		> Anticipated to be less than during construction
Habitat loss	> Removal of supporting habitat during installation of structures; and > All in-combination effects	> Prey habitat loss in footprint of structures/cable protection; and > All in-combination effects	> Anticipated to be less than during construction
Disturbance at haul out (non-physical disturbance)	> Vessel movements; and > All in-combination effects.		> Anticipated to be less than during construction

4.3.2 Stage 1 Screening (as presented in Table 4.12:) determines the potential for a pathway to exist between VE and each designated site identified through the initial site selection process during construction, operation & maintenance and decommissioning. Where potential for a pathway exists, potential for LSE is concluded. With regards to water quality impact pathway, the potential for a pathway to exist will be confirmed in the draft RIAA for which the results of sediment transport modelling will be available. All sites considered in the below screening table are depicted in Figure 4.2.

Table 4.12: Marine mammal site screening from the project alone.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
Berwickshire and North Northumberland Coast SAC	North East England MU	445.84	434.16	418.90	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	<u>Underwater noise (C):</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and underwater noise associated with VE. <u>Vessel collision and disturbance risk (C, O&M):</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC may result in increased collision and disturbance risk of grey seal (with vessels associated with activity relating to VE). <u>Changes to prey</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and changes in prey associated with VE. <u>Habitat loss</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC indicates the potential for grey seal habitat loss (caused by potential for disturbance and barrier effects as a result of increases in underwater noise). <u>Disturbance at haul out</u> It is not possible to screen out potential disturbance impacts at haul out sites for seals of this SAC since information on vessel use (movements, routes and levels of traffic) and the associated ports to be used is not yet available. <u>Decommissioning:</u> The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. The above, combined with the evidence to suggest connectivity (Vincent *et al*., 2017) therefore means that effects cannot be screened out at this stage and therefore there is a potential for LSE.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
						> Accidental pollution and changes in water quality	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Accidental pollution and changes in water quality > Habitat loss	> Accidental pollution and changes in water quality	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site, and the scale of the potential change.
Humber Estuary SAC	South East England MU	203.22	188.48	174.13	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	<u>Underwater noise (C):</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and underwater noise associated with VE. <u>Vessel collision and disturbance risk (C, O&M):</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC may result in increased collision and disturbance risk of grey seal (with vessels associated with activity relating to VE). <u>Changes to prey</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and changes in prey associated with VE. <u>Habitat loss</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC indicates the potential for grey seal habitat loss (caused by potential for disturbance and barrier effects as a result of increases in underwater noise). <u>Disturbance at haul out</u> It is not possible to screen out potential disturbance impacts at haul out sites for seals of this SAC since information on vessel use (movements, routes and levels of traffic) and the associated ports to be used is not yet available. <u>Decommissioning:</u> The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. The above, combined with the evidence to suggest connectivity (Vincent *et al*., 2017) therefore means that effects cannot be screened out at this stage and therefore there is a potential for LSE.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
						> Accidental pollution and changes in water quality	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Accidental pollution and changes in water quality > Habitat loss	> Accidental pollution and changes in water quality	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site, and the scale of the potential change.
Humber Estuary Ramsar	South East England MU	197.19	182.10	167.59	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	<u>Underwater noise (C):</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and underwater noise associated with VE. <u>Vessel collision and disturbance risk (C, O&M):</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC may result in increased collision and disturbance risk of grey seal (with vessels associated with activity relating to VE). <u>Changes to prey</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between grey seal and changes in prey associated with VE. <u>Habitat loss</u> The location of the project relative to the at sea usage area of grey seal together with connectivity to the SAC indicates the potential for grey seal habitat loss (caused by potential disturbance and barrier effects as a result of increases in underwater noise). <u>Disturbance at haul out</u> It is not possible to screen out potential disturbance impacts at haul out sites for seals of this SAC since information on vessel use (movements, routes and levels of traffic) and the associated ports to be used is not yet available. <u>Decommissioning:</u> The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. The above, combined with the evidence to suggest connectivity (Vincent *et al*., 2017) therefore means that effects cannot be screened out at this stage and therefore there is a potential for LSE.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
						> Accidental pollution and water quality	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Accidental pollution and water quality > Habitat loss	> Accidental pollution and water quality	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site, and the scale of the potential change.
Moray Firth SAC	Coastal East Scotland MU	725.82	716.56	702.82	Bottlenose dolphin	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Accidental pollution and changes in water quality > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Accidental pollution and changes in water quality > Changes to prey	No potential for LSE. The site has been screened out based on a lack of evidence to suggest connectivity.
Southern North Sea SAC	North Sea MU	0	0	28.04	Harbour Porpoise	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Habitat loss > Accidental pollution and changes in water quality > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Habitat loss > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) Habitat loss > Accidental pollution and changes in water quality > Changes to prey	Effects cannot be screened out at this stage and therefore there is a potential for LSE.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
Wash and North Norfolk Coast SAC	South East England MU	126.35	119.36	105.30	Harbour seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	<u>Underwater noise (C):</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between harbour seal and underwater noise associated with VE. <u>Vessel collision and disturbance risk (C, O&M):</u> The location of the project relative to the at sea usage area of harbour seal together with connectivity to the SAC may result in increased collision and disturbance risk of harbour seal (with vessels associated with activity relating to VE). <u>Changes to prey</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between harbour seal and changes in prey associated with VE. <u>Habitat loss</u> The location of the project relative to the at sea usage area of harbour seal together with connectivity to the SAC indicates the potential for harbour seal habitat loss (caused by potential disturbance and barrier effects as a result of increases in underwater noise). <u>Disturbance at haul out</u> It is not possible to screen out potential disturbance impacts at haul out sites for seals of this SAC since information on vessel use (movements, routes and levels of traffic) and the associated ports to be used is not yet available. <u>Decommissioning:</u> The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. The above, combined with the evidence to suggest connectivity (Vincent *et al*., 2017) therefore means that effects cannot be screened out at this stage and therefore there is a potential for LSE.
						> Accidental pollution and changes in water quality	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Accidental pollution and changes in water quality > Habitat loss	> Accidental pollution and changes in water quality	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site, and the scale of the potential change.

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
Transboundary sites for Harbour porpoise; Bancs des Flandres SCI; Doggersbank (Netherlands) SAC Klaverbank SCI; Noordzeekustone SCI; SBZ 1 SCI; SBZ 2 SCI; SBZ 3 SCI; Vlaamse Banken SAC; Vlakte van de Raan SCI; Voordelta SCI; Waddenzee SCI; and Westerschelde & Saeftinghe SCI.	Various	Various	Various	Various	Harbour porpoise	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Habitat loss > Accidental pollution and changes in water quality > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Habitat loss > Accidental pollution and changes in water quality > Changes to prey	No potential for LSE. The sites have been screened out based on a lack of evidence to suggest connectivity (no site within 26km of VE).

Designated Site	Management Unit	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
		Array (km)	Offshore ECC (km)	Onshore ECC (km)		Construction	Operation and maintenance	Decommissioning	
Transboundary sites for seals; Bancs des Flandres SCI; Doggersbank (Netherlands) SAC Klaverbank SCI; Noordzeekustone SCI; SBZ 1 SCI; SBZ 2 SCI; SBZ 3 SCI; Vlaamse Banken SAC; Vlakte van de Raan SCI; Voordelta SCI; Waddenzee SCI; and Westerschelde & Saeftinghe SCI.	Various	Various	Various	Various	Harbour seal; and Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Collision risk > Changes to prey > Habitat loss > Disturbance at haul out	> Collision risk > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Collision risk > Changes to prey > Habitat loss > Disturbance at haul out	<u>Underwater noise (C):</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between seals and underwater noise associated with VE. <u>Vessel collision and disturbance risk (C, O&M):</u> The location of the project relative to the at sea usage area of seals together with connectivity to the SAC may result in increased collision and disturbance risk of seals (with vessels associated with activity relating to VE). <u>Changes to prey</u> Potential for site connectivity is indicated from seal use at sea data. Therefore, there is the potential for some level of interaction between seals and changes in prey associated with VE. <u>Habitat loss</u> The location of the project relative to the at sea usage area of seals together with connectivity to the SAC indicates the potential for seal habitat loss (caused by potential disturbance and barrier effects as a result of increases in underwater noise). <u>Disturbance at haul out</u> It is not possible to screen out potential disturbance impacts at haul out sites for seals of this SAC since information on vessel use (movements, routes and levels of traffic) and the associated ports to be used is not yet available. <u>Decommissioning:</u> The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. The above, combined with the evidence to suggest connectivity (Vincent *et al*., 2017) therefore means that effects cannot be screened out at this stage and therefore there is a potential for LSE.
						> Accidental pollution and changes in water quality	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Accidental pollution and changes in water quality > Habitat loss	> Accidental pollution and changes in water quality	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site, and the scale of the potential change.

*Note: The maximum range considered relevant for this project and receptor is considered to be 26 km for Harbour porpoise. Disturbance modelling will dictate this distance for other species if relevant.

-500000 0 500000 1000000

6500000 6000000 5500000

N

Mousa SAC

Faray and Holm of Faray SAC

Moray Firth SAC

Berwickshire and North Northumberland Coast SAC

Southern North Sea SAC

Doggersbank SCI

Klaverbank SCI

Humber Estuary SAC / Ramsar

Noordzeekustzone SCI

Waddenzee SCI

The Wash and North Norfolk Coast SAC

Vlakte van de Raan SCI

Voordelta SCI

Westerschelde & Saeftinghe SCI

SBZ 3 / ZPS 3 SCI

SBZ 2 / ZPS 2 SCI

SBZ 1 / ZPS 1 SCI

Bancs des Flandres SCI

Vlaamse Banken SCI

0 10 20 40
Kilometers

LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Screened Mammals Designated Sites

0 50 100 200
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

All Designated Sites considered during the Screening Stage for Marine Mammal Features

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 4.2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:6,000,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

4.4 OFFSHORE AND INTERTIDAL ORNITHOLOGY SCREENING

4.4.1 Vessel activity during the construction phase has the potential to directly disturb and displace birds resulting in a reduction in the area available to birds for feeding, resting and moulting. The potential for impact on offshore birds from construction disturbance and displacement effects is greater for birds that occupy an area for a long period such as when they are breeding nearby or are resident for the winter.

4.4.2 Effects on habitats and prey species during the construction phase include those resulting from the production of underwater noise and suspended sediments caused by construction and vessel movements. These effects might alter the behaviour or availability of bird prey species such as fish and invertebrates. Similarly, these processes result in less prey being available within the construction area and a buffer around it to foraging birds.

4.4.3 The presence of the operating WTGs has the potential to directly disturb and displace birds from within and around the proposed OWF. This has the potential to reduce the area available to birds for feeding, resting and moulting. Vessel activity associated with routine and unplanned maintenance also has the potential to disturb and displace birds, equally resulting in a reduction in the area available to birds for feeding, resting and moulting. The potential for impact on offshore birds from operational disturbance and displacement effects is greater for birds that occupy an area for a long period such as when they are breeding nearby or are resident for the winter.

4.4.4 Effects on habitats and prey species during the operation phase include those resulting from the production of underwater noise, as will occur through the turning of the wind WTGs, the production of electro-magnetic fields (EMF) and the generation of suspended sediments, as will occur due to scour around foundations or maintenance activities. These effects might alter the behaviour or availability of bird prey species such as fish and invertebrates. Similarly, these processes result in less prey being available within the operation area and a buffer around it to foraging birds.

4.4.5 Birds which fly through the proposed WTG array whilst foraging for food, commuting between breeding sites and foraging areas or passing through on migration are at potential risk of collision with the WTG rotors and associated infrastructure. This might result in injury or death. The probability of this occurring will be predicted through collision risk modelling (CRM).

4.4.6 The presence of the operating OWF could potentially create a barrier to seasonal migratory movements and/ or regular foraging flights. The result would be permanent changes in bird flight routes. A bird making a detour around a WTG array would fly a greater distance, either daily or seasonally, which would increase its energy expenditure and potentially decrease its survival chances or those of the dependent young for which it was making foraging flights. Such effects might be expected to be greater on birds that regularly commute around a wind farm rather than on migrants that might encounter the wind farm once or twice per year.

4.4.7 The potential effects on offshore and intertidal seabird ornithology from the proposed VE project during different stages of development are summarised in Table 4.13.

Table 4.13: Summary of Potential Effects for offshore and intertidal seabird ornithology (relevant to determination of potential for LSE (yes - ✓, no - x)) from the project alone

Potential Effect	Construction	Operation	Decommissioning
Direct disturbance and displacement due to work activity and vessel movements in both the subtidal and intertidal zones	✓	✓	✓
Direct disturbance and displacement due to the presence of turbines	✓	✓	x
Collision risk due to the presence of turbines	x	✓	x
Barrier effects due to the presence of turbines	x	✓	x
Indirect impacts through effects on habitats and prey species	✓	✓	✓

4.4.8 For sites/features identified by the site selection process, consideration was given at Stage 1 Screening (as presented in Table 4.14) to determine the potential for a pathway to exist between VE and each designated site identified during construction, operation and decommissioning. Where potential for a pathway exists, the potential for LSE is concluded.

4.4.9 During site selection a number of transboundary sites were identified as having features that met Criteria 2 (having designated seabird features that are within MMF+1SD of VE). Due to the distances associated with these transboundary sites, assessment for screening has been grouped by feature. The assessments are presented in Table 4.14.

4.4.10 Additionally, for sites identified by the site selection process for non-seabird features, consideration was given to potential collision effects using migratory pathways provided in Wright *et al*. (2012). Table 4.16 provides an overview of the designated sites, relevant designated waterbird features and distance to the VE array boundary. This process focusses primarily on migratory waterbirds (i.e., wildfowl and waders). Other species of the associated designated sites have been assessed for breeding season and non-breeding season connectivity in Table 4.16.

