East Anglia TWO Offshore Windfarm

Habitats Regulations Assessment Appendix 1

HRA Screening Report

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Glossary of Abbreviations

cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
East Anglia TWO	East Anglia TWO Offshore Windfarm
EC	European Commission
EPP	Evidence Plan Process
ETG	Expert Topic Group
EU	European Union
FCS	Favourable Conservation Status
HRA	Habitats Regulations Assessment
HRGN	Habitats Regulations Guidance Note
IAMMWG	Inter-Agency Marine Mammal Working Group
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MU	Management Unit
NSER	No Significant Effects Report
OESEA	Offshore Energy Strategic Environmental Assessment
pSAC	Possible Special Area of Conservation
pSPA	Potential Special Protection Area
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Bodies
SoS	Secretary of State
SPA	Special Protection Area
SPR	ScottishPower Renewables (UK) Limited
UK	United Kingdom
WTG	Wind Turbine Generator
ZAP	Zone Appraisal and Planning
ZEA	Zone Environmental Appraisal
ZTA	Zone Technical Appraisal

Glossary of Terminology

East Anglia TWO Project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one offshore construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO Windfarm Site	The offshore area within which wind turbines and offshore platforms will be located.
Designated Site	A network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SAC) and Special Protection Areas (SPA) designated under the Habitats Directive and Birds Directive, respectively. Designated sites also include Sites of Community Importance (SCI) and Candidate SACs (cSACs)
Offshore Development Area	The East Anglia TWO windfarm site and offshore cable corridor (up to Mean High Water Springs).
Offshore Cable Corridor	This is the area which will contain the offshore export cables between offshore electrical platforms and landfall.
Ramsar Site	A Ramsar Site is a wetland site of international importance under the Convention on Wetlands, known as the Ramsar Convention

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Executive Summary

ScottishPower Renewables (UK) Limited (SPR) is developing the East Anglia TWO offshore windfarm (the proposed East Anglia TWO project) and is currently in the process of preparing a Development Consent Order (DCO) application for the project. This document presents the findings of the combined onshore and offshore Habitats Regulations Assessment (HRA) screening exercise, which is stage 1 of the HRA process in support of the proposed East Anglia TWO project DCO application.

The results of the onshore HRA screening exercise proposes the screening out of all designated sites for all terrestrial ecology receptors based on the proximity of sites being too far from the onshore indicative development area to have the potential to result in Likely Significant Effect (LSE).

The screening exercise for onshore ornithology screened in one designated site and interest feature for further consideration:

- The Sandlings SPA for breeding populations of nightjar and woodlark.

The results of the offshore HRA screening exercise proposes screening out of all designated sites for benthic ecology and fish receptors based on the location of sites being too far from the proposed East Anglia TWO project to have the potential to result in LSE.

The screening exercise for marine mammals screened in three designated sites and interest features for further consideration:

- The Southern North Sea cSAC which is designated for harbour porpoise and overlaps with the East Anglia TWO windfarm (winter area only).
- The Humber Estuary SAC which is designated for grey seals and is 164km from the East Anglia TWO development area at its nearest point.
- The Wash and North Norfolk Coast SAC which is designated for harbour seal and is 90km from the East Anglia TWO development area at its nearest point.

The screening exercise for offshore ornithology screened in four designated sites and interest features for further consideration:

- The Outer Thames Estuary SPA and pSPA Extension designated for wintering marine birds and breeding terns which overlaps with the East Anglia TWO development area.
- The Greater Wash SPA designated for breeding seabirds as well as breeding and wintering passage waterbirds. The site has been screened in due to the potential for small numbers of migratory non-breeding seabirds to pass through the East Anglia TWO windfarm site.

- The Alde-Ore Estuary SPA and Ramsar which is designated for breeding seabirds as well as breeding, wintering and passage waterbirds. The site has been screened in due to potential connectivity with lesser black-back gull and herring gull populations.
- Flamborough and Filey Coast pSPA which is designated for breeding seabirds. The site has been screened in due to the potential for migrations of seabirds and connectivity with the gannet population during the breeding season.

Note that this report has been updated with clarifications in response to comments from the Planning Inspectorate. These changes were all made to clarify questions the Planning Inspectorate had on which sites were included in the exercise and the conclusions reached. In addition, some figures were added (see ***Annex 1***) which the Planning Inspectorate suggested would aid understanding. However, it should also be noted that this document represents a 'point-in-time' and therefore ***section* 1.2** of this report which relates to the project description has not been updated and the reader should instead refer to ***Chapter 6 Project Description of the ES***. Any conclusions relating which followed from the project description at the time of screening remain as they were.

In Addition, sites which have since been added to the screening at the request of Natural England have not been included in the updates, these are captured in the full Information to Support the Appropriate Assessment Report and the Screening Matrices and Integrity Matrices (document reference 5.3). These sites are:

- Grey Seal:
    - Vlaamse Banken SAC in Belgium, located approximately 59km from the East Anglia TWO windfarm site and 72km from the cable corridor;
    - SBZ 1 / ZPS 1 SPA in Belgium, located approximately 94km from the East Anglia TWO windfarm site and 107km from the cable corridor;
    - SBZ 2 / ZPS 2 SPA in Belgium, located approximately 84km from the East Anglia TWO windfarm site and 100km from the cable corridor;
    - SBZ 3 / ZPS 3 SPA in Belgium, located approximately 92km from the East Anglia TWO windfarm site and 108km from the cable corridor;
    - Vlakte van de Raan SCI in Belgium, located approximately 89km from the East Anglia TWO windfarm site and 107km from the cable corridor;
    - Bancs des Flandres SAC in France, located approximately 82km from the East Anglia TWO windfarm site and 93km from the cable corridor;
    - Vlakte van de Raan SAC in the Netherlands, located approximately 82km from the East Anglia TWO windfarm site and 99km from the cable corridor; and
    - Voordelta SAC and SPA in the Netherlands, located approximately 84km from the East Anglia TWO windfarm site and 101km from the cable corridor.

- Birds:
    - Breydon Water SPA and Ramsar located approximately 50.8km from the East Anglia TWO windfarm site
    - Broadland SPA and Ramsar located approximately 39.6km from the East Anglia TWO windfarm site
    - North Norfolk Coast SPA and Ramsar located approximately 105.4km from the East Anglia TWO windfarm site

Reference should also be made to Appendix 4 of the Information to Support Appropriate Assessment Report (which includes stakeholder consultation responses to the Screening exercise) (document reference 5.3.4) and the HRA Screening Matrices (Appendix 2 of the Information to Support Appropriate Assessment Report).

1 Introduction

1.1 Purpose of this Document

1. This document represents stage 1 of the onshore and offshore Habitats Regulations Assessment (HRA) process, which supports the proposed East Anglia TWO project's Development Consent Order (DCO) application. This HRA screening report outlines the HRA process and details the findings of the onshore and offshore HRA screening process for the proposed East Anglia TWO project.

2. This document will consider whether there is potential for Likely Significant Effect (LSE) on the features of the designated sites to occur due to the presence of onshore and offshore components or activities associated with the proposed East Anglia TWO project. Where it is considered that there is no potential for LSE, this site will be 'screened out' from further consideration. Where the potential for LSE cannot be discounted for a site, the site will remain 'screened in' and further assessment will be undertaken.

3. This document is to be used to inform stakeholder consultation. Agreement on whether sites should or should not be screened-out will be sought through the Evidence Plan Process (EPP) through the relevant Expert Topic Groups (ETGs).

4. This document considers onshore activities in relation to effects on designated sites and considers the following receptor types:

   - Terrestrial ecology; and
   - Onshore ornithology.

5. This combined HRA screening report also considers offshore activities in relation to effects on designated sites. This screening report considers the following receptor types:

   - Benthic ecology;
   - Fish ecology;
   - Marine mammals; and
   - Offshore Ornithology.