Table 4.14: Potential for LSE for offshore and intertidal seabird ornithology from the project alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Outer Thames Estuary SPA	17.11	0.00	Red-throated diver	Changes in prey availability and behaviour Disturbance and displacement due to work activity and vessel movements Direct disturbance and displacement due to the presence of vessels. Habitat loss along the ECC	Changes in prey availability and behaviour Disturbance and displacement due to work activity and vessel movements Direct disturbance and displacement due to the presence of turbines Barrier effect	Changes in prey availability and behaviour Disturbance and displacement due to work activity and vessel movements	There is potential for disturbance and displacement of non-breeding red-throated divers within the SPA resulting from vessel movements within the offshore ECC. Therefore, there is a potential for LSE. The VE array areas are beyond the maximum expected extent of displacement/disturbance for red-throated divers, therefore, LSE from VE acting both alone can be discounted in relation to this effect. Red-throated divers tend to fly low over the sea so will be at very low risk of collision. Red-throated divers strongly avoid disturbance and offshore wind farms and so may have to fly further by flying around the VE site rather than through the wind farm. However, in the context of a migration of over 1000 km, the extra distance flown to pass an offshore wind farm represents a negligible increase in energy expenditure for the very few individuals that might be affected. Red-throated divers have a large foraging range, the pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE from VE acting alone can be discounted in relation to changes in prey availability, collision and barrier effects. There is potential for habitat loss during the winter period during the construction phase through the ECC location. Therefore, there is a potential for LSE.	Potential for LSE, consider disturbance and displacement from vessels within the RIAA
			Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement	This species has moderate vulnerability to collision risk with turbines (Bradbury *et al.*, 2014). Based on the proximity of the Array to the breeding colony and the number of foraging trips required by terns per day during the chick rearing period (Masden *et al.*, 2010), this effect cannot be screened out at this stage alone. Therefore, there is a potential for LSE. This species has a very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al.*, 2019). This	Potential for LSE, consider collision risk with turbines within the RIAA

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
					Barrier effect Risk of collision		species also has a low vulnerability to displacement (Bradbury *et al*., 2014) and barrier effect. Therefore, LSE from VE acting alone can be discounted in relation to these effects. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	
			Little Tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect Risk of collision	Changes in prey availability and behaviour Direct disturbance and displacement	The SPA is not within MMF+1SD of the array areas area and therefore does not have connectivity during the breeding season. However, as little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014), effects cannot be screened out at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts in the array areas alone. The SPA is within MMF+1SD of the offshore ECC area. Therefore, effects cannot be screened out at this stage for displacement within the offshore ECC. Therefore, there is a potential for LSE. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	Potential for LSE, consider collision risk with turbines and displacement within offshore ECC within the RIAA.
Alde-Ore Estuary SPA	37.31	12.18	Lesser black-backed gull	Changes in prey availability and behaviour	Changes in prey availability and behaviour	Changes in prey availability and behaviour	This SPA is within the MMF+1SD for lesser back-backed gull and therefore there may be connectivity during the breeding season for this species as it has a very high vulnerability to collision risk with turbines (Bradbury *et al*., 2014).	Potential for LSE, consider collision risk with turbines for all seasons within the RIAA

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
					Direct disturbance and displacement due to work activity and vessel movements Risk of collision Barrier effect		In addition, according to Furness (2015) it is possible for a project in the southern North Sea to have connectivity with this SPA during the non-breeding season. Therefore, since qualifying breeding features may still be afforded protection outside of the breeding season (the conservation objectives of all breeding seabird SPAs include the requirement to maintain abundance) activities that have the potential to significantly reduce abundance should be assessed regardless of time of year. Given the proximity of VE to the SPA, effects cannot be screened out at this stage alone both in and outside of the breeding season. Therefore, there is a potential for LSE. This species has no very low vulnerability to displacement or disturbance and barrier effects from OWF and vessel disturbance (Bradbury *et al*., 2014; Fliessbach *et al*., 2019). Therefore, LSE can be discounted in relation to this effect alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	
			Sandwich tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Risk of collision Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is within the MMF+1SD for sandwich tern and therefore may have connectivity during the breeding season. As, this species has moderate vulnerability to displacement by offshore wind farms (Bradbury *et al*., 2014) with some evidence of weak avoidance from post-construction monitoring (Dierschke, Furness & Garth, 2016). Therefore, there is a potential for LSE during the operation phase. This SPA is within MMF+1SD for sandwich tern of the array areas and therefore may have connectivity during the breeding season. As this species is vulnerable to displacement, barrier effects cannot be ruled out. Therefore, there is a potential for LSE. This species has moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014). Given the proximity VE to the	Potential for LSE, consider disturbance and displacement from turbines, barrier effects and collision risk with turbines within the RIAA

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
							SPA, effects cannot be screened out at this stage alone. Therefore, there is a potential for LSE. Sandwich tern have low sensitivity to disturbance by vessel traffic (Fliessbach *et al*., 2019). Therefore, LSE can be discounted during the construction phase alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	
			Little Tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Risk of collision Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	The SPA is not within MMF+1SD of the array areas area and therefore does not have connectivity during the breeding season. However, as little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014), effects cannot be screened out at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts in the array areas alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	Potential for LSE, consider collision risk with WTGs within the RIAA
Alde-Ore Estuary Ramsar	37.31	12.18	Lesser black-backed gull	Changes in prey availability	Changes in prey availability	Changes in prey availability and behaviour	This SPA is within the MMF+1SD for lesser back-backed gull and therefore may have connectivity during the breeding season. This species has a very high vulnerability to collision	Potential for LSE, consider collision risk

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
			Other features addressed in Table 4.10: and Table 4.16:.	and behaviour	and behaviour Direct disturbance and displacement due to work activity and vessel movements Risk of collision Barrier effect		risk with turbines (Bradbury *et al*., 2014). Given the proximity VE to the Ramsar, effects cannot be screened out at this stage alone. Therefore, there is a potential for LSE. In addition, according to Furness (2015) it is possible for a project in the southern North Sea to have connectivity with this site during the non-breeding season. Therefore, since qualifying breeding features may still be afforded protection outside of the breeding season (the conservation objectives of all breeding seabird SPAs include the requirement to maintain abundance) activities that have the potential to significantly reduce abundance should be assessed regardless of time of year. This species has no very low vulnerability to displacement or disturbance and barrier effects from OWF and vessel disturbance (Bradbury *et al*., 2014; Fliessbach *et al*., 2019). Therefore, LSE can be discounted in relation to this effect alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	with WTGs within the RIAA
Minsmere-Walberswick SPA	41.75	36.98	Little tern (see Table 4.16 for waterbirds)	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	This SPA is outside of the MMF+1SD for little tern from the array areas area, therefore, there is unlikely to be connectivity during the breeding season. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts during all phases alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone. As little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014), effects cannot be screened out	Potential for LSE, consider collision risk with WTGs within the RIAA

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
							at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	
Minsmere-Walberswick Ramsar	41.75	36.98	Little tern	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	This SPA is outside of the MMF+1SD for little tern from the array areas area, therefore, there is unlikely to be connectivity during the breeding season. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts during all phases alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone. As little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014), effects cannot be screened out at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	Potential for LSE, consider collision risk with WTGs within the RIAA
			Black-headed gull	Changes in prey availability and behaviour Direct disturbance	Direct disturbance and displacement Collision risk due to the	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is outside of the MMF+1SD for black-headed gull from the array areas area, therefore, there is unlikely to be connectivity during the breeding season. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				and displacement	presence of turbines Indirect impacts through effects on habitats and prey species		(Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts during all phases alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone.	
			Mediterranean gull	Changes in prey availability and behaviour Direct disturbance and displacement	Direct disturbance and displacement Collision risk due to the presence of turbines Indirect impacts through effects on habitats and prey species	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is outside of the MMF+1SD for Mediterranean gull from the array areas area, therefore, there is unlikely to be connectivity during the breeding season. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts during all phases alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone.	No LSE alone
Hamford Water SPA	51.04	3.10	Little tern Other species considered in Table 4.20.	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	The SPA is not within MMF+1SD of the array areas area and therefore does not have connectivity during the breeding season. However, as little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al*., 2014), effects cannot be screened out at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al*., 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts in the array areas alone.	Potential for LSE, consider collision risk with WTGs and displacement within the RIAA

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
							The SPA is within MMF+1SD of the offshore ECC. Therefore, effects cannot be screened out at this stage for displacement in the offshore ECC. Therefore, there is a potential for LSE. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	
Thanet Coast and Sandwich Bay SPA	57.64	45.89	Little tern	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement due to work activity and vessel movements	The SPA is not within MMF+1SD of the array areas area and therefore does not have connectivity during the breeding season. However, as little tern have moderate vulnerability to collision risk with turbines (Bradbury *et al.*, 2014), effects cannot be screened out at this stage alone for mortality due to collision during the migration period. Therefore, there is a potential for LSE. Migratory birds may pass windfarms during their migrations; however, are at low risk of adverse impacts from displacement and barrier effect. The cost of one-off avoidances during migration are trivial, accounting for less than 2% of available fat reserves (Speakman *et al.*, 2009 – sandwich tern). Therefore, LSE can be discounted for displacement impacts in the array areas alone. The SPA is not within MMF+1SD of the offshore ECC. Therefore, effects can be ruled out at this stage for displacement in the offshore ECC. Therefore, LSE can be discounted for this impact alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effect alone.	Potential for LSE, consider collision risk with WTGs within the RIAA
Greater Wash SPA	62.77	69.48	Sandwich tern	Changes in prey availability	Changes in prey availability	Changes in prey availability and behaviour	This SPA is not within the MMF+1SD for sandwich tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				and behaviour	and behaviour	Direct disturbance and displacement	areas site. Therefore, LSE can be discounted in relation to effects alone.	
			Common tern	Direct disturbance and displacement	Direct disturbance and displacement Barrier effect		This SPA is not within the MMF+1SD for common tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Little Tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Little gull	Changes in prey availability and behaviour Direct disturbance and displacement	Direct disturbance and displacement Collision risk due to the presence of turbines Indirect impacts through effects on habitats and prey species	Changes in prey availability and behaviour Direct disturbance and displacement	Following Bradbury (2014), little gull has moderate collision vulnerability but very low displacement risk. Dierscke *et al.* (2016) mention that construction and the turbulence of operational turbines may affect food availability for little gull.	Potential for LSE, consider collision risk with WTGs, changes in prey availability and disturbance/displacement within the RIAA
Colne Estuary (Mid-Essex Coast Phase 2) SPA	66.51	9.28	Little tern For birds onshore see Table 4.20.	Changes in prey availability and behaviour	Changes in prey availability and behaviour	Changes in prey availability and behaviour	This SPA is not within the MMF+1SD for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				Direct disturbance and displacement	Direct disturbance and displacement Barrier effect	Direct disturbance and displacement		
Foulness (Mid-Essex Coast Phase 5) SPA	67.36	18.79	Sandwich tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al*., 2019). Therefore, LSE can be discounted in relation to C&D disturbance and displacement effects alone. This SPA is not within the MMF+1SD of the array areas for sandwich tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to O&M effects alone.	No LSE alone
			Common tern				These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al*., 2019). Therefore, LSE can be discounted in relation to C&D effects alone. This SPA is not within the MMF+1SD of the array areas for common tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to O&M effects alone.	No LSE alone
			Little Tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Breydon Water SPA	72.55	73.70	Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for common tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	77.69	19.65	Little tern Other features considered in Table 4.20.	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA collision impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Medway Estuary and Marshes SPA	96.42	51.30	Little tern Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for common tern and little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Dungeness, Romney Marsh and Rye Bay SPA	103.34	83.95	Common tern Sandwich tern Little tern	Changes in prey availability and behaviour	Changes in prey availability and behaviour	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for common tern, little tern and sandwich tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				Direct disturbance and displacement	Direct disturbance and displacement Barrier effect		areas site. Therefore, LSE can be discounted in relation to effects alone.	
North Norfolk Coast SPA	126.13	119.10	Little tern Sandwich tern Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern, common tern and sandwich tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
North Norfolk Coast Ramsar	126.13	119.10	Sandwich tern Common tern Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for common tern, little tern and sandwich tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
The Wash SPA	146.96	122.59	Common tern Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for common tern and little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Gibraltar Point SPA	170.97	152.60	Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Humber Estuary SPA	197.19	182.10	Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Flamborough and Filey Coast SPA	275.50	264.61	Kittiwake	Changes in prey availability and behaviour	Collision risk Changes in prey availability and behaviour Barrier effect	Changes in prey availability and behaviour	Despite the Array being within the species MMF+1SD (Woodward *et al*. 2019) from this site, tracking data (FAME tracking data collected by the RSPB) and habitat utilisation modelling based on tracking data (Cleasby *et al*. 2020) show no connectivity during the breeding season. However, there is potential for connectivity during the non-breeding season only. This species has high vulnerability to collision risk with turbines (Bradbury *et al*., 2014). Effects cannot be screened out at this stage alone for this species during the non-breeding season. Therefore, there is a potential for LSE. Kittiwakes are not considered to be at risk of disturbance and displacement or barrier effects at offshore wind farms therefore LSE can be ruled out alone.	Potential for LSE, consider collision risk with WTGs within the RIAA
			Gannet	Changes in prey availability	Collision risk Direct disturbance	Changes in prey availability and behaviour	Based on the proximity of the Array and the MMF+1SD of this species (Woodward *et al*., 2019) from this site, potential for connectivity during the breeding season has been established. Gannets have shown high avoidance during offshore wind	Potential for LSE, consider collision risk with WTGs and displacement in all

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				and behaviour Direct disturbance and displacement	and displacement Changes in prey availability and behaviour Barrier effect		farms post-construction monitoring (Dierschke, Furness & Garth, 2016). Gannets have high collision risk (Bradbury *et al.*, 2014). Therefore, there is a potential for LSE for C&D and O&M displacement and collision risk. In addition, according to Furness (2015) it is possible for a project in the southern North Sea to have connectivity with this SPA during the non-breeding season. Therefore, since qualifying breeding features may still be afforded protection outside of the breeding season (the conservation objectives of all breeding seabird SPAs include the requirement to maintain abundance) activities that have the potential to significantly reduce abundance should be assessed regardless of time of year. Gannets are not considered at risk of barrier effects due to their wide-ranging habits, and migrating gannets cover very large distances, extending from the North Sea to West Africa, so that slight local effects would be negligible in the context of their large migrations and area use, therefore LSE can be ruled out alone.	seasons within the RIAA. In addition, the combined impacts from both collision risk and displacement will be included within the RIAA.
			Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	VE is beyond the MMF +1SD for this species from Flamborough and Filey Coast SPA, there will be no breeding season barrier impact for this population, therefore LSE can be ruled out alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effects alone for the breeding season. However, connectivity during the non-breeding season means that LSE cannot be discounted.	Risk of LSE alone from disturbance and displacement.
			Razorbill	Changes in prey availability and behaviour Direct disturbance	Changes in prey availability and behaviour Direct disturbance	Changes in prey availability and behaviour Direct disturbance and displacement	VE is beyond the MMF +1SD for this species from Flamborough and Filey Coast SPA, there will be no breeding season barrier impact for this population, therefore LSE can be ruled out alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be	Risk of LSE alone from disturbance and displacement.