6. It should be noted that SPR is also in the pre-application stage for the 800MW East Anglia ONE North offshore windfarm project (the proposed East Anglia ONE North project). The proposed East Anglia ONE North project will have a separate HRA assessment process, but has been considered in the development of the design of the proposed East Anglia TWO project. Although separate HRA screening reports have been produced for the proposed East Anglia TWO and East Anglia ONE North projects, both projects share the same onshore study area and therefore effects on designated sites are likely to be similar.

7. At this stage, it has not been confirmed whether construction of the proposed East Anglia TWO and East Anglia ONE North projects will occur in parallel (i.e. at the same time) or sequentially (construction of one project followed by construction of the second project). Therefore, the HRA assessment will have two construction scenarios, construction of both projects in parallel and construction of each project sequentially as these represent the worst case scenarios.

1.2 Project Details

8. This section provides further detail on the infrastructure parameters of the proposed East Anglia TWO project.

9. Detailed project design will be ongoing throughout the environmental impact assessment (EIA) and pre-construction phase. Therefore, the description of the project provided here is indicative at this stage and designed to provide context for the wider document. The project design envelope will be developed in parallel with the EIA process and will be influenced by the results of environmental and technical studies and in some cases stakeholder consultation.

1.2.1 East Anglia TWO Onshore Infrastructure

10. For the purpose of this assessment, the key onshore project characteristics are as outlined in ***Table 1.1.*** Whilst ***Table 1.1*** below presents the onshore infrastructure required for the proposed East Anglia TWO project, it should be noted that the additional onshore infrastructure required for the East Anglia ONE North project will share the same landfall, cable corridor and substation location.

Table 1.1 Indicative Onshore Project Characteristics for the proposed East Anglia TWO project

Landfall and Onshore Cable Route	
Number of ducts installed at the landfall (by HDD)	Up to 4
Number of transition bays	Up to 2
Transition bay dimensions	21m (length) x 6m (width) x 1.8m (depth)
Landfall HDD compound dimensions (if required)	175m x 50m
Number of onshore export cables	Up to 6
Onshore cable corridor swathe width	Up to 50.1m
Number cable trenches (between transition bay and onshore substation)	Up to 2

Number ducts installed within onshore cable corridor swathe	Up to 6
Number of underground jointing bays	Dependent upon length of onshore cable route. One required approximately every 500m.
Dimension of jointing bays	15m (length) x 3m (width) x 2m (depth)
Number of link boxes	Dependent upon length of onshore cable route. Two required for every jointing bay.
Dimension of link boxes	1.5m (length) x 1.5m (width) x 1.5m (depth)
Onshore Substation	
Substation operational compound area	190m x 190m
Substation construction compound area (required in addition to the operational footprint)	185m x 50m
Substation buildings height	Up to 15m (outdoor equipment up to 18m)
National Grid infrastructure	
Substation compound area	325m x 140m
Maximum height (excluding pylons)	Up to 16m

11. Further information in relation to the onshore project description and infrastructure is available within the East Anglia TWO Scoping Report, section 1.5.3 for landfall parameters and section 1.5.4 for infrastructure relating to the cable route and onshore substation.

1.2.2 National Grid Electrical Infrastructure

12. The National Grid infrastructure will include a substation comprising external electrical equipment and gantries. The substation compound will be up to 325 x 140m, with a maximum height of external equipment up to 16m, for both AIS and GIS scenarios.

13. The National Grid infrastructure may also require the upgrade of two existing overhead pylons or minor relocation of existing overhead pylons. This will be confirmed with National Grid in on-going design discussions and development.

1.2.3 East Anglia TWO Offshore Infrastructure

14. The East Anglia TWO windfarm site (***Figure 1.2*** in ***Annex 1***) is approximately 255km^2 in area and the export cable corridor is 181km^2. At its nearest point, the

East Anglia TWO windfarm site is 31km from Lowestoft and 32km from Southwold. Within the East Anglia TWO windfarm site, it is proposed that up to 67 wind turbines with an overall installed capacity of up to 900MW would be installed. Electricity would flow from the wind turbine generators (WTG) via subsea inter-array cables to a number of offshore electrical platforms.

15. Offshore export cables would connect East Anglia TWO offshore electrical platforms to shore. Offshore export cables would make landfall between Sizewell and Thorpeness in Suffolk.

16. Once the offshore export cables reach the shore, they would be joined to onshore cables via a transition bay near the point of landfall and then to a new onshore substation. From this substation, the proposed East Anglia TWO project would be connected into the transmission network via a new transmission substation owned and operated by National Grid.

1.2.3.1 Indicative Project Programme

17. The indicative project programme for both the onshore and offshore works are outlined for each phase in the following sections.

1.2.3.2 Construction Programme

18. It is anticipated that onshore works will take approximately 36 months (subject to change). Construction works would be undertaken between 0700 and 1900 Monday to Saturday, with no works on bank holidays or Sundays except in special circumstances[1].

19. It is anticipated that the installation of the offshore elements will take approximately 26 months (subject to change). Construction works would be undertaken 24 hours a day and seven days a week offshore, dependent upon weather conditions.

1.2.3.3 Operations and Maintenance (O&M) Strategy

20. There is no ongoing requirement to maintain the onshore cables following installation. However, periodic access to installed link boxes / test pits may be required for inspection, estimated to be annually. No emissions are anticipated to arise from the onshore cables during operation.

21. The operational emissions from the substation are restricted to light and noise. It is not anticipated that the substation will be illuminated under normal operating conditions. Site lighting will be provided during operations and maintenance

[1] For example where continual work is required such as a concrete pour or HDD bore.

activities only, which are anticipated to occur on average once per week during operation.

22. During the operational period, scheduled and unscheduled monitoring and maintenance activities will be required offshore. All offshore infrastructure, including wind turbines, foundations, cables and offshore platforms will be included in monitoring and maintenance programmes. During the 25 years of operation it is likely that some refurbishment or replacement of offshore infrastructure will be required.

1.2.3.4 Decommissioning

23. In respect of the onshore infrastructure, no decision has been made regarding the final decommissioning policy for the substation as it is recognised that industry best practice, rules and legislation change over time. However, the substation equipment will likely be removed and reused or recycled. It is expected that the onshore cables, joint pits and ducts will be left in situ. Offshore decommissioning is likely to include the removal of all of the wind turbine components, part of the wind turbine foundations (down to 1m below seabed level), offshore platforms and met mast and associated foundations and the sections of the inter-array cables close to the offshore structures, as well as sections of the export cables.

24. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator.

1.3 Legislation, Policy and Guidance

1.3.1 Overview

25. The HRA process covers features designated under the European Council Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') and Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive').

26. It is worth noting that the UK has triggered article 50 of the Treaty of European Union and is currently in the process of withdrawing from the European Union (EU). Following withdrawal from the EU, the UK government plans to enact the Great Repeal Bill. In its white Paper, the UK Government has confirmed that it plans to transpose all current European environmental regulation into UK law after withdrawing from the EU.

1.3.2 European Legislation

1.3.2.1 The Birds Directive

27. The EU Directive on the Conservation of Wild Birds (2009/147/EC) (hereafter called the Birds Directive) provides a framework for the conservation and

management of wild birds in Europe. The relevant provisions of the Directive are the identification and classification of SPAs for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive.

1.3.2.2 The Habitats Directive

28. The EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (hereafter called the Habitats Directive) provides a framework for the conservation and management of natural habitats, wild fauna (except birds) and flora in Europe. Its aim is to maintain or restore natural habitats and wild species at a favourable conservation status. The relevant provisions of the Directive are the identification and classification of Special Areas of Conservation (SAC) (Article 4) and procedures for the protection of SACs and SPAs (Article 6). SACs are identified based on the presence of natural habitat types listed in Annex I and populations of the species listed in Annex II. The Directive requires national Governments to establish SACs and to have in place mechanisms to protect and manage them.

1.3.3 UK National Legislation

1.3.3.1 The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017

29. These regulations (hereafter the 'Habitat Regulations') together with the Wildlife and Countryside Act 1981 transpose the Habitats and Birds Directives into UK legislation covering terrestrial areas out to and including the UK Offshore Marine Area with the exception of within Scottish territorial waters, where The Conservation (Natural Habitats, &c.) Regulations 1994 continue to apply.

30. The Habitats Regulations place an obligation on 'competent authorities' to carry out an appropriate assessment of any proposal likely to affect a designated site, to seek advice from Natural England and not to approve an application that would have an adverse effect on a designated site except under very tightly constrained conditions that involve decisions by the Secretary of State. The competent authority in the case of the proposed project is the Secretary of State (SoS) for Business Energy and Industrial Strategy (BEIS).

1.3.4 Policy and Guidance

31. In addition to the legislation outlined above, the HRA will give consideration to all relevant guidance and policies issued by a number of Governmental, statutory and industry bodies.

1.3.4.1 Government Guidance

32. In relation to guidance from Government bodies, this includes:

- European Commission: Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites.
- European Commission: EU Guidance on wind energy development in accordance with EU nature directives.
- The Planning Inspectorate Advice Note Nine: Rochdale Envelope.
- The Planning Inspectorate Advice Note Ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects.
- The Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment.
- Department of Energy and Climate Change: Guidelines on the Assessment of Transboundary Impacts of Energy Developments on Natura 2000 Sites outside the UK.

1.3.4.2 Statutory Nature Conservation Bodies (SNCBs) Guidance

33. In relation to guidance from Statutory Nature Conservation Bodies (SNCBs) this includes:

- English Nature: Habitats Regulations Guidance Note (HRGN 1): The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations, 1994.
- English Nature: Habitats Regulations Guidance Note (HRGN 3): The Determination of Likely Significant Effect under the Conservation (Natural Habitats &c) Regulations, 1994.
- English Nature: Habitats Regulations Guidance Note (HRGN 4): Alone or in-combination.
- Natural England and JNCC: Interim advice on HRA screening for seabirds in the non-breeding season.
- Natural England and JNCC: Advice on HRA screening for seabirds in the breeding season.
- Natural England and JNCC: Interim Advice Note – Presenting information to inform assessment of the potential magnitude and consequences of displacement of seabirds in relation to Offshore Windfarm Developments.

1.3.4.3 Industry Guidance

34. In relation to guidance from industry this includes:

- Developing Guidance on Ornithological Cumulative Impact Assessment for Offshore Wind Farm Developers (King *et al*. 2009).

- Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms (RenewableUK 2013).

2 HRA Methodology

2.1 HRA Process

35. The HRA process consists of several phases that are described further below and in Planning Inspectorate Advice Note 10 (Planning Inspectorate, 2016). For all plans and projects which are not wholly directly connected with or necessary to the conservation management of a site's qualifying features (such as the proposed East Anglia TWO project), this will include formal screening for any LSE (either alone or in combination with other plans or projects).

2.1.1 Stage 1 – Screening (This Report)

36. In Stage 1, designated sites and Ramsar sites are screened for LSE, both effects from the project alone and in combination with other projects. Where it can be determined that there is no potential for LSE to occur to interest features of a site, that site is sought to be 'screened out'.

37. Mitigation, including embedded mitigation, has not been taken into account at Stage 1 HRA Screening, but will be included during the Stage 2 assessment.

38. The Planning Inspectorate advises that for those projects where no LSE is predicted then that should be reported in the form of a No Significant Effects Report (NSER) and there is no requirement to undertake the Stage 2 assessment (Planning Inspectorate, 2016).

2.1.1.1 Stage 1 Screening Process

39. The initial identification of designated sites and Ramsar sites for inclusion in the Stage 1 HRA Screening is primarily based on the location of the site relative to the proposed East Anglia TWO project. The approach for each site interest feature is outlined in the ***section 3*** Terrestrial Ecology, ***section 4*** Onshore Ornithology, ***section 0***

40. In-combination effects

41. Given that the proposed East Anglia ONE North project will share the onshore indicative development area, the Sandlings SPA is screened in for potential in-combination effects. No other sites are screened in as there is no pathway for effects from the proposed East Anglia TWO project alone.

2.1.2 Onshore Ornithology Screening Summary

42. The Sandlings SPA is screened in for further consideration in the HRA process.

43. Benthic Ecology, ***section 6*** Fish Ecology, ***section 7*** Marine Mammals and ***section 8*** Offshore Ornithology.

44. Screening has been based on a conceptual 'source-pathway-receptor' approach. This approach identifies likely environmental effects resulting from the proposed construction, operation and maintenance and decommissioning of the proposed East Anglia TWO project. The parameters are defined as follows:

- Source – the origin of a potential effect (noting that one source may have several pathways and receptors).
  - Example: cable installation.
- Pathway – the means by which the effect of the activity could impact a receptor.
  - Example: noise from cable installation.
- Receptor – the element of the receiving environment that is impacted.
  - Example: presence of a receptor within the direct footprint physical effect or within range of disturbance (e.g. noise or light).

45. Where there is no pathway or the pathway has sufficient distance that that the effect from the source has dissipated to a negligible level before reaching the receptor, there is justification for the screening out of that particular receptor (i.e. feature) for a site.

46. Note that sites will be screened in if, for any one of their qualifying features (i.e. a species or habitat), a source-pathway-receptor relationship and potential for LSE cannot be ruled out (including in-combination effects). However, each qualifying feature of that site will be considered separately and it may be that the screening process rules out LSE for some features at this stage.

47. Mitigation, including embedded mitigation, has not been taken into account at Stage 1 HRA Screening, but will be include during the Stage 2 assessment.

48. The approach to screening for each receptor is outlined in sections 3-8 and is based on the known distribution, ecology and sensitivities of each receptor group and therefore the potential for being affected by the proposed East Anglia TWO project.

49. Where there is insufficient information available at this stage to screen out a site, the site is screened in for further consideration.

2.1.3 Stage 2 - Appropriate Assessment

50. The purpose of the HRA process is to identify where potential LSE may occur and to provide information to the competent authority so that they can determine whether LSE is expected to occur through an Appropriate Assessment.

51. For those sites where LSE cannot be excluded in Stage 1, further information to inform the assessment is prepared. The assessment will determine whether the

project alone or in-combination could adversely affect the integrity of the site in view of its conservation objectives. The assessment and conclusions of this stage will be reported in the form of a HRA Report and the results of the assessment summarised in the form of a series of matrices.

52. In cases where the HRA Report concludes that an adverse effect on the integrity of a designated or Ramsar site has been identified, the assessment proceeds to Stage 3.

2.1.4 Stage 3 - Assessment of Alternatives

53. Stage 3 investigates alternatives that could be applied to reduce the potential for effects. The Planning Inspectorate advises that alternative solutions can include a proposal of a different scale, a different location and an option of not having the scheme at all - the 'do nothing' approach.

54. If required, information on the consideration of alternatives will be provided.

2.1.5 Stage 4 - Assessment of Imperative Reasons of Overriding Public Interest (IROPI)

55. If it is demonstrated that there are no alternative solutions to the proposal that would have a lesser effect or avoid an adverse effect on the integrity of the site(s), then a justified case will be prepared that the scheme should be carried out for IROPI.

56. If the conclusion of Stages 3 and 4 is that there is no alternative and that the project has demonstrated IROPI then the project may proceed with a requirement that appropriate compensatory measures are delivered.

2.1.6 In-combination Assessment

57. The Habitats Regulations require that the potential effects of a project on designated sites are considered both alone and in-combination with other plans or projects.