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				and displacement	and displacement Barrier effect		discounted in relation to effects alone for the breeding season. However, connectivity during the non-breeding season means that LSE cannot be discounted.	
			Fulmar Puffin Herring gull	Changes in prey availability and behaviour Direct disturbance and displacement	Collision risk Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	Peak puffin density in the array areas and 4 km buffer was estimated to be 0.01 (0.01); peak fulmar density in the array areas and 4 km buffer was estimated to be 0.1; and peak herring gull density in the array areas and 4km buffer was estimated to be 0.14. Given these extremely low densities within the VE site and that these species have very low vulnerabilities to collision and displacement from offshore wind farms (Bradbury *et al*., 2014) and low vulnerability to vessel traffic (Fliessbach *et al*., 2019) LSE can be discounted in relation to effects alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Teesmouth and Cleveland Coast SPA	359.98	345.86	Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Northumbria Coast SPA	377.99	363.41	Arctic tern Little tern	No LSE	Collision risk Direct disturbance and displacement Barrier effect	No LSE	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and Arctic tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Northumbria Coast Ramsar	377.99	363.41	Little tern	No LSE	Collision risk Direct disturbance and displacement Barrier effect	No LSE	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and therefore is unlikely to have connectivity during the breeding season. For this SPA impacts on migration are likely to be negligible due to the distance from the SPA to the VE array areas site. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Northumberland Marine SPA	419.87	406.37	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For these SPA / Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Kittiwake Sandwich tern Common tern Arctic tern Guillemot Little tern Puffin Roseate tern Black-headed gull Great black-backed gull Lesser black-backed gull Herring gull Razorbill	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for kittiwake, sandwich tern, common tern, Arctic tern and guillemot. For this SPA site, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Coquet Island SPA	443.00	430.64	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For these SPA / Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Sandwich tern Common tern Arctic tern Roseate tern Black-headed gull Herring gull Lesser black-backed gull Kittiwake	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for sandwich tern, common tern and Arctic tern. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for any of this feature. Peak puffin density in the array areas and 4 km buffer was estimated to be 0.01 (0.01). Given the extremely low density within the VE site it is considered that there is no potential for LSE.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Farne Islands SPA	472.54	461.41	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For these SPA/ Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Kittiwake Herring gull Gannet Arctic tern Common tern Sandwich tern Roseate tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for any of these features. For these SPA / Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
			Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for any of these features; however, since breeding features are afforded protection outside of the breeding season and there is the potential for these features to winter in southern North Sea (even in very small numbers), there is the potential for connectivity between this SPA and VE, expect for puffin since peak puffin density in the array areas and 4km buffer was estimated to be 0.01 (0.01). Given the extremely low density within the VE site it is considered that there is no potential for LSE on puffin.	No LSE alone
			Guillemot Razorbill	Changes in prey availability and behaviour	Changes in prey availability and behaviour Barrier effect	Changes in prey availability and behaviour	For guillemot and razorbill, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally and for these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible.	No LSE alone
				Direct disturbance and displacement	Direct disturbance and displacement	Direct disturbance and displacement	VE is beyond the MMF +1SD for this species from Farne Islands SPA, there will be no breeding season barrier impact for this population, therefore LSE can be ruled out alone. The pathway to effects due to insufficient prey resource is weak for this highly mobile receptor. Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Therefore, LSE can be discounted in relation to effects alone for the breeding season. However, connectivity during the non-breeding season means that LSE cannot be discounted.	Risk of LSE alone from disturbance and displacement.
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and	466.73	412.31	Manx shearwater	Changes in prey availability and behaviour	Changes in prey availability and behaviour	Changes in prey availability and behaviour	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Bardsey Island SPA				Direct disturbance and displacement	Direct disturbance and displacement Barrier effect	Direct disturbance and displacement	distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site-specific maximum foraging range from this SPA for Manx shearwater is 162 km (Woodward *et al.,* 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	
Lindisfarne SPA	476.20	464.16	Little tern Roseate tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for little tern and Roseate tern. For these SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	478.97	421.10	Manx shearwater	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
St Abb's Head to Fast Castle SPA	515.55	503.33	Kittiwake Guillemot Herring gull Razorbill	Changes in prey availability and behaviour Direct disturbance	Changes in prey availability and behaviour Direct disturbance	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for kittiwake, guillemot, herring gull and razorbill. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
				and displacement	and displacement Collision risk Barrier effect		that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	
Grassholm SPA	517.95	459.86	Gannet	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, when considering that seabirds are likely to travel around land masses to forage, the maximum foraging range for gannet is within proximity of VE (Woodward *et al.*, 2019). Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Imperial Dock Lock, Leith SPA	563.20	546.37	Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPAs are not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPA sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Forth Islands SPA	547.90	534.44	Arctic tern Common tern Gannet Guillemot Kittiwake Lesser black-backed gull Herring gull Razorbill Sandwich tern Puffin Roseate tern					
Ailsa Craig SPA	596.44	564.78	Gannet					

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Fowlsheugh SPA	611.79	603.58	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Razorbill Herring gull Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPA/Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Isles of Scilly SPA	617.31	563.81	Manx shearwater Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	647.67	641.50	Common tern Sandwich tern Little tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPA/Ramsar sites are not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPA/Ramsar sites, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Ythan Estuary, Sands of Forvie and Meikle Loch Ramsar	647.67	641.50	Sandwich tern					
Buchan Ness to Collieston Coast SPA	647.97	642.05	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site-specific maximum foraging range from this SPA for Fulmar is 224 km (Woodward *et al.*, 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Herring gull Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Rathlin Island SPA	656.74	621.68	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Loch of Strathbeg SPA	675.36	670.55	Sandwich tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Troup, Pennan and Lion's Heads SPA	689.82	684.05	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
			Kittiwake Guillemot Razorbill Herring gull	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Inner Moray Firth SPA	733.22	720.46	Common tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPAs are not within the MMF+1SD of the array areas and offshore ECC for this species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Cromarty Firth SPA	746.03	734.32	Common tern					
Rum SPA	767.14	743.98	Manx shearwater	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
East Caithness Cliffs SPA	772.54	763.51	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site-specific maximum foraging range from this SPA for Fulmar is 240 km (Woodward *et al.*, 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Herring gull Great black-backed gull Kittiwake Guillemot Razorbill	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
North Caithness Cliffs SPA	801.84	795.82	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Copinsay SPA	822.56	818.38	Kittiwake Guillemot Razorbill	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site specific maximum foraging range from this SPA for Fulmar is 480 km (Woodward *et al.*, 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Great black-backed gull Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Mingulay and Berneray SPA	823.05	794.73	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Hoy SPA	826.27	820.02	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Great skua Great black-backed gull Kittiwake Guillemot Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Auskerry (UK) SPA	836.68	833.04	European storm petrel Arctic tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Handa SPA	845.66	833.27	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Shiant Isles SPA	846.30	828.11	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Cape Wrath SPA	854.49	843.67	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Calf of Eday SPA	858.73	855.11	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Great black-backed gull Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Rousay SPA	859.68	855.14	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Guillemot Arctic tern Kittiwake	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Marwick Head SPA	861.96	856.27	Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Fair Isle SPA	865.48	865.85	Fulmar Great skua	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site specific maximum foraging range from this SPA for Fulmar is 247 km (Woodward *et al*., 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Arctic tern Kittiwake Gannet Guillemot Razorbill Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
West Westray SPA	870.21	865.82	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Guillemot					No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
			Razorbill Arctic tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPAs are not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPAs, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	
Papa Westray (North Hill and Holm) SPA	876.22	872.43	Arctic tern					
Sule Skerry and Sule Stack SPA	884.2	875.45	Guillemot Gannet European storm petrel Leach's storm petrel Puffin					
Sumburgh Head SPA	897.16	899.04	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Arctic tern Kittiwake Guillemot	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPAs are not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPAs, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context	No LSE alone
Mousa SPA	912.55	914.79	European storm petrel Arctic tern					

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
							alone. Therefore, LSE can be discounted in relation to effects alone.	
Noss SPA	923.70	926.71	Great skua Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Gannet Kittiwake Guillemot Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Flannan Isles SPA	928.89	909.06	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
St Kilda SPA	932.16	907.45	Fulmar Manx shearwater	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Gannet	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
North Rona and Sula Sgeir SPA	933.85	922.30	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Foula SPA	937.01	937.10	Gannet	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Additionally, the site specific maximum foraging range from this SPA for Fulmar is 120 km (Woodward *et al.*, 2019), therefore the site is unlikely to have connectivity with VE. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Leach's storm petrel Razorbill Kittiwake Guillemot Arctic tern Great skua Puffin	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Papa Stour SPA	956.56	957.77	Arctic tern	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for this species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Fetlar SPA	967.58	971.72	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Arctic tern Great skua	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	These SPAs are not within the MMF+1SD of the array areas and offshore ECC for these species. For these SPAs, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Ronas Hill – North Roe and Tingon SPA	972.74	975.04	Great skua					

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Hermaness, Saxa Vord and Valla Field SPA	989.01	992.79	Fulmar	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
			Gannet Kittiwake Guillemot Puffin Great skua	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Ramna Stacks and Gruney SPA	986.32	989.07	Leach's storm petrel	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	This SPA is not within the MMF+1SD of the array areas and offshore ECC for these species. For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Designated Site	Distance to (km)		Feature(s) to consider for potential LSE	Effects Assessed			Consideration of LSE	Conclusion
	Array	Offshore ECC		Construction	O&M	Decommissioning		
Southern Waters of Gibraltar SPA	1835.07	1821.37	Manx shearwater	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this SPA, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone

Table 4.15: Potential for LSE for transboundary offshore and intertidal seabird ornithology sites from the project alone

Feature	Site	Distance to (km) ARRAY	Distance to (km) Offshore ECC	Effects Considered: Construction	Effects Considered: Operation and Maintenance	Effects Considered: Decommissioning	Consideration of LSE	Conclusion
Great Skua	Estuaire et marais de la Basse Seine	262.64	254.61	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this feature, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
Manx shearwater	Baie de Vilaine	568.44	541.26	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this feature, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
	Saltee Islands SPA	594.45	537.57					
	Iles Houat-Hoëdic	601.21	572.75					
	Archipel de Glénan	609.91	573.26					
	Roches de Penmarc'h	618.42	581.35					
	Deenish Island and Scariff Island SPA	848.02	789.83					
	Cruagh Island SPA	849.44	796.77					
	Blasket Islands SPA	864.94	807.79					
	Skelligs SPA	867.90	810.41					
	Estuaire de la Bidassoa et baie de Fontarabie	960.97	951.39					
	Espacio marino de la Ría de Mundaka-Cabo de Ogoño	984.91	970.23					
	Urdaibaiko itsasadarra / Ría de Urdaibai	989.93	975.28					

Feature	Site	Distance to (km) ARRAY	Distance to (km) Offshore ECC	Effects Considered Construction	Operation and Maintenance	Decommissioning	Consideration of LSE	Conclusion
	Espacio marino de Cabo Peñas	1061.73	1034.66					
	Cabo Busto-Luanco	1075.95	1049.01					
	Espacio marino de Punta de Candelaria-Ría de Ortigueira-Estaca de Bares	1124.81	1092.13					
	Espacio marino de la Costa de Ferrolterra-Valdoviño	1192.24	1157.96					
	Espacio marino de la Costa da Morte	1215.93	1180.21					
	Espacio marino de las Rías Baixas de Galicia	1310.33	1277.00					
	ZEPA Banco de Galicia	1396.86	1356.32					
	Arcipelago delle Egadi - area marina e terrestre	1717.54	1723.47					
	Arcipelago delle Eolie - area marina e terrestre	1753.65	1759.22					
Northern Fulmar	Littoral seino-marin	195.84	187.70	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this feature, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider	No LSE alone
	Baie de Seine occidentale	319.97	290.73					
	Falaise du Bessin Occidental	334.83	306.98					
	SPA Östliche Deutsche Bucht	448.49	460.83					
	Ramsar-Gebiet S-H Wattenmeer und	456.04	468.49					

Feature	Site	Distance to (km) ARRAY	Distance to (km) Offshore ECC	Effects Considered Construction	Operation and Maintenance	Decommissioning	Consideration of LSE	Conclusion
	angrenzende Küstengebiete						environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	
	Lambay Island SPA	571.90	522.91					
	Saltee Islands SPA	594.45	536.57					
	Helvick Head to Ballyquin SPA	660.34	603.32					
	West Donegal Coast SPA	770.13	725.33					
	Cliffs of Moher SPA	790.37	735.32					
	Kerry Head SPA	810.86	753.54					
	Beara Peninsula SPA	822.22	764.06					
	Iveragh Peninsula SPA	829.91	771.95					
	Clare Island SPA	836.44	785.41					
	High Island, Inishshark and Davillaun SPA	844.80	792.66					
	Deenish Island and Scariff Island SPA	848.02	789.82					
	Blasket Islands SPA	864.94	807.09					
	Skelligs SPA	867.89	809.69					
	Urdaibaiko itsasadarra / Ría de Urdaibai	989.93	974.96					
Northern gannet	Bancs des Flandres	49.11	52.62	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement	For this feature, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the	No LSE alone
	Baie de Seine occidentale	319.97	290.25					
	Sydlige Nordsø	481.01	488.14					

Feature	Site	Distance to (km) ARRAY	Distance to (km) Offshore ECC	Effects Considered Construction	Operation and Maintenance	Decommissioning	Consideration of LSE	Conclusion
					Collision risk Barrier effect		likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	
Razorbill	Bancs des Flandres	49.11	52.62	Changes in prey availability and behaviour Direct disturbance and displacement	Changes in prey availability and behaviour Direct disturbance and displacement Collision risk Barrier effect	Changes in prey availability and behaviour Direct disturbance and displacement	For this feature, the significance of effects at a population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. For these effect categories, the likelihood and severity of the effect experienced locally is considered to be low and small to negligible. It is determined that significant effects would not therefore manifest on these distant sites after the likelihood and severity of effects on the designated populations have been diluted over distance and could only result in negligible effects in the wider environmental context alone. Therefore, LSE can be discounted in relation to effects alone.	No LSE alone
	Cap Gris-Nez	87.20	84.00					

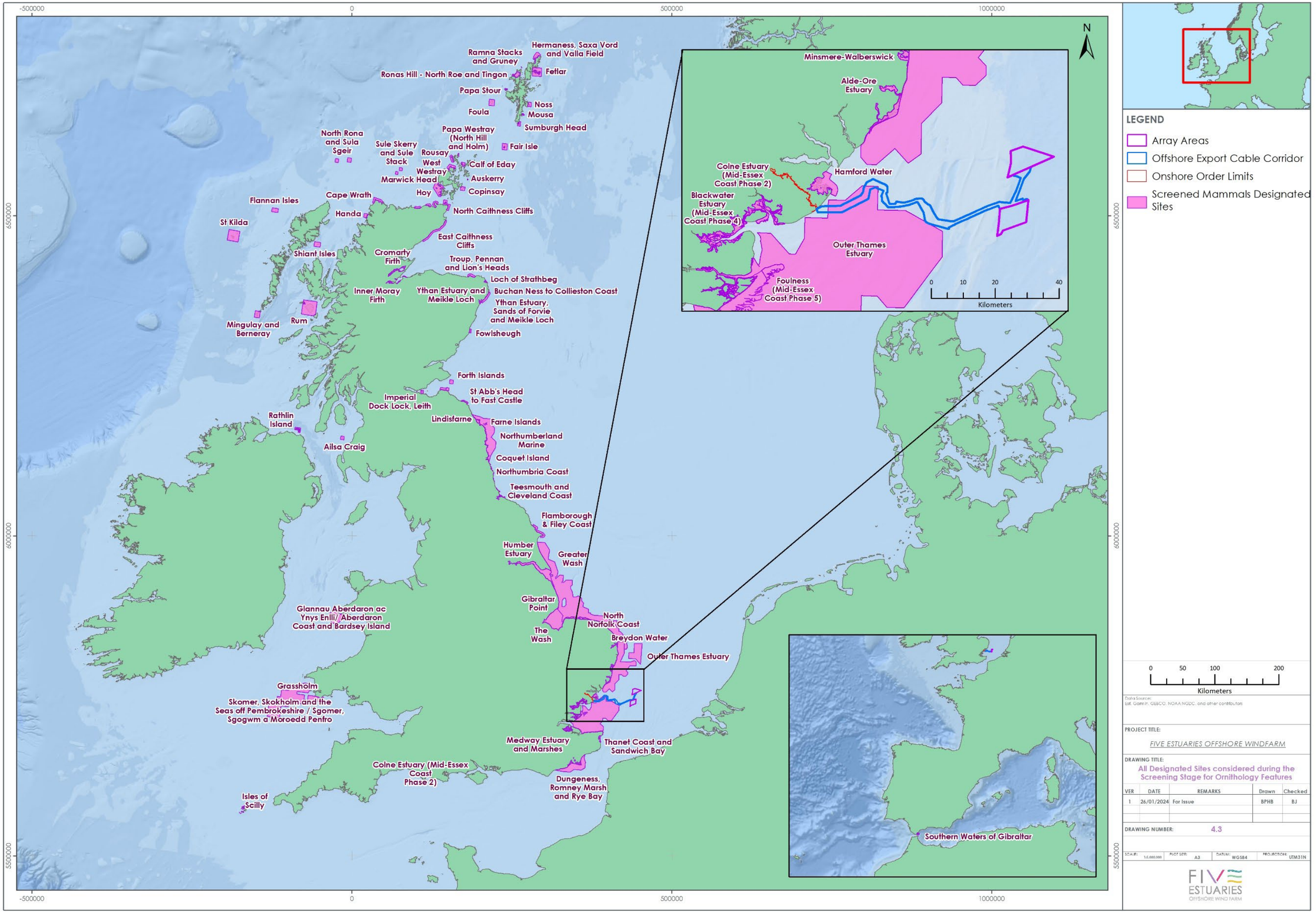
Table 4.16: Additional SPAs and Ramsar sites screened in for non-seabird features. Consideration is taken only for impacts of collision during migration when the turbines are operational from the project alone.