58. The identification of plans and projects to include in the in-combination assessment will be based on:

- Projects that are under construction;
- Permitted application(s) not yet implemented;
- Submitted application(s) not yet determined;
- All refusals subject to appeal procedures not yet determined;
- Projects on the National Infrastructure's programme of projects; and
- 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.

59. Onshore plans or projects that may be considered include (but are not limited to):

- Other energy generation infrastructure;
- Building and / or housing developments;
- Installation or upgrade of roads;
- Installation or upgrade of cables and pipelines; and
- Coastal protection works.

60. Offshore plans or projects that may be considered include (but are not limited to):

- Offshore windfarms;
- Marine renewables (wave and tidal);
- Port and harbour developments;
- Marine aggregate extraction and dredging;
- Licensed disposal sites;
- Oil and gas exploration and extraction;
- Subsea cables and pipelines; and
- Recreational marine fishing activity.

61. The assessment will present relevant in-combination effects of projects using the tiered approach as devised by Natural England (JNCC and Natural England, 2013a) and presented in ***Table 2.1***.

Table 2.1. Tiers for Undertaking In-combination Assessment (based on JNCC and Natural England, 2013a)

Tier Description	Consenting or Construction Phase	Data Availability
Tier 1	Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of “baseline” conditions e.g. “background” distribution or mortality rate for birds.	Pre-construction (and possibly post-construction) survey data from the built project(s) and environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project).

Tier Description	Consenting or Construction Phase	Data Availability
Tier 2	Tier 1 + projects under construction	As Tier 1 but not including post-construction survey data
Tier 3	Tier 2 + projects that have been consented (but construction has not yet commenced)	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project) and possibly pre-construction
Tier 4	Tier 3 + projects that have an application submitted to the appropriate regulatory body that have not yet been determined	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project)
Tier 5	Tier 4 + projects that the regulatory body are expecting an application to be submitted for determination (e.g. projects listed under the Planning Inspectorate programme of projects)	Possibly environmental characterisation survey data (but strong likelihood that this data will not be publicly available at this stage).
Tier 6	Tier 5 + projects that have been identified in relevant strategic plans or programmes (e.g. projects identified in Round 3 wind farm ZAP documents)	Historic survey data collected for other purposes/by other projects or industries or at a strategic level.

2.2 Designated Sites included in HRA

62. The classes of designations considered within this HRA Screening are:

- Special Protection Areas (SPAs; some of which are also Ramsar sites);
- Potential SPA (pSPA);
  - SPAs that are approved by the UK Government but are still in the process of being classified.
- Special Areas of Conservation (SACs);
- Possible SACs (pSACs);
  - A site which has been identified and approved to go out to formal consultation.
- Candidate SACs (cSACs);
  - Following consultation on the pSAC, the site is submitted to the European Commission (EC) for designation and it this stage it is called a cSAC.
- Sites of Community Importance (SCI);

- Once the EC approves the site it becomes a SCI, before the national government then designates it as a SAC.

63. Consideration is also given to potential effects on Ramsar sites. Ramsar sites protect wetland areas and extend only to “areas of marine water the depth of which at low tide does not exceed six metres”.

3 Terrestrial Ecology

3.1 Approach to Screening

3.1.1 Potential Effects (Source)

64. During construction of the proposed East Anglia TWO project, activities such as site preparation, cable installation and substation construction may result in direct or indirect (e.g. disturbance from light or noise) effects on terrestrial habitats.

65. During the operational period, the physical presence of the substation will result in the loss or replacement of existing habitats. There may also be indirect effects from lighting and noise. Maintenance activities during the operational phase may also result in localised direct and in-direct effects during works.

66. Decommissioning would require the removal of the substation with other infrastructure likely to be left in situ. Effects caused during decommissioning would be similar to those during the construction phase (although likely to be of lower magnitude).

67. The potential effects on terrestrial ecology from the proposed East Anglia TWO project have been identified within the East Anglia TWO Scoping Report (SPR, 2017a) and Scoping Opinion (The Planning Inspectorate, 2017). ***Table 3.1*** outlines which effects will be considered in relation to terrestrial ecology features within the HRA. These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 3.1 Summary of Potential Impacts – Terrestrial Ecology (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Direct impacts (permanent and temporary loss) to habitats due to footprint of the onshore works	✓	✓	✓
Direct impacts as a result of fragmentation of habitats due to removal of linear habitats such as hedgerows	✓	✓	✓
Direct and indirect impacts (disturbance / potential killing) to qualifying species	✓	x	✓
Spread of invasive species as a result of construction activities	✓	x	✓
Direct and indirect impacts (noise, lighting) to adjacent habitats and species	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.1.2 Identification of Sites and Features (Pathway and Receptor)

68. Sites designated for terrestrial ecology which have been considered in the screening exercise are shown in ***Figure 3.1 in Annex 1***.

69. Direct or indirect effects on terrestrial habitats and species may arise from permanent or temporary disturbance during the construction of the onshore infrastructure. There is also potential for direct or indirect effects on these receptors during the operational and decommissioning phases of the proposed East Anglia TWO project.

3.1.2.1 Onshore Habitats

70. A site designated for an onshore habitat interest feature will be screened in through this high level process if:

- A component of the proposed project directly overlaps with the site.
- The distance between the proposed project and the onshore habitat interest feature is within the range for which there could be a likely significant effect e.g. the pathway is not too long for water pollution.

3.1.2.2 Onshore Species (other than birds)

71. A site designated for an onshore species interest feature (other than birds) will be screened in through this high level process if:

- There is physical overlap between the proposed project and the site.
- The distance between the proposed project and the site is within the range for which there could be a likely significant effect e.g. noise, light or physical disturbances from the proposed project could be detected within a site **and** at a level which would have an effect on a receptor.
- The distance between the proposed project and resources on which the interest feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the range for which there could be a likely significant effect e.g. noise, light or physical disturbances from the proposed project could be detected at foraging grounds **and** at a level which would have an effect on a receptor.

3.2 Screening

3.2.1 Project Alone Effects

72. The onshore indicative development area is shown in ***Figure 1.1 in Annex 1***. At the time of preparing this document, the onshore development area for both the substation and the cable corridor for the proposed East Anglia TWO project and the National Grid substation are yet to be finalised.

73. There are only four sites within 20km onshore indicative development area it is not considered that there are any pathways of effect that could extend beyond this. Air quality effects and noise and light emissions are anticipated to be highly

localised and this is reflected in the proposed methodology for Phase 1 ecological surveys which at most will extend 500m beyond the onshore indicative development area (as proposed in the Scoping Report, SPR 2017a). Any effects on water bodies would be manifested downstream of the onshore indicative development area (i.e. immediately out to sea and not affect sites inshore of the onshore indicative development area. Designated sites for terrestrial ecology identified during the desk-based review are listed in ***Table 3.2***. These are also shown in ***Figure 1.1 in Annex 1.***

Table 3.2 Statutory Sites Designated for Terrestrial Ecology within 20km of the Onshore Study Area

Site code	Name	Features	Proximity to onshore study area	Screening decision	Rationale
UK0012809	Minsmere to Walberswick Heaths and Marshes SAC	• Annual vegetation of drift lines • European dry heath • Perennial vegetation of stony banks (qualifying feature) • No Annex II species	1.8km	Out	No overlap therefore no direct effect and Beyond the range of potential significant indirect effect
UK0030076	Alde-Ore Estuary SAC	• Estuaries • Atlantic salt meadows • Mudflats • No Annex II species	2km	Out	
UK0014780	Orfordness to Shingle Street SAC	• Coastal lagoons • Annual vegetation of drift lines • Perennial vegetation of stony banks • No Annex II species	4km	Out	
UK0012741	Staverton Park and the Thicks, Wantisden SAC	• Old acidophilous oak woods with Quercus robur on sandy plains • No Annex II species	6km	Out	

74. For all sites given that there is no overlap with the onshore study area, there is no potential for direct effects and therefore no potential for LSE. Therefore, these sites are screened out with respect to direct effects.

75. For all sites it is considered that given the distance from the onshore study area and the nature of the features themselves (vegetation and coastal habitats) there is no potential for significant indirect effects (e.g. disturbance from noise or light, dust) and therefore no potential for LSE. Therefore, these sites are screened out with respect to indirect effects.

3.2.2 In-combination Effects

76. No sites are screened in for project-alone effects; therefore, it is considered that there is no pathway for in-combination effects. Therefore, all sites are screened out with respect to potential LSE on their terrestrial ecology features.

3.2.3 Terrestrial Ecology Screening Summary

77. On the basis that there is no potential for direct or indirect in-combination effects which could result in LSE on any site, either for the proposed East Anglia TWO project alone or in-combination, all sites are screened out with respect to potential LSE on their terrestrial ecology features.

4 Onshore Ornithology

4.1 Approach to Screening

4.1.1 Potential Effects (Source)

78. Note that this assessment only considers sites from the perspective of onshore effects. Offshore effects have been considered in section 8 Offshore Ornithology.

79. During construction of the proposed East Anglia TWO project, activities such as site preparation, cable installation and substation construction may result in direct or indirect (e.g. disturbance from light or noise) effects on birds or their supporting habitats.

80. During the operational period, the physical presence of the substation will result in the loss or replacement of existing habitats. There may also be indirect effects from lighting and noise. Maintenance activities during the operational phase may also result in localised direct and in-direct effects during works.

81. Decommissioning would require the removal of the substation with other infrastructure likely to be left in situ. Effects caused during decommissioning would be similar to those during the construction phase (although likely to be of lower magnitude).

82. The potential effects on onshore ornithology from the proposed East Anglia TWO project have been identified within the East Anglia TWO Scoping Report (SPR, 2017a) and Scoping Opinion (The Planning Inspectorate, 2017). ***Table 4.1*** outlines which effects will be considered in relation to ornithological features within the HRA. These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 4.1 Summary of Potential Impacts – Onshore ornithology (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Direct impacts as a result of fragmentation of habitats	✓	✓	✓
Direct impacts (disturbance / potential killing) to qualifying species	✓	x	✓
Spread of invasive species as a result of construction activities	✓	x	✓
Direct and indirect impacts (noise, lighting) to adjacent habitats and species	✓	✓	✓
Cumulative impacts	✓	✓	✓

4.1.2 Identification of Sites and Features (Pathway and Receptor)

83. Sites designated for onshore ornithology which have been considered in the screening exercise are shown in ***Figure 4.1 in Annex 1***.

84. A site designated for a bird species feature will be screened in through this high level process if:

- A component of the proposed project directly overlaps with the site.
- The distance between the proposed project and the site with a bird interest feature is within the range for which there could be a likely significant effect on the bird species i.e. this will relate to sources of noise, light etc.
- The distance between the proposed project and resources on which the interest feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the range for which there could be a likely significant effect e.g. noise, light or physical disturbances from the proposed project could be detected at foraging grounds **and** at a level which would have an effect on a receptor.

4.2 Screening

4.2.1 Project Alone Effects

85. The indicative onshore development area is shown in ***Figure 1.1 in Annex 1***. At the time of preparing this document, the development area for both the onshore substation and the onshore cable corridor for the proposed East Anglia TWO project and the National Grid substation are yet to be finalised.

86. There are only nine sites within 20km onshore indicative development area it is not considered that there are any pathways of effect that could extend beyond this. Air quality effects and noise and light emissions are anticipated to be highly localised and this is reflected in the proposed methodology for Phase 1 ecological surveys which at most will extend 500m beyond the onshore indicative development area (as proposed in the Scoping Report, SPR 2017a). Any effects on water bodies would be manifested downstream of the onshore indicative development area (i.e. immediately out to sea and not affect sites inshore of the onshore indicative development area. The onshore indicative development area is not within the Alde and Ore River catchment. Designated sites identified during the desk-based review are listed in ***Table 4.2***. These are also shown in ***Figure 1.1 in Annex 1***.

87. The onshore cable corridor is not fully defined but will run alongside and potentially through the Sandlings SPA. It considered therefore that there is potential for both direct and indirect effects upon the site during construction.

88. For sites other than the Sandlings SPA given that there is no overlap with the onshore study area, there is no potential for direct effects and therefore no potential for LSE. Therefore, these sites are screened out with respect to direct effects.

89. For all other sites it is considered that given the distance from the onshore study area there is no potential for significant indirect effects (e.g. disturbance from noise or light) during any phase of development. This conclusion is based upon Ruddock and Whitfield (2007), which looked at disturbance effects on 26 species of birds (including waterbirds, seabirds, passerines and raptors), at different life history stages. This concluded that, based on expert judgement, disturbance effects for the majority of species were limited to within 1km.

90. In addition, given that the supporting habitats of these sites are wetland, estuarine or intertidal, it is considered that there would be no effect on their birds outwith the sites as the land within the onshore indicative development area is an agricultural landscape including a mix of arable and grazing pasture, with hedgerows acting as field boundaries, and occasional pockets of woodland (SPR, 2017a). There will be no works within the intertidal as landfall will be made via HDD (see ***Table 1.1***). Although there is potential for noise disturbance of birds in the intertidal area from HDD activities, this is not considered to be a pathway for LSE as the shingle of the intertidal area is not a feature of the SPAs considered in ***Table 4.2*** and therefore unlikely to be used by large numbers of birds. This is supported by the fact that for Galloper Wind Farm (which also made landfall at Sizewell), cables were installed by trenching across the intertidal but disturbance of birds within the intertidal was not considered as an effect that project's HRA (Galloper Wind Farm Limited, 2011, The Planning Inspectorate, 2012b). It is therefore considered that there is no potential for LSE. Therefore, sites other than the Sandlings SPA are screened out with respect to indirect effects.

Table 4.2 Statutory Sites Designated for Onshore Ornithology within 20km of the Onshore Study Area

Designated site	Features	Proximity to onshore study area	Screening decision	Rationale
Sandlings SPA	• Breeding populations of nightjar and woodlark • Woodland and heath	Within study area	In	Potential for direct and indirect effects during all phases of development

Designated site	Features	Proximity to onshore study area	Screening decision	Rationale
Minsmere to Walberswick SPA	• Nationally important numbers of breeding and wintering birds • Lowland, coastal, floodplain, sandflat and mudflat	1.8km	Out	No overlap therefore no direct effect and Beyond the range of potential significant indirect effect
Minsmere to Walberswick Ramsar	• An important assemblage of rare breeding birds associated with marshland and reedbeds	1.8km	Out	
Alde-Ore Estuary SPA	• Nationally important numbers of breeding and wintering birds • Lowland, estuary, sandflat and mudflat	2km	Out	
Alde-Ore Estuary Ramsar	• Notable assemblage of breeding and wintering wetland birds.	2km	Out	
Deben Estuary Ramsar, SPA	• Wintering and passage waterbirds. • Sandflat, mudflat and estuary	10km	Out	
Benacre to Easton Bavents SPA	• Breeding birds • Woodland, marsh, estuary and shingle	19km	Out	
Stour and Orwell Estuaries SPA	• Wintering and passage waterbirds. • Sandflat, mudflat and estuary and lagoons	19km	Out	
Stour and Orwell Estuaries Ramsar	• Wintering and passage waterbirds	19km	Out	

4.2.2 In-combination effects

91. Given that the proposed East Anglia ONE North project will share the onshore indicative development area, the Sandlings SPA is screened in for potential in-combination effects. No other sites are screened in as there is no pathway for effects from the proposed East Anglia TWO project alone.