Site code	Site name	Distance from Array areas (KM)	Relevant Designated waterbird features	Consideration of LSE	conclusion
UK9009112	Alde-Ore Estuary SPA	37.31	Wintering populations of: Avocet Redshank Ruff (see Table 4.14 for seabirds features)	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11002	Alde-Ore Estuary Ramsar	37.31	Wintering populations of: Avocet Redshank (see Table 4.10: for benthic features and Table 4.14 for seabirds features)	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009101	Minsmere-Walberswick SPA and ramsar	41.75	Wintering populations of: Gadwall Shoveler	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009261	Deben Estuary SPA	48.32	Wintering populations of: Avocet Dark-bellied brent goose	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11017	Deben Estuary Ramsar	48.32	Wintering population of: Dark-bellied brent goose	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009131	Hamford Water SPA	51	Over winter: Avocet Black-tailed godwit Dark-bellied brent goose Grey plover Redshank	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone

Site code	Site name	Distance from Array areas (KM)	Relevant Designated waterbird features	Consideration of LSE	conclusion
			Ringed plover Shelduck Teal		
UK11028	Hamford Water Ramsar	52	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose Redshank Ringed plover	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009121	Stour and Orwell Estuaries SPA	55	Over winter: Black-tailed godwit Dark-bellied brent goose Dunlin Grey plover Knot Pintail Redshank Waterbird assemblage On passage: Redshank	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11067	Stour and Orwell Estuaries Ramsar	55	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose Dunlin Grey plover Knot Pintail Redshank Important passage populations of redshank. Also qualifies for:	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone

Site code	Site name	Distance from Array areas (KM)	Relevant Designated waterbird features	Consideration of LSE	conclusion
			Wintering waterbird assemblage		
UK9009243	Colne Estuary (Mid-Essex Coast Phase 2) SPA	67	Over winter: Dark-bellied brent goose Pochard Redshank Ringed plover Waterbird assemblage	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al.* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11015	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	67	Dark-bellied brent goose Redshank Waterbird assemblage (Non-bird criteria addressed under Table 4.10:)	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al.* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009245	Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	78	Non-breeding: Black-tailed godwit Dark-bellied Brent goose Dunlin Grey plover Waterbird assemblage	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al.* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11007	Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	78	Wintering: Black-tailed godwit, Dark-bellied brent goose Dunlin Grey plover Waterbird assemblage	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al.* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK9009242	Dengie (Mid-Essex Coast Phase 1) SPA	74	Non-breeding: Dark-bellied Brent goose Grey plover Knot Waterbird assemblage	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate through the array areas (according to the migration zones presented in Wright *et al.* (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	Potential LSE, alone
UK11018	Dengie (Mid-Essex Coast Phase 1) Ramsar	74	Wintering: Dark-bellied brent goose	While this SPA/ Ramsar is a significant distance from the VE array area and previous assessments (WWT, 2014) of migratory non-seabirds at a cumulative scale have shown impacts at a population level are unlikely, these species have the potential to migrate	Potential LSE, alone

Site code	Site name	Distance from Array areas (KM)	Relevant Designated waterbird features	Consideration of LSE	conclusion
			Grey plover Knot Waterbird assemblage (Non-bird criteria addressed under Table 4.10).	through the array areas (according to the migration zones presented in Wright *et al*. (2012)) and therefore there is the potential for collision. Therefore, LSE cannot be discounted in relation to effects alone.	



Data Sources:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

All Designated Sites considered during the Screening Stage for Ornithology Features

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 4.3

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:5,000,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

-1000000 -500000 0 500000 1000000 1500000 2000000

6500000 6000000 5500000 5000000 4500000

N

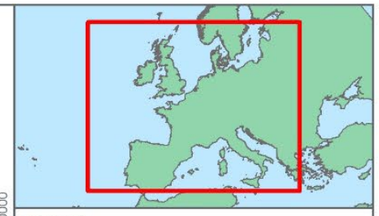
West Donegal Coast SPA
Clare Island SPA
High Island, Inishshark and Davillaun SPA
Cruagh Island SPA
Cliffs of Moher SPA
Kerry Head SPA
Blasket Islands SPA
Iveragh Peninsula SPA
Skelligs SPA
Deenish Island and Scariff Island SPA
Beara Peninsula SPA
Helvick Head to Ballyquin SPA
Lambay Island SPA
Saltee Islands SPA

Sydlige Nordsø
SPA Östliche Deutsche Bucht
Ramsar-Gebiet S-H Wattenmeer und angrenzende Küstengebiete

Bancs des Flandres
Cap Gris-Nez
Baie de Seine occidentale
Littoral seino-marin
Falaise du Bessin Occidental
Estuaire et marais de la Basse Seine
Archipel de Glénan
Roches de Penmarc'h
Baie de Vilaine
Iles Houat-Hoëdic

Espacio marino de Punta de Candelaria-Ría de Ortigueira-Estaca de Bares
Espacio marino de la Costa de Ferrolterra-Valdoviño
Espacio marino de Cabo Peñas
Espacio marino de la Ría de Mundaka-Cabo de Ogoño
ZEPA Banco de Galicia
Espacio marino de la Costa da Morte
Cabo Busto-Luanco
Urdaibaiko itsasadarra / Ría de Urdaibai
Estuaire de la Bidassoa et baie de Fontarabie
Espacio marino de las Rías Baixas de Galicia

Arcipelago delle Eolie - area marina e terrestre
Arcipelago delle Egadi - area marina e terrestre



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Designated Site for Transboundary Ornithology Screening

0 100 200 400
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

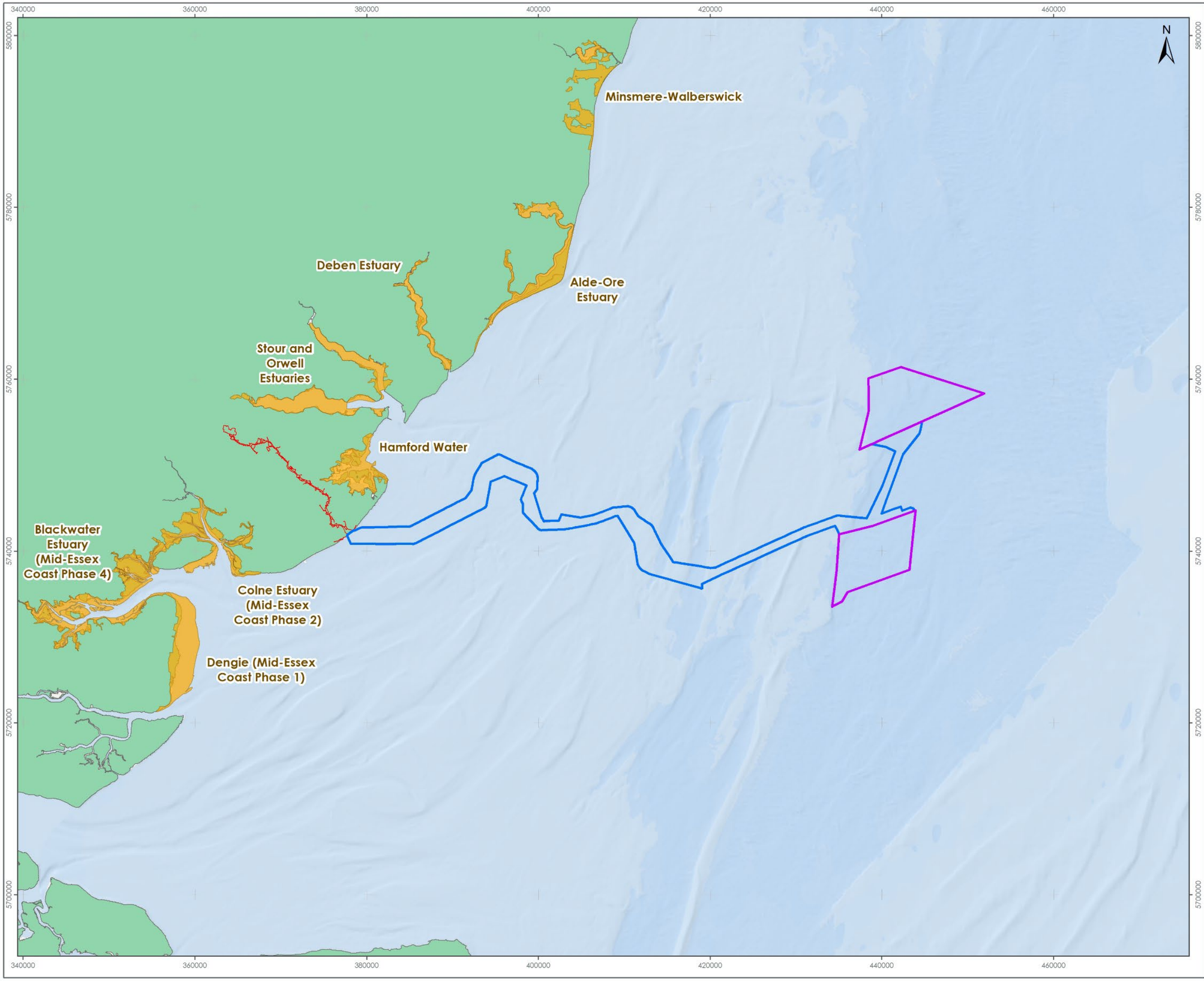
DRAWING TITLE: All Designated Sites considered during the Screening Stage for Transboundary Ornithology Features

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Issue	BPHB	BJ

DRAWING NUMBER: 4.4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:10,000,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Designated Sites (SPA/Ramsar) for Non-Seabird Ornithology Screening (Natura 2000)

0 5 10 20
Kilometers

Data Sources:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

All Designated Sites considered during the Screening Stage for Non-Seabird Ornithology Features

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Information	BPHB	BJ

DRAWING NUMBER: 4.5

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:400,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

4.5 MIGRATORY FISH SCREENING

4.5.1 The study area for migratory fish for this project with respect to Stage 1 Screening is defined by a precautionary range of 100 km from VE to the estuary mouth. Table 4.17 presents the potential effects considered for the migratory fish receptors identified.

Table 4.17: Migratory fish receptor group potential effects from the project alone.

Potential Effect	Activities potentially resulting in effect		
	Construction	**Operation and maintenance**	**Decommissioning**
Underwater Noise	> Piling; > UXO; > Construction vessel noise; > Other construction activities; > Acoustic/ geophysical surveys; > ADD; and > All in-combination effects.	> Acoustic/ geophysical surveys; > Vessel noise; > Operational noise; and > All in-combination effects.	> Anticipated to be less than during construction
Suspended Sediment/ deposition	> Installation of structures (e.g. piling); > Seabed preparation; > Seabed dredging and sandwave clearance; > Sediment disposal; > Cable installation; and > All in-combination effects	> Maintenance of structures; and > All in-combination effects	> Anticipated to be less than during construction
Accidental Pollution	> Release of contaminants; > Release of sediment (via all activities listed for suspended sediment/ deposition in Table 4.9); and > All in-combination effects		> Anticipated to be less than during construction

Potential Effect	Activities potentially resulting in effect		
	Construction	**Operation and maintenance**	**Decommissioning**
EMF	> N/A	> Generation of EMF from installed cables	> N/A
INNS	> Vessel movements on and off site; > Installation of solid structures; > All in-combination effects.	> Vessel movements on and off site; > Maintenance activities; > Presence of solid structures; > All in-combination effects.	> Anticipated to be less than during construction
Physical habitat loss/ disturbance	> Installation of structures; > Seabed preparation; > Seabed dredging; > Sediment disposal; > Vessel movements/ anchoring; and > All in-combination effects	> Maintenance of structures; and > All in-combination effects	> Anticipated to be less than during construction
Changes to prey	> Generation of underwater noise from construction/ maintenance activities; > Loss of supporting habitats (via all activities listed for physical habitat loss/ disturbance in Table 4.9 and below); > Vessel movements; > EMF; and > All in-combination effects.		> Anticipated to be less than during construction

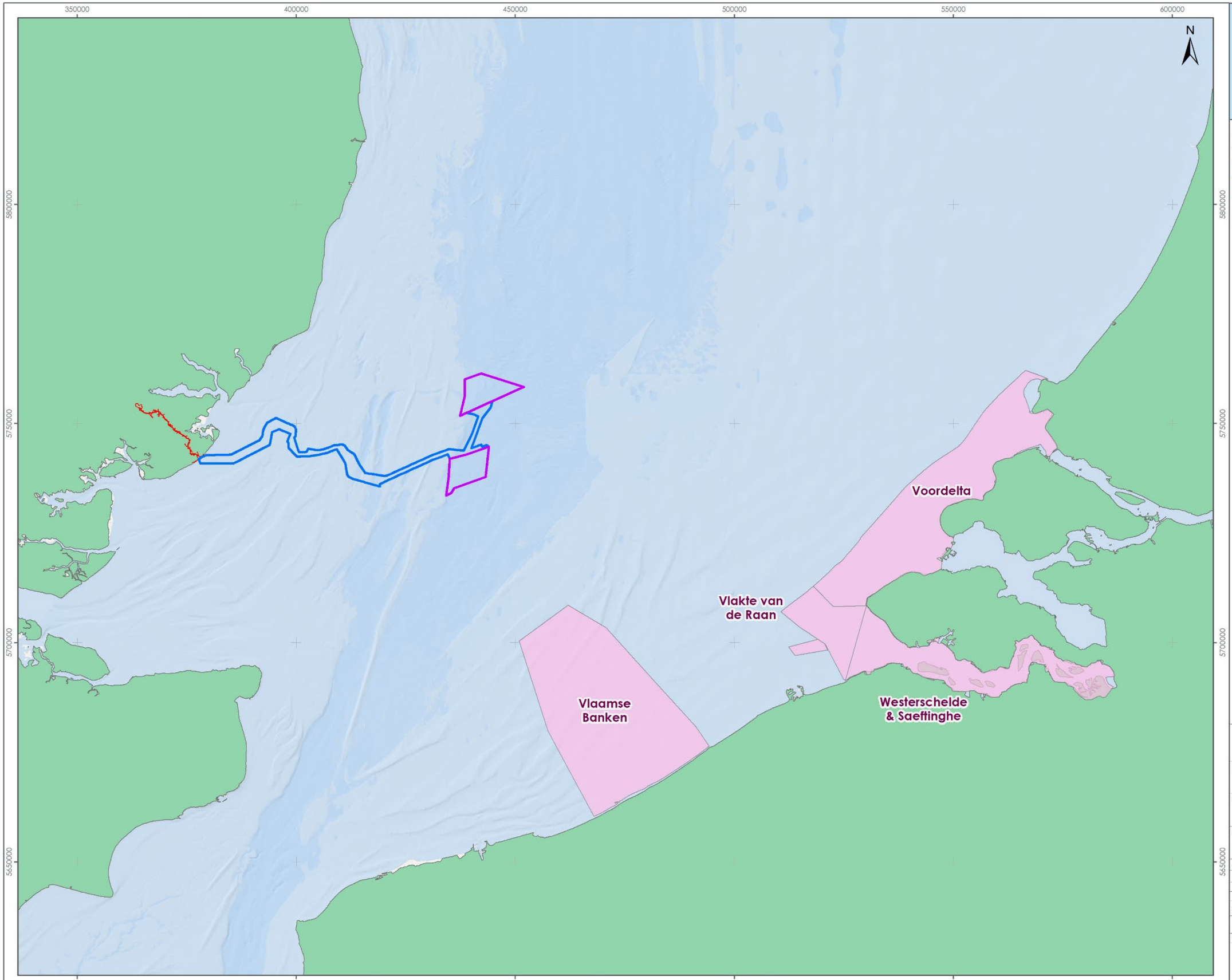
4.5.2 Stage 1 Screening (as presented in Table 4.18) considers the potential for a pathway to exist between VE and each designated site identified through the initial site selection process during construction, operation & maintenance and decommissioning. Where potential for a pathway exists, potential for LSE is concluded. All sites considered in the below screening table are depicted in Figure 4.6.

Table 4.18: Migratory fish site screening from the project alone

Designated Site	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
	Array Areas (KM)	Offshore ECC (KM)	Onshore ECC (KM)		Construction	Operation and Maintenance	Decommissioning	
Vlaamse Banken SAC	34.75	40.44	83.77	River lamprey; and Sea Lamprey	Underwater noise	Underwater noise	Underwater noise	The range between the array areas and designated site combined with the low sensitivity of lamprey to underwater noise (Popper *et al*., 2014) mean that there is no potential for LSE for these species at this site.
					Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey	Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	<u>Non-noise effects:</u> No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site.
				Twaite Shad	Underwater noise			The range between the array areas and designated site combined with the high sensitivity of Twaite Shad to underwater noise (Popper *et al*., 2014) mean that there is a potential for LSE for this species at this site during pile driving and UXO clearance.
					Suspended sediment/ deposition; Accidental pollution; EMF; INNS;	Suspended sediment/ deposition; Accidental pollution; EMF; INNS;	Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site.

Designated Site	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
	Array Areas (KM)	Offshore ECC (KM)	Onshore ECC (KM)		Construction	Operation and Maintenance	Decommissioning	
					Physical habitat loss/ disturbance; and Changes to prey.	Physical habitat loss/ disturbance; and Changes to prey		
Vlakte van de Raan (BEMNZ0005)	79.28	82.37	140.86	Twaite shad; and Sea Lamprey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; INNS; Physical habitat loss/ disturbance; and Changes to prey.	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; INNS; Physical habitat loss/ disturbance; and Changes to prey.	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site.
Vlakte van de Raan (NL2008003)	79.28	82.37	140.86	Twaite shad; River lamprey; and Sea Lamprey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; INNS; Physical habitat loss/ disturbance; and Changes to prey.	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; INNS; Physical habitat loss/ disturbance; and Changes to prey.	No potential for LSE. These features have been screened out from assessment as a result of the distance between VE and the designated site.
Westerschelde & Saeftinghe	91.8	93.7	155.5	Twaite shad; River lamprey; and Sea Lamprey	Underwater noise; Suspended sediment/ deposition; Accidental pollution;	Underwater noise; Suspended sediment/ deposition; Accidental pollution;	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF;	No potential for LSE. All features and effects have all been screened out from assessment as a result of the distance between VE and the designated site.

Designated Site	Overlap And/or Range			Feature(s) to consider for potential LSE	Potential Effects			Potential for LSE
	Array Areas (KM)	Offshore ECC (KM)	Onshore ECC (KM)		Construction	Operation and Maintenance	Decommissioning	
					EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey	INNS; Physical habitat loss/ disturbance; and Changes to prey.	
Voordelta	78.5	80.8	142.8	Allis shad; Twaite shad; River lamprey; and Sea Lamprey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey	Underwater noise; Suspended sediment/ deposition; Accidental pollution; EMF; INNS; Physical habitat loss/ disturbance; and Changes to prey.	No potential for LSE. All features and effects have all been screened out from assessment as a result of the distance between VE and the designated site.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Selected Special Areas of Conservation

0 5 10 20
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

All Designated Sites considered during the Screening Stage for Migratory Fish Features

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Information	BPHB	BJ

DRAWING NUMBER: 4.6

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:800,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

4.6 ONSHORE SCREENING

4.6.1 A summary of potential effects on onshore European and Ramsar Sites within 15 km is provided in Table 4.19 with a more detailed screening for LSE, for each of the relevant qualifying features at each stage of the proposed development, provided in Table 4.20Table 4.20: Potential for LSE for Onshore Ecology.

4.6.2 Given (i) the proximity of the onshore ECC to several European and Ramsar Sites, (ii) the known use of the onshore ECC and adjoining intertidal areas by species that are part of the qualifying interest of these sites (dark-bellied brent goose, mute swan, shelduck, shoveler, gadwall, wigeon, teal, great crested grebe, avocet, curlew, black-tailed godwit, sanderling, dunlin, redshank, and cormorant) and (iii) potential hydrological links between the onshore ECC and Hamford Water and the Stour Estuary , there is a risk of indirect effects during construction of the onshore infrastructure. This risk arises mainly from potential disturbance and displacement of birds, and pollution from run-off arising from construction of the proposed development. There is also the possibility of permanent loss of habitat used by qualifying interest bird species outside of the designated sites, from permanent infrastructure, and a further risk that impacts on populations of scarce plants and invertebrates outside the SACs and Ramsar sites (but inside other designated sites) will have knock-on effects on the qualifying populations of the same species within SACs and Ramsar sites. Possible impacts from air quality may also require further assessment or mitigation. Therefore, without mitigation and further assessment is not possible to conclude no LSE for the onshore elements.

4.6.3 Given the mobility of the birds and the hydrological connections between the onshore ECC, all European and Ramsar Sites listed in Table 4.19 should be considered for screening for appropriate assessment. In addition, there is a low risk (readily mitigated, noting that mitigation has not been applied during Screening) that onshore construction and decommissioning activities affect the Essex Estuaries SAC, through the release of suspended solid pollution into watercourses and then the sea. This risk is effectively covered in Table 4.10 and Table 5.1.

Table 4.19: Summary of potential effects on European and Ramsar Sites (Onshore) from the project alone

Site	Closest distance to Onshore ECC (KM)5	Potential effects on qualifying interest features
Hamford Water SAC, SPA and Ramsar	0.71	Possible loss of supporting populations of invertebrates and plants, found within other designated sites. Possible loss of habitat for foraging and roosting birds outside the designated site. Disturbance (through noise, light, vibration, or presence of people and structures) of birds during the construction period when using habitat outside the designated site. Water pollution (or decreased water quality) of watercourses which feed into Hamford Water, during construction and de-commissioning. Lowering of the water table outside the designated site through dewatering construction areas with potential effects on qualifying species. Decreases in air quality during construction and decommissioning. (Seabird feature (little tern) of the SPA addressed in Table 4.14).
Stour and Orwell Estuaries SPA and Ramsar	3.10	As above.
Colne Estuary (Mid-Essex Coast Phase 2) SPA and Ramsar	7.21	As above.
Essex Estuaries SAC	7.21	See Table 5.3.
Abberton Reservoir SPA and Ramsar	11.4	Possible loss of habitat for foraging and roosting birds away from the reservoir. Disturbance (through noise, light, vibration, trampling or presence of people and structures) of birds during the construction period when using sites away from the reservoir.
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA and Ramsar	13.91	Possible loss of foraging habitat for birds outside the SPA/Ramsar. Disturbance (through noise, light, vibration, trampling or presence of people and structures) of birds during the construction period when using sites away from the estuary. (Seabird feature (little tern) of the SPA addressed in Table 4.14).

[5] Distances are subject to change as the site selection process develops and preferred onshore cable route and substation locations are selected.

Table 4.20: Potential for LSE for Onshore Ecology[6] from the project alone

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered			Consideration of LSE	Conclusion
			Construction	O&M	Decommissioning		
Hamford Water SAC	0.71	Fisher's estuarine moth *Gortyna borelii lunata*	Impacts on supporting populations, food plant and potential habitat outside SAC. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity. Decrease in air quality	No risk.	As construction.	Risk of impacts on supporting populations of the moth and its food plant, hog's fennel *Peucedanum officinale*, outside the SAC. The moth may occur outside Hamford Water SAC in Essex, for example its food plant and habitat are recorded from Holland Haven Marshes, and the moth may therefore occur within the ECC. Impacts on populations of the moth or its food plant could therefore have knock-on effects for the moth population within the SAC. The species is terrestrial, with a strong association with sea walls and its larval foodplant. Neither would be affected by changes in water quality and quantity within the SAC as a result of construction of the onshore ECC. The habitat of Fisher's estuarine moth (**sea walls and dry coastal grassland**) is potentially sensitive to increases in nitrogen and acid deposition, and to increases in ammonia, nitrogen oxide and sulphur dioxide levels (APIS, 2022). Changes in the levels of these pollutants in the air may occur during construction and decommissioning when increases in vehicle activity will be required.	Potential for LSE, consider within the RIAA.
Hamford Water SPA	0.71	Over winter: Avocet Black-tailed godwit Dark-bellied brent goose	Loss of foraging and roosting habitat outside the SPA.	Disturbance of birds outside the SPA, as a result or routine and non-routine	Disturbance of birds outside SPA.	Risk of loss of foraging and roosting habitat outside the SPA depending on location of the above ground infrastructure, applies to all the over-wintering species which have all been recorded within or adjacent to	Potential for LSE on all qualifying features which occur within or near the ECC (currently known to be avocet, black-tailed godwit, dark-bellied brent goose, redshank,

[6] Note: Some sites and features here are also included within the migratory non-seabird screening consideration section of this report in relation to collision risk during migration.

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
		Grey plover Redshank Ringed plover Shelduck Teal During the breeding season: Little tern (considered offshore in Table 4.14)	Disturbance of birds outside the SPA. Water quality: pollution from site run-off affecting prey availability. Decreases in water quantity. Decrease in air quality.	maintenance work.	Water quality: pollution from site run-off affecting prey availability. Decrease in air quality.	the ECC (so far these are avocet, black-tailed godwit, dark-bellied brent goose, redshank, shelduck and teal). Risk of impacts from disturbance during construction, operation and decommissioning for wintering bird species which occur in or adjacent to the ECC. The little tern breeding colony is c. 4.7 km distant from the ECC with foraging occurring out to sea, therefore no risk of impacts from disturbance of birds at the breeding colony or while foraging. The surface water in the ECC may drain into Hamford Water, giving rise to a low risk of impacts on water quality, such as changes in natural turbidity, concentration of aqueous contaminants, dissolved oxygen and inorganic nitrogen, with knock-on effects for wintering birds. Again, the little tern foraging areas are too distant to be at risk (considered offshore in Table 4.14). Changes in water levels could occur at sites within the ECC used by the qualifying interest bird species because of de-watering during the construction period, with effects on e.g. over-winter survival. Habitats of this site's features (littoral and supralittoral, open water and coastal grassland) are potentially	shelduck, teal and others in the waterbird assemblage, if these form part of the SPA population). No potential for LSE for little tern (with this feature considered further for Screening in Table 4.14). Consider Hamford Water SPA within the RIAA.

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
						sensitive to increases in nitrogen and acid deposition, and to increases in ammonia, nitrogen oxide and sulphur dioxide levels (APIS, 2022). Changes in the levels of these pollutants in the air may occur during construction and decommissioning when increases in vehicle activity will be required.	
Hamford Water Ramsar	0.71	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose Redshank Ringed plover	As for the SPA.	As for the SPA.	As for the SPA.	As for the SPA, for the relevant species.	Potential for LSE on all qualifying features which occur within or near the ECC (currently known to be black-tailed godwit, dark-bellied brent goose, redshank and others in the waterbird assemblage, if these form part of the Ramsar population), consider within the RIAA.
Stour and Orwell Estuaries SPA	3.10	Over winter: Black-tailed godwit Dark-bellied brent goose Dunlin Grey plover Knot Pintail Redshank Waterbird assemblage On passage: Redshank During the breeding season: Avocet	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting prey availability. Decreases in water quantity. Decrease in air quality	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting prey availability. Decrease in air quality	Risk of loss of foraging and roosting habitat outside the SPA depending on location of the above ground infrastructure, applies to all the over-wintering and passage species which have been recorded within or immediately adjacent to the ECC (these are known to include avocet, black-tailed godwit, dark-bellied brent goose, dunlin and redshank). Risk of impacts from disturbance during construction, operation and decommissioning for all wintering and passage bird species, that have been recorded within and adjacent to the ECC. The surface water in the onshore ECC may drain into the Stour Estuary, giving rise to a low risk of impacts on water quality such as	Potential for LSE on all qualifying features which occur within or near the ECC (currently known to be avocet, black-tailed godwit, dark-bellied brent goose, dunlin, redshank and others in the waterbird assemblage, if these form part of the SPA population), considered within the RIAA

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
						changes natural turbidity, concentration of aqueous contaminants, dissolved oxygen and inorganic nitrogen, with knock-on effects for wintering and passage birds. The breeding avocet population is expected to remain within the SPA during the breeding season and would not be at risk from loss of habitat or disturbance, however, may be at risk from water quality changes, albeit a low risk. Changes in water levels could occur at sites within the ECC used by the qualifying interest bird species because of de-watering during the construction period, with effects on e.g., over-winter survival. Habitats of this site's features (littoral and supralittoral sediments, inshore sublittoral sediments, open water and coastal grasslands) are potentially sensitive to increases in nitrogen and acid deposition, and to increases in ammonia, nitrogen oxide and sulphur dioxide levels (APIS, 2022). Changes in the levels of these pollutants in the air may occur during construction and decommissioning when increases in vehicle activity will be required.	
Stour and Orwell Estuaries Ramsar	3.10	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose Dunlin	As for the SPA plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA.	As for the SPA plus, impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA, plus there is potential for impacts on plant and invertebrate populations outside the Ramsar site which are supporting populations for those within the Ramsar site. Impacts on supporting populations could include loss of	Potential for LSE on all qualifying features that occur within or near the ECC (currently known to be black-tailed godwit, dark-bellied brent goose, redshank and others in the waterbird assemblage, if

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
		Grey plover Knot Pintail Redshank Important passage populations of redshank. Also qualifies for: Wintering waterbird assemblage Nationally important higher plant species occurring on the site, *Puccinellia rupestris*, *Spartina maritima*, *Sarcocornia perennis*, *Limonium humile*, *Zostera angustifolia*, *Zostera noltei*. Nationally important Invertebrate species occurring on the site, *Phaonia fusca*, *Haematopota grandis* (Meigen), *Arctosa fulvolineata*, *Baryphyma duffeya*. (Non-bird criteria addressed under Table 4.10)				individuals, loss of habitat and degradation of habitat from polluted site run-off or dust.	these for part of the Ramsar population), consider within the RIAA.
Colne Estuary (Mid-Essex Coast Phase 2) SPA	7.21	Over winter: Dark-bellied brent goose Hen harrier Pochard Redshank Ringed plover	As for Stour and Orwell Estuaries SPA.	As for Stour and Orwell Estuaries SPA.	As for Stour and Orwell Estuaries SPA.	As for Hamford Water SPA, with the little tern colony at Colne Point more than 9 km from the onshore ECC. and the species recorded so far being dark-bellied brent goose and redshank. Decreases in air quality potentially affecting additional supporting habitats (dwarf shrub heath, fen, marsh and swamp, and open water).	Potential for LSE on all qualifying features which occur within or adjacent to the ECC (currently known to be dark-bellied brent goose, redshank and others in the waterbird assemblage), if these form part of the SPA population). No potential for LSE for little tern (with this feature

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
		Waterbird assemblage During the breeding season: Little tern (see Table 4.14)					considered further for Screening in Table 5.7), Consider Colne Estuary (Mid-Essex Coast Phase 2) SPA within the RIAA. See Table 4.14 for offshore screening (little tern).
Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	7.21	Over winter: Dark-bellied brent goose Redshank Waterbird assemblage Wetland invertebrate assemblage Wetland plant assemblage	As for Stour and Orwell Estuaries Ramsar.	As for Stour and Orwell Estuaries Ramsar.	As for Stour and Orwell Estuaries Ramsar.	As for the SPA for the relevant species, plus there is potential for impacts on plant and invertebrate populations outside the Ramsar site which are supporting populations for those within the Ramsar site. Impacts on supporting populations could include loss of individuals, loss of habitat and degradation of habitat from polluted site run-off or dust. Decreases in air quality potentially affecting additional supporting habitats (dwarf shrub heath, fen, marsh and swamp and open water).).	Potential for LSE on all qualifying features, consider within the RIAA.
Essex Estuaries SAC							See Table 5.1
Abberton Reservoir SPA	11.4	Breeding: Cormorant Non-breeding: Coot Gadwall Goldeneye Great crested grebe Mute swan Pochard Shoveler	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality.	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decrease in air quality	Of the 11 species that make up the qualifying interest, four have been recorded within the ECC or within 250 m of the ECC. These are gadwall, great crested grebe, mute swan, shoveler, teal, wigeon and cormorant. Other qualifying interest species which use similar habitats such as mute swan, coot and gadwall could also occur. Species associated with deep freshwater have not been recorded in the ECC and are likely to be absent: goldeneye, pochard and tufted duck.	Potential for LSE on all qualifying features except goldeneye, pochard, and tufted duck, consider within the RIAA.