4.2.3 Onshore Ornithology Screening Summary

92. The Sandlings SPA is screened in for further consideration in the HRA process.

5 Benthic Ecology (Offshore habitats)

5.1 Approach to screening

5.1.1 Site Selection Criteria (Receptor)

93. Direct or indirect effects on benthic habitats may arise from permanent or temporary physical presence of components or plant and/or activities relating to the construction, operation or decommissioning of the windfarm and associated infrastructure.

94. This offshore HRA screening exercise will consider sites which meet the following criteria:

- A component of the proposed East Anglia TWO project (permanently or temporarily) directly interacts with the site whose interest features include a habitat listed in Annex I of the Habitats Directive; and
- The distance between the proposed East Anglia TWO project and the interest feature is within a range for which there could be indirect interaction (i.e. within a zone of influence for a physical process change resulting from the proposed East Anglia TWO project).

5.1.2 Potential Effects (Source)

95. The conservation objective of the Habitats Directive is to “maintain or restore the habitat at a Favourable Conservation Status (FCS)”.

96. The key factors that will be applied during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to the qualifying feature (distance between the proposed development and designated sites) (pathway and receptor).

97. It is recognised that there are six categories of effect which may result in deterioration of benthic habitats within designated sites, either alone or in-combination (JNCC and Natural England, 2013b). These categories have been identified as follows:

- Physical loss;
- Physical damage;
- Non-physical disturbance;
- Toxic contamination;

- Non-toxic contamination[2]; and
- Biological disturbance[3] .

98. During construction of the proposed East Anglia TWO project, activities such as seabed preparation, foundation installation, cable installation and jack-up activities may result in direct or indirect effects on benthic habitats.

99. During the operational period, the physical presence of turbine foundations and associated components (offshore platforms, export cables, inter-array cables) will result in the loss or replacement of existing habitats. Maintenance activities during the operational phase may also result in localised direct and in-direct effects during works.

100. Decommissioning would require the removal of foundation structures and either the cutting or removal of subsea cables, resulting in physical disturbance and the potential for indirect effects associated with suspended sediment. Effects caused during decommissioning would be similar to those during the construction phase.

101. The potential effects on benthic habitats from the proposed East Anglia TWO project have been identified within the East Anglia TWO Scoping Report (SPR, 2017a) and Scoping Opinion (The Planning Inspectorate, 2017). ***Table 5.1*** outlines which effects will be considered in relation to benthic features within the HRA. These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 5.1 Summary of Potential Effects - Benthic Ecology (scoped in (✓) and scoped out (x))

Potential impacts	Construction	Operation	Decommissioning
Temporary physical disturbance	✓	✓	✓
Permanent habitat loss[4]	x	✓	✓
Increased suspended sediment concentrations	✓	✓	✓

[2] For some sites, this includes changes in nutrient and/or organic enrichment and/or salinity.

[3] For some sites, this includes the introduction of non-native species and/or the selective extraction of species.

[4] Within the East Anglia TWO scoping opinion, PINS highlighted that insufficient evidence was provided within the scoping report to scope out of the EIA permenant habitat loss and colonisation during other phases of the development. However, the MMO has agreed through subsequent Evidence Plan meetings that permenant impacts due to the presence of foundations and scour protection, and the colonsiation of structures will be assessed as an operational impact and where it was proposed to leave seabed infrastructure in place after decomissioning (MMO correspondance, 15/05/2018).

Potential impacts	Construction	Operation	Decommissioning
Re-mobilisation of contaminated sediments	✓	✓	✓
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection[4]	x	✓	x
Colonisation of foundations and cable protection by Invasive species	✓	✓	✓
Potential impacts on sites of marine conservation importance	✓	✓	✓
Impact of Electromagnetic Fields.	x	✓	x
Cumulative permenant habitat loss[4]	*x*	✓	✓
Cumlative changes to seabed habitat characteristics	✓	✓	✓
Transboundary impacts	x	x	x

5.1.3 Identification of sites and features (Pathway)

102. Designated sites with benthic habitats listed under Annex I of the Habitats Directive as interest features have been considered in this screening exercise (see ***Figure 5.1 in Annex1***).

103. The spatial extent of this screening report includes sites in the southern North Sea which includes sites within 750km of the East Anglia TWO offshore development area (***Table 5.2***). Impacts to benthic habitats are restricted to physical direct and indirect effects at a relatively localised scale and it is proposed that there is no potential pathway for impacts to sites in the wider North Sea or beyond. As it has been agreed through the scoping process that transboundary effects are scoped out for EIA (given the distance to sites in other Members States jurisdictions) these have also been screened out from consideration for HRA purposes.

104. Consideration for sites within the southern North Sea is based on the sensitivities of site specific interest features (receptors) and whether there is a potential pathway for habitats to receive direct or indirect effects (source). Potential impacts to benthic habitats from the proposed East Anglia TWO project are generally considered small scale, and are mainly driven by localised physical disturbance to the seabed, or localised effects on physical processes.

105. The significance of effects on the habitats will be derived from their sensitivity to the received impact. This will include temporary and permanent change and the ability of the interest feature to withstand or recover from change.

106. Annex I habitats, for which designated sites are designated, are:

- Sandbanks which are slightly covered by sea water all the time;
- Estuaries;
- Mudflats and sandflats not covered by seawater at low tide;
- Coastal lagoons;
- Reefs;
- Large shallow inlets and bays;
- Submarine structures made by leaking gases; and
- Submerged or partially submerged sea caves.

107. It has been reported that some benthic species may react to episodic and high intensity noise, which may include the type of noise typically generated by piling activities (Lovell *et al,* 2005, Heinisch and Weise, 1987). However, Annex I habitats for which sites are designated are not known to have any noise sensitivity; therefore, noise effects will not be considered criteria for screening-in effects on benthic habitats.

5.2 Screening

5.2.1 Project Alone Effects

108. This section screens the potential for LSE from the proposed East Anglia TWO project alone.

109. There are 15 designated sites within the southern North Sea (not already screened out as transboundary) which have benthic features as primary reasons for designation or qualifying features.

110. There are no SACs designated for benthic features within the footprint of the East Anglia TWO offshore development area, therefore there are no sites that will be directly impacted during construction, operation or decommissioning. Therefore, no sites are screened in for direct effects this includes permanent habitat loss, EMF effects and colonisation.

111. Indirect impacts to benthic features from sites outside the East Anglia TWO offshore development area could arise from deposition of sediment suspended during construction works or from other effects on physical processes. To determine if there is potential for indirect effects upon any site it is necessary to

determine whether there is a pathway for effect and the potential zone of influence.

112. In response to comments raised by Cefas (regarding potential cumulative effects on wave climate) SPR has undertaken wave modelling (SPR, 2018). Cefas were concerned that the combined impact on wave climate from the presence of offshore structures may result in a 5% or greater change in current wave conditions, and this in turn may result in changes such as increased erosion rates at sensitive receptors.

113. The individual project modelling for the proposed East Anglia TWO project comprised of runs for 1 in 1 year and 1 in 50 year return period events from each of three directions, namely north, north-northeast and east.

114. Modelling of the effects on baseline wave height considered increases in wave height caused by reflection, and decreases in wave height as a result of wave sheltering. Under all conditions, the results indicated larger changes to the 1 in 1 year baseline than the 1 in 50 year baseline.

115. Under a northerly wave direction, reflection and wave sheltering effects largely cancelled each other out and changes to wave height baseline are predicted to be within ±0.5%. For waves approaching from the north-north east, effects on waves were over a larger range; however, changes were less than ±1% and did not impinge on nearby projects. Modelling of waves to the east, which have a lower baseline wave height in general, showed wave sheltering in a shoreward direct. However, the zone of effect does not reach the shore and is reported as less than ±1%.