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
		Teal Tufted duck Wigeon Waterbird assemblage	Decrease in air quality			Like the other SPAs, there is potential for the above ground infrastructure to result in loss of foraging habitat (e.g. wigeon graze in grassland) and disturbance of birds using habitats outside the SPA during construction, operation and de-commissioning. There are no hydrological links between the ECC and the reservoir and therefore impacts on water quality and quantity can be discounted. Given the distance, air quality effects can be discounted.	
Abberton Reservoir Ramsar	11.4	Wintering: Gadwall Shoveler Wigeon Waterbird assemblage	As for the SPA.	As for the SPA.	As for the SPA.	As for the SPA	Potential for LSE on all qualifying features, consider within the RIAA.
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	13.91	Non-breeding: Black-tailed godwit Dark-bellied Brent goose Dunlin Grey plover Hen harrier Waterbird assemblage Breeding: Little tern (see Table 4.14) Pochard Ringed plover	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity.	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity. Decreases in air quality	The Blackwater Estuary SPA is much further from the ECC than the other sites considered above. Nevertheless, two species that make up its qualifying interest (black-tailed godwit, dark-bellied brent goose and dunlin) have been recorded in the onshore ECC and there is potential for individuals to move between the ECC and the Blackwater Estuary. The risk of effects from loss of habitat and disturbance during construction, operation and decommissioning is much lower but not absent. Similar to Hamford Water SPA, effects on little tern can be discounted due the distance to the	Potential for LSE on all qualifying features that occur within or near the onshore ECC (currently black-tailed godwit, dark-bellied brent goose and others in the waterbird assemblage, if these form part of the SPA population). LSE can be excluded for little tern (see Table 4.14 for this species), Consider Blackwater Estuary (Mid-Essex Coast Phase 4) SPA within the RIAA.

Designated Site	Distance to Onshore ECC (km)	Feature(s) to Consider for Potential LSE	Effects Considered Construction	O&M	Decommissioning	Consideration of LSE	Conclusion
			Decreases in air quality			breeding colony and its propensity to forage at sea. There are no or very weak hydrological links (i.e. linked via the sea only) between the ECC and the Blackwater Estuary and so effects from pollution and dewatering can be discounted. Given the distance, air quality effects can be discounted.	
Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	13.91	Wintering: Black-tailed godwit, Dark-bellied brent goose Dunlin Grey plover Waterbird assemblage Saltmarsh Wetland invertebrate assemblage Wetland plant assemblage	As for the SPA plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA.	As for the SPA, plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA, excluding consideration of little tern Given the distance between the Blackwater Estuary and the ECC and the lack of hydrological connections the potential for impacts on saltmarsh and supporting populations of plants and invertebrates outside the Ramsar site can be excluded.	Potential for LSE for wintering bird qualifying features that have been recorded within or near the onshore ECC (currently black-tailed godwit, dark-bellied brent goose and others in the waterbird assemblage, if these form part of the Ramsar population) only, consider within the RIAA.

5 IN-COMBINATION ASSESSMENT

5.1 APPROACH TO IN-COMBINATION ASSESSMENT

5.1.1 Regulation 63 of the Habitats Regulations includes a requirement for the Competent Authority to assess the impacts of the project alone and in-combination with other plans or projects. Screening for VE alone is undertaken above, with screening for VE in-combination provided here.

5.1.2 For screening, there is a presumption that where potential for LSE has been identified for VE alone, then potential LSE in-combination applies. **Consideration has also been given to the potential for LSE in-combination even where VE alone was insufficient to trigger the threshold for potential LSE**, for example benthic habitat loss within the Southern North Sea SAC was not considered for VE alone (due to the likely trivial and inconsequential contribution) but is considered in-combination. Given the precautionary nature of screening alone, no additional effects other than benthic habitat loss within the Southern North Sea SAC has been identified;

5.1.3 The potential for in-combination impacts will be assessed in the RIAA to identify where there could be an accumulation of impacts on a sensitive receptor, which could result in the need for further mitigation (for instance a large number of minor effects may coincide to result in an adverse effect of greater severity/ harm overall). These impacts consider other proposed developments within the context of the site and any other reasonably foreseeable proposals in the vicinity including:

- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s) not yet determined;
- Projects on the Planning Inspectorate's Programme of Projects;
- Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited; and
- Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

5.1.4 It is proposed that projects that are built and operational at the time the site was designated have been classified as part of the baseline conditions. For those projects that were/ are only partially constructed or have only recently been completed, the full extent of the impacts arising from the development(s) may not be known and will therefore be included within the Cumulative Environmental Assessment (CEA).

5.1.5 In assessing the potential in-combination impact(s) for VE, it is important to bear in mind that for some projects, predominantly those 'proposed' or identified in development plans etc. may or may not actually be taken forward. There is thus a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For this reason, all relevant projects/ plans considered in-combination alongside VE will be allocated into 'Tiers', reflecting their stage within the planning and development process. This allows the in-combination assessment to present several future development scenarios, each with a differing potential for being ultimately built out. A full review of such plans and projects will be conducted for VE for Preliminary Environmental Assessment and will therefore be incorporated into the draft RIAA at that stage. The types of plans and projects that will be considered include the following:

- Offshore:
  - Relevant renewable energy developments;
  - Relevant offshore oil and gas developments;
  - Relevant pipelines and cable developments;
  - Relevant port and harbour activities (including capital and maintenance dredging);
  - Relevant marine disposal sites;
  - Relevant marine aggregate dredging activities;
  - Relevant commercial fishing activity;
  - Relevant military, aviation and radar activity;
  - Relevant major shipping route activity; and
  - Relevant carbon capture and storage activity.
- Onshore:
  - Onshore infrastructure associated with offshore windfarms;
  - Other energy generation infrastructure;
  - Building/housing developments;
  - Installation or upgrade of roads;
  - Installation or upgrade of cables and pipelines;
  - Relevant military, aviation and radar activity;
  - Coastal protection works; and
  - NGET enabling works.

5.1.6 The in-combination assessment, which will be presented in the RIAA, will be undertaken following a tiered structure, with tiers applied as aligned with wider VE reporting, such as the EIA. The potential for an in-combination effect will also depend on factors such as timing of works and specifics of works – as not all plans and projects will result in an in-combination effect. Potential plans and projects included in the in-combination assessment have therefore been identified for each site screened in alone and in the context of the potential for both VE and that plan or project(s) to result in an in-combination effect.

5.1.7 Full details of the methodology and approach to the in-combination assessments can be found within Volume 6, Part 1, Chapter 3: EIA Methodology. In order to generate a long list of projects for consideration within the EIA and HRA, a precautionary list of distances/rationales for each industry sector has been applied for identification of relevant projects which have the potential to have an in-combination effect. The respective distances are as set out within the Volume 6, Part 1, Chapter 3: EIA Methodology:

- Subtidal and intertidal benthic ecology – 22.5 km based on the tidal excursion;
- Marine mammals – distance not relevant: projects considered are within the species-specific MUs or with potential site connectivity;
- Offshore and intertidal ornithology – distance not relevant: projects considered are those defined by the criteria outlined in Table 4.2 and Appendix 2;
- Migratory fish – 50 km; and
- Onshore ecology – 15 km.

5.1.8 The longlist of projects presented here is based on the rationale outlined in sections 6.2 to 6.6 for each relevant environmental receptor.

5.1.9 As stated above, the in-combination assessment is based on the presumption that where potential for LSE has been identified for VE alone, then potential LSE in-combination applies. Those designated sites considered for the in-combination assessment are presented below in Table 5.1.

Table 5.1: Designated sites screened in for VE in-combination

Receptor Group	Designated Sites Considered In-combination
Subtidal and intertidal benthic ecology	Alde, Ore and Butley Estuaries SAC
	Alde-Ore Estuary Ramsar
	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar (with onshore ornithology addressed separately)
	Dengie (Mid-Essex Coast Phase 1) Ramsar (with onshore ornithology addressed separately)
	Essex Estuaries SAC
	Foulness (Mid-Essex Coast Phase 5) Ramsar
	Margate and Long Sands SAC
	Orfordness – Shingle Street SAC
	Stour and Orwell Estuaries Ramsar (with onshore ornithology addressed separately)
Marine Mammals	Bancs des Flandres SAC
	Berwickshire and North Northumberland Coast SAC
	Doggersbank (Netherlands) SAC
	Humber Estuary SAC
	Humber Estuary Ramsar
	Klaverbank SCI
	Noordzeekustone SCI
	SBZ 1 SCI
	SBZ 2 SCI
	SBZ 3 SCI
	Southern North Sea SAC
	Wash and North Norfolk Coast SAC
	Vlaamse Banken SAC
	Vlakte van de Raan SCI
	Voordelta SCI
	Waddenzee SCI

Receptor Group	Designated Sites Considered In-combination
	Westerschelde & Saeftinghe SCI
Offshore and Intertidal Ornithology	Outer Thames Estuary SPA
	Alde-Ore Estuary SPA
	Alde-Ore Estuary Ramsar
	Minsmere-Walberswick SPA
	Minsmere-Walberswick Ramsar (non-seabirds only)
	Hamford Water SPA (for little tern only, all other species considered under onshore ecology)
	Deben Estuary SPA (non-seabirds only)
	Deben Estuary Ramsar (non-seabirds only) (with benthic ecology addressed separately)
	Thanet Coast and Sandwich Bay SPA
	Flamborough and Filey Coast SPA
Migratory Fish	Vlaamse Banken SAC
Onshore Ecology	Hamford Water SAC
	Hamford Water SPA (except little tern, which is addressed under offshore ornithology where it has been screened out as no LSE)
	Hamford Water Ramsar
	Stour and Orwell Estuaries SPA
	Stour and Orwell Estuaries Ramsar (with benthic habitats addressed separately)
	Colne Estuary (Mid-Essex Coast Phase 2) SPA (except little tern, which is considered under offshore ornithology)
	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar (with benthic habitats addressed separately)
	Abberton Reservoir SPA (except goldeneye, tufted duck and great crested grebe)
	Abberton Reservoir Ramsar
	Blackwater Estuary (Mid-Essex Coast Phase 4) SPA (except little tern, which is considered under offshore ornithology)
	Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar (except saltmarsh, wetland invertebrate assemblage and wetland plant assemblage)
	Dengie (Mid-Essex Coast Phase 1) SPA
	Dengie (Mid-Essex Coast Phase 1) Ramsar (except saltmarsh, wetland invertebrate assemblage and wetland plant assemblage, non-bird criteria addressed under benthic ecology)

5.1.10 A final long list of all potential plans and projects considered relevant to VE will be developed by VE OWFL. At the time of screening, the long list is not available. Therefore, a precautionary approach is being taken in order to define what plans and projects may require consideration in for the in-combination screening in respect of each receptor group. This precautionary list of plans and projects for in-combination screening and the rationale for selection for each receptor group is described below.

5.2 SUBTIDAL AND INTERTIDAL BENTHIC ECOLOGY

5.2.1 The potential for LSE in-combination for subtidal and intertidal benthic ecology will be determined based on the following:

- A plan or project which is located within sufficient proximity (22.5 km) to the designated site; this is based on the maximum potential zone of influence associated with increased suspended sediment. It is based on a precautionary estimate in the absence of site-specific physical processes assessment and will be refined down following assessment of site-specific conditions.

5.2.2 Based on the above criteria and similar project screening reports, the following plans and projects are proposed to be screened in for the subtidal and intertidal benthic ecology in-combination screening:

- OWFs and the associated export cables;
  - North Falls OWF; and
  - East Anglia TWO
- Aggregate production areas:
  - CEMEX UK Marine Ltd (Area Number 507/2)
  - CEMEX UK Marine Ltd (Area Number 507/4)
  - CEMEX UK Marine Ltd (Area Number 507/3)
  - CEMEX UK Marine Ltd (Area Number 507/1)
  - CEMEX UK Marine Ltd (Area Number 507/6)
  - CEMEX UK Marine Ltd (Area Number 510/2)
  - Tarmac Marine Ltd (Area Number 509/3)
  - Tarmac Marine Ltd (Area Number 509/1)
  - Tarmac Marine Ltd (Area Number 509/2)
  - Britannia Aggregates Ltd (Area Number 508)
  - Hanson Aggregates Marine Ltd (Area Number 528/2)
- Disposal sites:
  - TH052 Inner Gabbard
  - EC-5TH073 Whitstable C
  - TH213 Wrabness Beach
  - TH216 Copperas
  - TH217 Erwarton Track
  - TH027 Harwich Haven
  - TH064 Maldon Saltings 3
  - TH221 EA One Route EC-2
  - TH153 TEOW Disposal site 1

- TH154 TEOW Disposal site 2
- TH155 TEOW Disposal site 3
- TH058 Northey Island
- TH229 Wrabness Beach East
- TH230 Horsey.

- Interconnectors and telecommunications cables:
  - Gridlink;
  - NeuConnect Interconnector;
  - Nautilus MPI;
  - Eurolink; and
  - Sealink.

5.3 MARINE MAMMALS

5.3.1 The potential for LSE in-combination for marine mammals will be determined based on the following:

- A plan or project where there is potential for the impacts of the construction and operation and maintenance phases to have a temporal and/ or spatial overlap with that of VE and the plan/ or project is within the relevant range to the designated site (e.g., species-specific MUs or drawn in via potential site connectivity).

5.3.2 Based on the above criteria and similar project screening reports, the following plans and projects are proposed to be screened in for the marine mammal in-combination screening:

- Berwick Bank;
- Blyth Demo;
- Brokum Rifgrund West;
- DBS East;
- DBS West;
- Dogger Bank A;
- Dogger Bank B;
- Dogger Bank C;
- Dudgeon Extension;
- Dunkerque;
- East Anglia ONE NORTH;
- East Anglia TWO;
- EnBW He Dreidt;
- Gode Wind 3;
- Hornsea 3;
- Hornsea 4;
- Moray West;
- N- 3.7;

- N- 3.8;
- N-7.2;
- Norfolk Boreas;
- Norfolk Vanguard West;
- North Falls;
- Outer Dowsing;
- Parc Eolien Normadie (AO4);
- Pentalnd;
- Rampion 2;
- Scotwind E1;
- Scotwind N1;
- Scotwind NE6;
- Scotwind NE8;
- SeaGreen C;
- Sherringham Extension;
- Sofia; and
- Thor.

5.4 OFFSHORE AND INTERTIDAL ORNITHOLOGY

5.4.1 The potential for LSE in-combination for offshore and intertidal ornithology will be determined based on the following:

- An offshore wind farm for which the ZoI during the construction or operation periods have temporal or spatial overlap with that of VE.

5.4.2 Based on the above criteria and similar project screening reports, the following offshore wind farms are proposed to be screened in, and reassessed in the draft RIAA, for the offshore and intertidal ornithology in-combination screening:

- Beatrice;
- Berwick Bank;
- Blyth Demonstration Site;
- Dogger Bank C;
- Dogger Bank Creyke Beck Projects A and B;
- Dogger Bank D;
- Dogger Bank South;
- Dudgeon;
- East Anglia One;
- East Anglia ONE North;
- East Anglia Three;
- East Anglia TWO;
- EOWDC;
- Firth of Forth Alpha and Bravo;

- Galloper;
- Greater Gabbard;
- Green Volt;
- Gunfleet Sands;
- Hornsea Four;
- Hornsea Project One;
- Hornsea Project Two;
- Hornsea Three;
- Humber Gateway;
- Hywind;
- Hywind 2 Demonstration;
- Inch Cape;
- Kentish Flats;
- Kentish Flats Extension;
- Kincardine;
- Lincs;
- London Array;
- Lynn and Inner Dowsing;
- Methil;
- Moray East;
- Moray West;
- Neart na Gaoithe;
- Norfolk Boreas;
- Norfolk Vanguard;
- North Falls Offshore Wind Farm;
- Outer Dowsing;
- Pentland;
- Race Bank;
- Rampion;
- Rampion 2;
- Scroby Sands;
- Seagreen Alpha;
- Seagreen Bravo;
- Sheringham Shoal;
- Sheringham Shoal and Dudgeon Extension Projects;
- Sofia;
- Teesside;
- Thanet;
- Triton Knoll;

- West of Orkney; and
- Westermost Rough.

5.5 MIGRATORY FISH

5.5.1 The potential for LSE in-combination for migratory fish will be determined based on the following:

- A plan or project which is located within sufficient proximity (50 km) to the designated site.

5.5.2 Based on the above criteria and similar project screening reports, the following plans and projects are proposed to be screened in for the migratory fish in-combination screening:

- OWFs:
  - East Anglia ONE NORTH;
  - IJmuiden Ver;
  - North Falls; and
  - Scroby Sands.
- Aggregate and Disposal Sites;
  - Tarmac Marine Ltd (509/1);
  - Tarmac Marine Ltd (509/2);
  - CEMEX UK Marine Ltd (510/2);
  - Tarmac Marine Ltd (509/3);
  - Britannia Aggregates Ltd (508);
  - CEMEX UK Marine Ltd (507/1);
  - CEMEX UK Marine Ltd (507/3);
  - CEMEX UK Marine Ltd (507/4);
  - TH052 Inner Gabbard;
  - EC-5TH073 Whitstable C;
  - TH213 Wrabness Beach;
  - TH216 Copperas;
  - TH217 Erwarton Track;
  - TH027 Harwich Haven;
  - TH064 Maldon Saltings 3;
  - TH221 EA One Route EC-2;
  - TH153 TEOW Disposal site 1;
  - TH154 TEOW Disposal site 2;
  - TH155 TEOW Disposal site 3;

- TH058 Northey Island;
- TH229 Wrabness Beach East; and
- TH230 Horsey.

- Electricity Interconnector Cables
  - Grid Link;
  - Nautilus MPI;
  - NeuConnect Interconnector; and
  - Sealink.

5.6 ONSHORE ECOLOGY

5.6.1 A precautionary approach has been taken to define the plans and projects that may require consideration in the in-combination screening for onshore ecology, Plans that have been screened in for consideration within the in-combination assessment are the adopted and emerging local plans (where available) for the following districts:

- Tendring;
- Colchester;
- Maldon;
- Babergh (and Mid Suffolk); and
- Suffolk Coastal.

5.6.2 Projects that have been screened in for consideration within the in-combination assessment are the developments within 15 km of the European and Ramsar sites listed in Table 4.19: and Table 4.20: that are identified within the same local plans, emerging local plans, recent planning applications and consented developments within this same area. This excludes development in urban centres away from the coast, those less than 5 residential units and modifications to existing buildings.

5.6.3 Potentially relevant projects that have been identified are:

- North Falls OWF;
- Bradwell B new nuclear power station;
- Tendring/Colchester Borders Garden Community;
- Rivenhall IWMF and Energy Centre;
- Bramford to Twinstead Electricity Line;
- Sea Link Electricity Line;
- East Anglia Green Energy Enablement (Green) project (EAG) (new high voltage network reinforcement between Norwich, Bramford and Tilbury);
- A12 Chelmsford to A120 Widening Scheme;
- Improvements to the A120 to Harwich;
- Harwich Freeport;
- Land allocations for development within the local plans identified above;
- 22/00979/DETAIL;
- 22/02117/FUL/;

- 23/00008/REFUSE;
- 20/00179/FUL; and
- 17/01988/FUL.

5.6.4 Development occurring concurrently to the installation of the onshore infrastructure presents the main risk of in-combination to the sites identified in Table 5.1:. However, the draft RIAA will not only be restricted to development occurring concurrently with the project.

5.6.5 Any new Investment Zone under the Government's Growth Plan which comes forward in south Essex will also be considered for in combination effects.

6 CONCLUSION OF POTENTIAL FOR LSE

6.1 SUBTIDAL AND INTERTIDAL BENTHIC ECOLOGY

Table 6.1 Conclusion of LSE for subtidal and intertidal benthic ecology

Designated Site	Feature(s) screened in	Potential Effects			Potential for LSE alone OR in-combination
		Construction	Operation and Maintenance	Decommissioning	
Margate and Long Sands SAC	Sandbanks which are slightly covered by sea water all the time	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS	Effects cannot be screened out at this stage and therefore there is a potential for LSE.
Essex Estuaries SAC	Estuaries Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonizing mud and sand Spartina swards (Spartinion maritimae) Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruitocosi*) Sandbanks which are slightly covered by sea water all the time	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS EMF Changes to physical processes	Physical habitat loss/ disturbance Suspended sediment/ deposition INNS	Effects cannot be screened out at this stage and therefore there is a potential for LSE.

Table 6.2: Conclusion of LSE for marine mammals

Designated Site	Feature(s) Screened in	Potential Effects			Potential for LSE alone OR in-combination
		Construction	Operation and Maintenance	Decommissioning	
Berwickshire and North Northumberland Coast SAC	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	Evidence to suggest connectivity (Vincent *et al*., 2017) and therefore effects cannot be screened out at this stage and therefore there is a potential for LSE.
Humber Estuary SAC	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	Evidence to suggest connectivity (Vincent *et al*., 2017) and therefore effects cannot be screened out at this stage and therefore there is a potential for LSE.
Humber Estuary Ramsar	Grey seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS,) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	Evidence to suggest connectivity (Vincent *et al.,* 2017) and therefore effects cannot be screened out at this stage and therefore there is a potential for LSE.
Southern North Sea SAC	Harbour Porpoise	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Habitat loss > Accidental pollution and changes in water quality > Changes to prey	> Underwater noise (disturbance/TTS) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss	> Underwater noise (disturbance/TTS, PTS) > Vessel collision risk (injury and disturbance) > Habitat loss > Accidental pollution and changes in water quality > Changes to prey	Effects cannot be screened out at this stage and therefore there is a potential for LSE.

Designated Site	Feature(s) Screened in	Potential Effects Construction	Operation and Maintenance	Decommissioning	Potential for LSE alone OR in-combination
Wash and North Norfolk Coast SAC	Harbour seal	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	Evidence to suggest connectivity (Vincent *et al*., 2017) and therefore effects cannot be screened out at this stage and therefore there is a potential for LSE.
Transboundary sites for seals; > Bancs des Flandres SCI; > Doggersbank (Netherlands) SAC > Klaverbank SCI; > Noordzeekustone SCI; > SBZ 1 SCI; > SBZ 2 SCI; > SBZ 3 SCI; > Vlaamse Banken SAC; > Vlakte van de Raan SCI; > Voordelta SCI; > Waddenzee SCI; and > Westerschelde & Saeftinghe SCI.	Harbour seal; and Grey seal	> Underwater (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	> Vessel collision risk (injury and disturbance) > Changes to prey > Disturbance at haul out	> Underwater noise (disturbance/TTS, PTS and barrier effect) > Vessel collision risk (injury and disturbance) > Changes to prey > Habitat loss > Disturbance at haul out	Evidence to suggest connectivity (Vincent *et al*., 2017) and therefore effects cannot be screened out at this stage and therefore there is a potential for LSE.

Table 6.3: Conclusion of LSE for offshore and intertidal ornithology

Designated Site	Feature(s) Assessed	Potential Effects Construction	O&M	Decommissioning	Potential for LSE alone OR in-combination
Outer Thames Estuary SPA	Red-throated diver	Disturbance and displacement and habitat loss due to work activity and vessel movements within the preferred offshore ECC only	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Common tern	No LSE	Risk of collision	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Little tern	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Risk of collision during migration Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Alde-Ore Estuary SPA	Lesser black-backed gull	No LSE	Risk of collision	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Sandwich tern	No LSE	Direct disturbance and displacement Risk of collision Barrier effect	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Little tern	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Avocet Marsh harrier Redshank Ruff	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.

Designated Site	Feature(s) Assessed	Potential Effects Construction	O&M	Decommissioning	Potential for LSE alone OR in-combination
Alde-Ore Estuary Ramsar Non bird features addressed in Table 4.10).	Lesser black-backed gull	No LSE	Risk of collision	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Avocet Redshank	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Minsmere-Walberswick SPA	Little tern	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Avocet Bittern Gadwall Greater white-fronted goose Hen harrier Marsh harrier Nightjar Shoveler Teal	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Minsmere-Walberswick Ramsar	Bittern Gadwall Teal Shoveler Marsh harrier Avocet Bearded reedling	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Deben Estuary SPA	Avocet Dark-bellied brent goose	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Deben Estuary Ramsar (non-bird criteria screened out in Table 4.10:)	Dark-bellied brent goose	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.

Designated Site	Feature(s) Assessed	Potential Effects Construction	O&M	Decommissioning	Potential for LSE alone OR in-combination
Hamford Water SPA (see also Table 6.5)	Little tern	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Risk of collision on migration Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Disturbance and displacement due to work activity and vessel movements within the preferred offshore ECC only	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Thanet Coast and Sandwich Bay SPA	Little tern	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Flamborough and Filey Coast SPA	Kittiwake	No LSE	Risk of collision on migration	No LSE	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
	Gannet	Direct disturbance and displacement	Risk of collision Direct disturbance and displacement	Direct disturbance and displacement	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination both for effects, as well as a combined effect (i.e., the combined effect of the two impacts (disturbance/displacement and the risk of collision).
	Guillemot	Direct disturbance and displacement due to the potential for this species to migrate through VE and winter in southern North Sea	Direct disturbance and displacement due to the potential for this species to migrate through VE and winter in southern North Sea	No LSE	Effects cannot be screened out at this stage, in-combination. Therefore, there is a potential for LSE in-combination.
	Razorbill	Direct disturbance and displacement due to the potential for this species to migrate through VE and winter in southern North Sea	Direct disturbance and displacement due to the potential for this species to migrate through VE and winter in southern North Sea	No LSE	Effects cannot be screened out at this stage, in-combination. Therefore, there is a potential for LSE in-combination.
Farne Islands SPA	Guillemot	Direct disturbance and displacement due to the potential for this species to winter in southern North Sea	Direct disturbance and displacement due to the potential for this species to winter in southern North Sea	No LSE	Effects alone cannot be screened out at this stage. Therefore, there is a potential for LSE alone.
	Razorbill	Direct disturbance and displacement due to the potential for this species to winter in southern North Sea	Direct disturbance and displacement due to the potential for this species to winter in southern North Sea	No LSE	Effects alone cannot be screened out at this stage. Therefore, there is a potential for LSE alone.

Table 6.4: Conclusion of LSE for migratory fish

Designated Site	Feature(s) Assessed	Potential Effects			Potential for LSE alone OR in-combination
		Construction	O&M	Decommissioning	
Vlaamse Banken SAC	Twaite shad	Underwater noise and vibration	No LSE	Underwater noise and vibration	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.

Table 6.5:Conclusion of LSE for onshore ecology

Designated Site	Distance to Onshore ECC (km)	Feature(s) Assessed	Effects Assessed Construction	O&M	De-commissioning	Potential for LSE alone OR in-combination
Hamford Water SAC	0.71	Fisher's estuarine moth *Gortyna borelii lunata*	Impacts on supporting populations, food plant and potential habitat outside SAC. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity. Decrease in air quality	No risk.	As construction.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination
Hamford Water SPA (see also Table 6.3)	0.71	Over winter: Avocet Black-tailed godwit Dark-bellied brent goose Grey plover Redshank Ringed plover Shelduck Teal During the breeding season: Little tern	Loss of foraging and roosting habitat outside the SPA. Disturbance of birds outside the SPA. Water quality: pollution from site run-off affecting prey availability. Decreases in water quantity. Decrease in air quality.	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance of birds outside SPA. Water quality: pollution from site run-off affecting prey availability. Decrease in air quality.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination, except for little tern as this species breeds and forages in areas that are distant from the ECC and is addressed separately offshore in Table 6.3.
Hamford Water Ramsar	0.72	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose	As for the SPA.	As for the SPA.	As for the SPA.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.

Designated Site	Distance to Onshore ECC (km)	Feature(s) Assessed	Effects Assessed Construction	O&M	De-commissioning	Potential for LSE alone OR in-combination
		Redshank Ringed plover				
Stour and Orwell Estuaries SPA	3.10	Over winter: Black-tailed godwit Dark-bellied brent goose Dunlin Grey plover Knot Pintail Redshank Waterbird assemblage On passage: Redshank During the breeding season: Avocet	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting prey availability. Decreases in water quantity. Decrease in air quality.	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting prey availability. Decrease in air quality.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Stour and Orwell Estuaries Ramsar (see also Table 4.10)	3.10	Important wintering populations of: Black-tailed godwit Dark-bellied brent goose Dunlin Grey plover Knot Pintail Redshank Important passage populations of redshank. Also qualifies for: Wintering waterbird assemblage Habitat criteria addressed in Table 4.9	As for the SPA plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA.	As for the SPA plus, impacts on supporting populations of plants and invertebrates outside the Ramsar.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.

Designated Site	Distance to Onshore ECC (km)	Feature(s) Assessed	Effects Assessed Construction	O&M	De-commissioning	Potential for LSE alone OR in-combination
Colne Estuary (Mid-Essex Coast Phase 2) SPA	7.21	Over winter: Dark-bellied brent goose Hen harrier Pochard Redshank Ringed plover Waterbird assemblage During the breeding season: Little tern	As for Stour and Orwell Estuaries SPA.	As for Stour and Orwell Estuaries SPA.	As for Stour and Orwell Estuaries SPA.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination, except for little tern as this species breeds and forages in areas that are distant from the ECC. This feature is screened out from potential LSE in Table 4.14.
Colne Estuary (Mid-Essex Coast Phase 2) Ramsar (see also Table 4.14)	7.21	Over winter: Dark-bellied brent goose Redshank Waterbird assemblage Wetland invertebrate assemblage Wetland plant assemblage Saltmarsh Habitat criteria addressed in Table 4.10.	As for Stour and Orwell Estuaries Ramsar.	As for Stour and Orwell Estuaries Ramsar.	As for Stour and Orwell Estuaries Ramsar.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination. Benthic habitats are addressed separately in Table 4.10.
Abberton Reservoir SPA	11.4	Breeding: Cormorant Non-breeding: Coot Gadwall Goldeneye Great crested grebe Mute swan Pochard Shoveler Teal Tufted duck	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decrease in air quality	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decrease in air quality	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination except for goldeneye, pochard and tufted duck.