116. Therefore, under all wave directions modelled, the zone of effect from the proposed East Anglia TWO project are small resulting in changes in baseline wave height of less than ±1% and therefore not significant. It is therefore considered no SACs could be affected as a result of changes in the wave climate.

117. Sediment transport modelling was undertaken for the East Anglia ONE offshore windfarm and cumulatively for the former East Anglia Zone. As the projects have similar depths and sedimentary conditions, results from East Anglia ONE physical processes modelling were agreed to be relevant and therefore used to inform the East Anglia THREE EIA and HRA (SPR, 2015) and Norfolk Vanguard PEI (Vattenfall, 2017). It is also considered that this modelling would be appropriate for the project-alone screening for the proposed East Anglia TWO project given the similar environmental conditions (i.e. depths and sediment conditions, SPR, 2017a).

118. East Anglia ONE and Zonal (SPR, 2012) modelling demonstrated that coarse sediment would settle out rapidly where disturbed (or dredged) and that indirect

far-field effects would be limited to within 1km of the works and for the duration of 1 tidal cycle. For finer materials it was predicted that deposition could occur at up to 50km from the source, however, the deposited sediment layer across the wider seabed was found to be generally less than 0.2mm thick and did not exceed 2mm. Further information to support these findings in relation to the proposed East Anglia TWO project has been provided to MMO, Cefas and NE through the Evidence Plan Process and in the supporting document 'East Anglia TWO Wave Modelling Report, Appendix D (SPR, 2018).

119. Of the 15 sites screened in to this assessment, only four sites are within 50km of the East Anglia TWO windfarm site and offshore export cable corridor;

- Alde, Ore and Butley Estuaries SAC (3.6km);
- Orfordness - Shingle Street SAC (5.09km)[5];
- Haisborough, Hammond and Winterton SAC (30.4km); and
- Margate and Long Sands SCI (37km).

120. There are no sites within 1km of the East Anglia TWO offshore development area (where most of sediment deposition would be expected to occur) and any deposition beyond this point is expected to be minimal. It is therefore considered no SACs could be affected as a result of changes in sediment deposition.

121. Given the above, there is no potential for direct or indirect effects which could result in LSE of any benthic habitat feature of any of the sites considered. Therefore, all sites are screened out with respect to potential LSE on their benthic habitat features.

122. ***Table 5.2*** provides the results of the HRA screening process.

[5] The primary feature of the Orfordness- Shingle Street SAC is a series of percolation lagoons which are separated from the marine environment by the Orford shingle beach. These features are described as non-marine as they occur landward of highest astronomical tide. Therefore, due to a physical barrier there is no pathway between the source of any effects in the marine environment and the receptor

Table 5.2 List of SACs in the southern North Sea with their Respective Categories of Annex I Habitat Interest Feature and Screening Decisions

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2 Windfarm	Cable corridor		
UK0030076	UK	Alde, Ore and Butley Estuaries SAC	H1130 Estuaries H1140 Mudflats and sandflats not covered by seawater at low tide	37	4	Out	Within range of theoretical indirect effect (sediment deposition) but effect negligible. Features are primarily sedimentary
UK0030368	UK	Bassurelle Sandbank SAC	H1110 Sandbanks which are slightly covered by sea water all the time	169	172	Out	Beyond the range of potential impact.
UK0017072	UK	Berwickshire and North Northumberland Coast SAC	H1150 Coastal lagoons H8330 Submerged or partially submerged sea caves	416	407	Out	Beyond the range of potential impact.
UK0030357	UK	Braemar Pockmarks SAC	H1180 Submarine structures made by leaking gases	741	738	Out	Beyond the range of potential impact.
UK0013690	UK	Essex Estuaries SAC	H1130 Estuaries H1140 Mudflats and sandflats not covered by seawater at low tide	77	55	Out	Beyond the range of potential impact.
UK0013036	UK	Flamborough Head SAC	H8330 Submerged or partially submerged sea caves	248	233	Out	Beyond the range of potential impact.

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2 Windfarm	Cable corridor		
UK0013107	UK	Thanet Coast SAC	H1110 Sandbanks which are slightly covered by sea water all the time 1140 Mudflats and sandflats not covered by seawater at low tide H1170 Reefs	86	87	Out	Beyond the range of potential impact.
UK0030369	UK	Haisborough, Hammond and Winterton SAC	H1110 Sandbanks which are slightly covered by sea water all the time H1170 Reefs (*Sabellaria spinulosa*)	37	30	Out	Within range of theoretical indirect effect (sediment deposition) but effect negligible. Features are primarily sedimentary
UK0030170	UK	Humber Estuary SAC	H1130 Estuaries H1140 Mudflats and sandflats not covered by seawater at low tide H1110 Sandbanks which are slightly covered by sea water all the time H1150 Coastal lagoons	178	164	Out	Beyond the range of potential impact.

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2 Windfarm	Cable corridor		
UK0030370	UK	Inner Dowsing, Race Bank and North Ridge SAC	H1110 Sandbanks which are slightly covered by sea water all the time H1170 Reefs	118	109	Out	Beyond the range of potential impact.
UK0030371	UK	Margate and Long Sands SCI	H1110 Sandbanks which are slightly covered by sea water all the time	39	37	Out	Within range of theoretical indirect effect (sediment deposition) but effect negligible. Features are primarily sedimentary
UK0030358	UK	North Norfolk Sandbanks and Saturn Reef SCI	H1110 Sandbanks which are slightly covered by sea water all the time H1170 Reefs	75	73	Out	Beyond the range of potential impact
UK0014780	UK	Orfordness - Shingle Street SAC	H1150 Coastal lagoons	37	5	Out	The primary feature of the SAC is a series of percolation lagoons which are separated from the marine environment by the Orford shingle beach. These features are described as non-marine as they occur landward of highest

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2 Windfarm	Cable corridor		
							astronomical tide. Therefore, due to a physical barrier there is no pathway between the source of any effects in the marine environment and the receptor.
UK0030354	UK	Scanner Pockmark SAC	H1180 Submarine structures made by leaking gases	667	663	Out	Beyond the range of potential impact.
UK0017075	UK	The Wash and North Norfolk Coast SAC	H1110 Sandbanks which are slightly covered by sea water all the time H1140 Mudflats and sandflats not covered by seawater at low tide H1160 Large shallow inlets and bays	99	90	Out	Beyond the range of potential impact.

* Distance measured from the closest point of East Anglia TWO to the closest point of the designated site rounded to the nearest kilometre

5.2.2 In-combination Effects

123. There are no direct effects on any SAC from the proposed East Anglia TWO project; therefore there is no pathway for LSE from in-combination effects.

124. Indirect effects from sediment deposition would only occur during construction and the potential for in-combination effects would only occur if projects were constructed at the same time. In addition, effects at each site would be small scale and highly localised as for the proposed East Anglia TWO project alone. It is therefore considered that there is no pathway for LSE from in-combination sediment deposition effects.

125. As discussed in ***section 5.2.1***, Cefas were concerned that the combined impact on wave climate from the presence of offshore structures may result is a 5% or greater change in current wave conditions, which could result in changes such as increased erosion rates at sensitive receptors.

126. The cumulative wave modelling considered Hornsea Project 1, Project 2 and Project 3, East Anglia ONE, East Anglia THREE, the proposed East Anglia ONE North project, Norfolk Vanguard, Norfolk Boreas, Galloper and Gabbard windfarms and the proposed East Anglia TWO project. The modelling showed that there would be some cumulative effects as a result of interactions between the proposed East Anglia TWO project, the proposed East Anglia ONE North project and Galloper and Gabbard, however, effects outside of the footprint of the proposed East Anglia TWO project were less than 2% of baseline conditions, and therefore within the 5% threshold that is considered a significant impact. It is therefore considered no SACs could be affected as a result of changes in the wave climate.