Designated Site	Distance to Onshore ECC (km)	Feature(s) Assessed	Effects Assessed Construction	O&M	De-commissioning	Potential for LSE alone OR in-combination
		Wigeon Waterbird assemblage				
Abberton Reservoir Ramsar	11.4	Wintering: Gadwall Shoveler Wigeon Waterbird assemblage	As for the SPA.	As for the SPA.	As for the SPA.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination.
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	13.91	Non-breeding: Black-tailed godwit Dark-bellied Brent goose Dunlin Grey plover Hen harrier Waterbird assemblage Breeding: Little tern Pochard Ringed plover	Loss of foraging and roosting habitat outside the SPA. Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity. Decreases in air quality	Disturbance of birds outside the SPA, as a result or routine and non-routine maintenance work.	Disturbance/ displacement of birds outside SPA. Water quality: pollution from site run-off affecting habitat quality. Decreases in water quantity. Decreases in air quality	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination, except for little tern.
Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	13.91	Wintering: Black-tailed godwit, Dark-bellied brent goose Dunlin Grey plover Waterbird assemblage Saltmarsh Wetland invertebrate assemblage Wetland plant assemblage	As for the SPA plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	As for the SPA.	As for the SPA, plus impacts on supporting populations of plants and invertebrates outside the Ramsar.	Effects cannot be screened out at this stage, alone or in-combination. Therefore, there is a potential for LSE alone and in-combination, except for saltmarsh, the wetland invertebrate assemblage and the wetland plant assemblage due to the lack of hydrological link and the distance between the Ramsar and the ECC.

7 REFERENCES

Air Pollution Information System (APIS), 2022. Available at: https://www.apis.ac.uk/

Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W. and Hume, D., 2014. Mapping seabird sensitivity to offshore wind farms. PloS one, 9(9).

Brown and May Marine Ltd (2009a). Greater Gabbard Wind Farm Extension. Pre construction fish survey, Spring 2009.

Brown and May Marine Ltd (2009b). Greater Gabbard Wind Farm Extension. Pre construction fish survey, Autumn / Winter 2008.

Cefas (2010a). Mapping spawning and nursery areas of species to be considered in Marine Protected Areas (Marine Conservation Zones) Project Code: MB5301. August 2010.

Centre for Marine and Coastal Studies (CMACS). 2005a. Greater Gabbard Offshore Wind Farm Environmental Impact Assessment. Benthic Ecology Technical Report.

Centre for Marine and Coastal Studies (CMACS). 2010. Galloper Offshore Wind Farm. Benthic Survey Technical Report 2010. Prepared for OSIRIS PROJECTS (NRL and SSER). Included within Appendix 12.1.

Cleasby, I.R., Owen, E., Wilson, L., Wakefield, E.D., O'Connell, P. and Bolton, M., 2020. Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping. Biological Conservation, 241, p.108375.

Colclough, S.R., Gray, G., Bark, A. and Knights, B. (2002), Fish and fisheries of the tidal Thames: management of the modern resource, research aims and future pressures. Journal of Fish Biology, 61: 64-73. https://doi.org/10.1111/j.1095-8649.2002.tb01762.x

Coull, K.A., Johnstone, R., and S.I. Rogers. 1998. Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

Cox, T. M., J. Barker, J. Bramley, J. Debney, A. Debney, D. Thompson, and A.-C. Cucknell. (2020). Population trends of harbour and grey seals in the Greater Thames Estuary. Mammal Communications 6:42-51.

Cucknell, A., M. A, O. Boisseau, and R. McLanaghan. (2020). Confirmation of the presence of harbour porpoise (Phocoena phocoena) within the tidal Thames and Thames Estuary. Mammal Communications 6:21-28

DECC. 2002. Strategic Environmental Assessment (SEA) 3. Available at http://www.offshore-sea.org.uk/site/index.php

DECC. 2003. Round 2 Offshore Wind Farm Development Strategic Environmental Assessment (SEA). Available at http://www.offshoresea.org.uk/site/index.php

Defra, 2021. Changes to the Habitats Regulations 2017. Available at https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017

Dierschke, V., Furness, R.W. and Garthe, S., 2016. Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation, 202, pp.59-68.

Ellis, J.R., Milligan, S., Readdy, L., South, A., Taylor, N. and Brown, M. (2010), 'Mapping spawning and nursery areas of species to be considered in Marine Protected Areas (Marine Conservation Zones)'. Report to DEFRA.

Environment Agency. (2020) Salmon Stocks and Fisheries in England and Wales in 2020

European Commission (EC), 2001. Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Available at: https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf

EUSeaMap, (2021) Broadscale Marine Habitats Map.

Evans. 1995a. Chapter 5.15 Whales, dolphins and porpoises. In: Coasts andseas of the United Kingdom. Region 6 Eastern England: Flamborough Head to Great Yarmouth. Ed. By Barne, J.H., Robson, C.F., Kaznowska, S.S.,Doody, J.P. and Davidson, N.C. 129-133. Peterborough, Joint Nature Conservation Committee.

Evans. 1995b. Chapter 5.14 Seals. In: Coasts and seas of the United Kingdom. Region 6 Eastern England: Flamborough Head to Great Yarmouth. Ed. By Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P. and Davidson, N.C. 129-133. Peterborough, Joint Nature Conservation Committee.

Five Estuaries Offshore Wind Farm Ltd. (VE OWFL). 2021. Environmental Impact Assessment: Scoping Report. https://infrastructure.planninginspectorate.gov.uk/projects/eastern/five-estuaries-offshore-wind-farm/?ipcsection=docs

Fliessbach, K.L., Borkenhagen, K., Guse, N., Markones, N., Schwemmer, P. and Garthe, S., 2019. A ship traffic disturbance vulnerability index for Northwest European seabirds as a tool for marine spatial planning. Frontiers in Marine Science.

Fugro, (2022a). Fugro - WPM1 - Main Array – Benthic Ecology Monitoring Report

Fugro, (2022b). Fugro – WPM2, WPM3 & WPM4 – ECR & Intertidal – Benthic Ecology Monitoring Report

Galloper Wind Farm Limited. 2011. Galloper Wind Farm Project Environmental Statement.

Golding. N., Albrecht. J. & McBreen. F. (2020) Refining criteria for defining areas with a 'low resemblance' to Annex I stony reef; Workshop Report. (JNCC Report No. 656). JNCC, Peterborough, ISSN 0963-8091.

Great Gabbard Offshore Winds. 2005. Greater Gabbard Offshore Wind Farm Environmental Statement.

Green, R. M., Thaxter, C. B., Johnston, D. T., Boersch-Supan, P. H., Bouten, W and Burton, N. H.K. (2021). Assessing Movements of Lesser Black-backed Gulls using GPS Tracking Devices in Relation to the Galloper Wind Farm.

Gubbay, S. (2007) Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop 1-2 May 2007. JNCC Report No. 405.

Hammond, P.S., Berggren, P., Benke, H., Borchers, D.L., Collet, A., Heide- Joergensen, M.P., Heimlich, S., Hiby, A.R., Leopold, M.F., Oeien, N. 2002. Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. J Appl Ecol 39: 361-376.

Hammond, P., C. Lacey, A. Gilles, S. Viquerat, P. Börjesson, H. Herr, K. Macleod, V. Ridoux, M. Santos, M. Scheidat, J. Teilmann, J. Vingada, and N. Øien. 2017. Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.

Hendrick, Vicki & Foster-Smith, Robert. (2006). *Sabellaria spinulosa* reef: A scoring system for evaluating 'reefiness' in the context of the Habitats Directive. Journal of the Marine Biological Association of the United Kingdom. 86. 665 - 677. 10.1017/S0025315406013555.

HiDef Aerial Surveying Ltd. (2018). Digital video aerial surveys of red-throated diver in the Outer Thames Estuary Special Protection Area 2018.

HiDef Aerial Surveying Ltd. (2020). Digital video aerial surveys of seabirds and marine mammals at Five Estuaries: Annual report for March 2019 to February 2020.

HiDef Aerial Surveying Ltd. (2021). Digital video aerial surveys of seabirds and marine mammals at Five Estuaries: Two-year report March 2019 to February 2021.

IAMMWG. 2022. Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680 (Revised March 2022), JNCC Peterborough, ISSN 0963-8091. Available at: https://data.jncc.gov.uk/data/3a401204-aa46-43c8-85b8-5ae42cdd7ff3/jncc-report-680-revised-202203.pdf

Irving, R. (2009). The identification of the main characteristics of stony reef habitats under the Habitats Directive. Summary report of an inter-agency workshop 26-27 March 2008 (Report No. 432).

Joint Nature Conservation Committee (JNCC) (2013). Individual Species Reports – 3rd UK Habitats Directive Reporting 2013. Available at: http://jncc.defra.gov.uk/page-6391

Joint Nature Conservation Committee (JNCC) (2019). UK Biodiversity Action Plan. Available at: https://jncc.gov.uk/our-work/uk-bap/ [Accessed July 2022].

Magath, V., and Thiel, R. (2013). 'Stock recovery, spawning period and spawning area expansion of the twaite shad Alosa fallax in the Elbe estuary, southern North Sea'. Endang Species Res, DOI: https://doi.org/10.3354/esr00490.

Malcolm. I.A., Godfrey. J, and Youngson. A.F. (2010). Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables. Scottish Marine and Freshwater Science Vol 1 No 14.

Marine Aggregate Levy Sustainability Fund (MALSF). 2009. The Outer Thames Estuary Regional Environmental Characterisation (09/J/1/06/1305/0870, MEPF 08/01).

Marine Management Organisation (MMO), JNCC, Natural England, Countryside Council for Wales and Cefas (2010). Draft Guidance on the Assessment of Effects on the Environment and Cultural Heritage from Marine Renewable Developments. December 2010.

Masden. E.A., Haydon, D.T., Fox A.D., Furmess, R.W. 2010. Barriers to movement: Modelling energetic costs of avoiding marine wind farms amongst breeding seabirds. Marine Pollution Bulletin, 60(7) pp.1085-1091.

Osiris Projects (2010a). Areas A, B, C, D, R1 & R2 Geophysical and Benthic Ecology Survey Volume 2a – Areas A, B, C, R1 and R2 REPORT C9028 (May 2010).

Osiris Projects (2010b). Export Cable Geophysical and Benthic Ecology Survey Volume 3 REPORT C9028 (May 2010).

Planning Inspectorate (PINS) (2019). 'Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects'. https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ [Accessed July 2022]

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B.L., Zeddies, D.G., and Tavolga W.N. 2014. South Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.

Reid, J.B, Evans, P.G.H and Northridge, S.P. 2003. Atlas of cetacean Distribution in North-west European waters. JNCC, Peterborough.

RPS. 2008. Preconstruction Benthic Ecology. Gunfleet Sands Offshore Wind Farm Development. A report to Gunfleet Sands Ltd.

Russell, D., E. Jones, and C. Morris. (2017). Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals. Scottish Marine and Freshwater Science Vol 8, No 25.

SCOS. 2008. (SCOS Report) Scientific Advice on Matters Related to the Management of Seal Populations: 2008. Available at www.smru.st-and.ac.uk

SCOS. 2009. (SCOS Report) Scientific Advice on Matters Related to the Management of Seal Populations: 2009. Available at www.smru.st-and.ac.uk

SCOS. 2021. (SCOS Report) Scientific Advice on Matters Related to the Management of Seal Populations: 2021. Available at http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf

Sharples RJ, Matthiopoulos J, Hammond PS. 2008. Distribution and movements of Harbour seals around the coast of Britain. Report to the Department of Energy and Climate Change (DECC). Sea Mammal Research Unit, St Andrews, UK, 65pp.

Sea Mammal Research Unit (SMRU). 2006. Small Cetaceans in the European Atlantic and North Sea (SCANS-II).

SNCB. 2017. Joint SNCB Interim Displacement Advice Note. JNCC. Available at https://hub.jncc.gov.uk/assets/9aecb87c-80c5-4cfb-9102-39f0228dcc9a

Speakman, J., Gray, H. and Furness, L. (2009), 'University of Aberdeen report on effects of offshore wind farms on the energy demands of seabirds', Report to the DECC.

Subacoustech. 2011. Nedwell, J. R., Brooker, A.G., Barham, R., Lovell, J. J., and Lambert, D. Galloper Offshore Wind Farm Project: Underwater Noise Impact Assessment Subacoustech Environmental Report No. E218R0119.

Vincenta, C., Huona, M., Cauranta, F., Dabinb, W., Deniauc, A., Dixneufd, S., Laetitia, L., Elderg, J-F., Fremauh, M-H, Hassanii, S., Hemonj, A., Karpouzopoulosk, J., Lefeuvree, C., McConnelll, B.J., Mossl, S.E.W., Provostc, P., Spitzb, J., Turpine, Y., and Ridouxa., V. 2017. Grey and harbour seals in France: Distribution at sea, connectivity and trends in abundance at haulout sites. Deep-Sea Research Part II, 141, 294-305.

Waggitt, J. J., P. G. H. Evans, J. Andrade, A. N. Banks, O. Boisseau, M. Bolton, G. Bradbury, T. Brereton, C. J. Camphuysen, J. Durinck, T. Felce, R. C. Fijn, I. Garcia-Baron, S. Garthe, S. C. V. Geelhoed, A. Gilles, M. Goodall, J. Haelters, S. Hamilton, L. Hartny-Mills, N. Hodgins, K. James, M. Jessopp, A. S. Kavanagh, M. Leopold, K. Lohrengel, M. Louzao, N. Markones, J. Martinez-Cediera, O. O'Cadhla, S. L. Perry, G. J. Pierce, V. Ridoux, K. P. Robinson, M. B. Santos, C. Saavedra, H. Skov, E. W. M. Stienen, S. Sveegaard, P. Thompson, N. Vanermen, D. Wall, A. Webb, J. Wilson, S. Wanless, and J. G. Hiddink. (2020). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

Warwick-Evans, V., Atkinson, P, W., Walkington, I., and Green J, A. Predicting the impacts of wind farms on seabirds: An individual-based model. Journal of Applied Ecology 55: 503-515

Wildfowl and Wetland Trust (WWT). 2009. Distributions of Cetaceans, Seals, Turtles, Sharks and Ocean Sunfish recorded from Aerial Surveys 2001-2008. WWT Consulting. Report to Department of Energy and Climate Change.

Wildfowl and Wetlands Trust (WWT). 2014. Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds. Scottish Marine and Freshwater Science Vol 5 No 12. Edinburgh: Scottish Government, 174pp.

Woodward, I., Thaxter, C. B., Owen, E., Cook, A. S. C. P. 2019. Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724. ISBN 978-1-912642-12-0Zeale, M., 2009. Barbastelles in the landscape: ecological research and conservation in Dartmoor National Park. SITA Trust.

Worsfold, T.M. and Dyer, M.F. 2005. Benthic Ecology of Scroby Sands wind farm site: results of July 2005 (post-construction) survey and comparison with 1998 (pre-construction) survey. Unicomarine Report EONSCR05 to E. ON UK Renewables Offshore Wind Ltd, October, 2005.

Wright, L. J., Ross-Smith, V. H., Austin, G. E., Massimino, D., Dadam, D., Cook, A. S. C. P., Calbrade, N. A. and Burton, N. H. K. (2012), 'Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (and other Annex 1 species)', Strategic Ornithological Support Services, Project SOSS-05, BTO Research Report No. 592.

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