127. On the basis that there is no potential for direct or indirect in-combination effects which could result in LSE, all sites are screened out with respect to potential LSE on their benthic habitat features.

5.2.3 Benthic Ecology Screening Summary

128. On the basis that there is no potential for direct or indirect in-combination effects which could result in LSE on any site, either for the proposed East Anglia TWO project alone or in-combination, all sites are screened out with respect to potential LSE on their benthic habitat features.

6 Fish Ecology

6.1 Approach to Screening

6.1.1 Site Selection Criteria (Receptor)

129. Direct or indirect effects on Annex II migratory fish species may arise from the permanent or temporary physical presence or activities relating to the construction, operation or decommissioning of the windfarm and associated infrastructure. Potential effects include loss of habitat, disturbance and displacement.

130. This HRA screening exercise considers sites which meet the following criteria:

- The offshore development area directly overlaps a site whose interest features includes an Annex II migratory fish species;
- The distance between the offshore development area and a site with a fish interest feature is within the range for which there could be an interaction e.g. the distance of the site from the source of suspended sediment from the offshore development area is within the range at which sediment deposition could occur;
- The distance between the offshore development area and resources on which the interest feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the range for which there could be an interaction; and
- The likelihood that a foraging area or a migratory route occurs within the offshore development area.

6.1.2 Potential Effects (Source)

131. The key factors that will be considered during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to feature (distance between the proposed development and SACs, migration routes) (pathway and receptor).

132. During construction of the proposed East Anglia TWO project, activities which result in disturbance to the seabed and the generation of suspended sediment have the potential to disturb and displace fish from supporting habitats or migratory routes. Underwater noise generated by construction activities, such as piling, also has the potential to displace fish from supporting habitats or migratory routes by acting as a barrier.

133. During the operational period, the physical presence of turbine foundations and associated components (offshore platforms, export cables, inter-array cables) will result in the loss or replacement of existing habitats. Maintenance activities during the operational phase may also result in localised disturbance or displacement.

134. Decommissioning would require the removal of foundation structures and either the cutting or removal of subsea cables resulting in physical disturbance, potential disturbance and displacement of impacts associated with suspended sediment and underwater noise. Effects caused during decommissioning would be similar to those during the construction phase.

135. The potential effects on fish and associated important habitats from the proposed East Anglia TWO project have been identified within the East Anglia TWO Scoping Report (SPR, 2017a) and Scoping Opinion (The Planning Inspectorate, 2017). These are provided in ***Table 6.1.*** These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 6.1 Summary of Potential Effects - Fish Ecology (scoped in (✓) and scoped out (x))

Potential Effects	Construction	Operation	Decommissioning
Physical disturbance and temporary loss of sea bed habitat, spawning or nursery grounds during intrusive works	✓	x	✓
Permanent habitat loss	x	✓	x
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Re-mobilisation of contaminated sediment during intrusive works	✓	✓	✓
Underwater noise impacts to hearing sensitive species during foundation piling	✓	x	x
Underwater noise impacts to hearing sensitive species due to other activities (vessels, seabed preparation, cable installation etc.)	✓	✓	✓
Introduction of wind turbine foundations, scour protection and hard substrate	x	✓	x
Electromagnetic fields	x	✓	x
Changes in fishing activity	x	✓	x
Cumulative underwater noise	✓	✓	✓

Potential Effects	Construction	Operation	Decommissioning
Cumulative permanent habitat loss	x	✓	x
Cumulative (in-combination) changes to seabed habitat	✓	✓	✓
Transboundary impacts	x	x	x

6.1.3 Identification of sites and features (Pathway)

136. Sites designated for migratory fish species that have been considered in the screening exercise are shown in ***Figure 6.1a and 6.1 b of Annex 1***.

137. Based on a review of available information the following Annex II species are known to either migrate through or spend part of their lifecycle in the North Sea; Atlantic salmon *Salmo salar*, allis shad *Alosa alosa*, twaite shad *Alosa fallax* and sea lamprey *Petromyzon marinus* (and the River lamprey *Lampetra fluviatilis* which is restricted to coastal waters). Therefore, there is the potential for these migratory fish to be present in the vicinity of the proposed East Anglia TWO project and they are therefore considered in this screening exercise.

138. This exercise also considers all designated sites within the southern North Sea which have migratory fish species listed in Annex II of the Habitats Directive as an interest feature.

6.2 Screening

6.2.1 Project Alone Effects

139. It was agreed as part of the East Anglia TWO Scoping Report (SPR, 2017a) that transboundary impacts on fish would be scoped out of the EIA. We have therefore screened them out from consideration in the HRA.

140. There are no UK sites designated for Atlantic salmon, allis shad or twaite shad in the Southern North Sea. The nearest sites for these species are: Plymouth Sound and Estuaries SAC (allis shad), Severn Estuary SAC (twaite shad) and River Avon SAC (Atlantic salmon). Disturbance to supporting habitats due to permanent installation of infrastructure or due to temporary works will be localised within the offshore development area. Sediment plumes and changes to seabed characteristics are expected to be restricted to the vicinity of the offshore development area. Underwater noise, particularly from piling activity may have effects on fish at up to 40km from the East Anglia TWO windfarm site, thus effects would be limited to that range.

141. Therefore, given the remoteness of Plymouth Sound and Estuaries SAC, Severn Estuary SAC and River Avon SAC from the offshore development area there is

no pathway for direct effects upon the sites themselves. There is theoretical potential for individuals from these sites (and other UK sites beyond the Southern North Sea) to be in the vicinity of the offshore development area. However, it is considered that there is no potential for significant effects upon them as the absence of designated sites for these species reflects the lack of importance of the Southern North Sea to the species. Therefore, it is considered that there is no potential for LSE on Atlantic salmon, allis shad and twaite shad either alone or in-combination, see ***Table 6.2***.

142. There are two non-transboundary designated sites within the southern North Sea region which have Annex II fish species as features as primary reasons for designation or qualifying features. These are the Humber Estuary SAC and the River Derwent SAC in North Yorkshire (which flows into the Humber). The features are the Sea lamprey (and the River lamprey which is restricted to coastal waters), see ***Table 6.2.*** The Humber Estuary SAC is 178km from the East Anglia TWO windfarm site and 164km from the offshore export cable corridor.

143. At this distance, there would be no pathway for physical interaction, either directly or indirectly, with the SACs themselves. Relatively little is known about the precise habitats occupied by adult sea lampreys and although adults are sometimes caught at sea, the precise conditions in which they occur have not been described. Most adults are found in freshwater and spawning and larval stages occur in rivers (Maitland, 2003). Given the distance from the SACs, and the mostly freshwater life history of the species it is unlikely that there would be any effects from the proposed East Anglia TWO project on this species.

144. Based on the approach set out in ***section 6.1,*** it is concluded that there is no potential for LSE from the proposed East Anglia TWO project on the Humber Estuary SAC and, therefore, it is proposed that it not be considered further in the HRA.

145. ***Table 6.2*** presents the findings of the HRA screening exercise with justification for scoping individual sites out.

Table 6.2 List of SACs in the southern North Sea with their Respective Categories of Annex II Migratory Fish Species Interest Feature and Screening Decisions

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2	Cable corridor		
UK0013111	UK	Plymouth Sound and Estuaries SAC	1102 Allis shad**	477km (shortest distance overland)		Out	Allis shad could in theory be present in the vicinity of the proposed East Anglia TWO project, but the absence of designated sites in the southern North Sea reflects the lack of importance of the area to this species. The distance between the proposed project and the site precludes direct impact upon the site and its supporting habitats.
UK0013030	UK	Severn Estuary SAC	1102 Twaite shad*	312km (shortest distance overland)		Out	Twaite shad could in theory be present in the vicinity of the proposed East Anglia TWO project, but the absence of designated sites in the southern North Sea reflects the lack of importance of the area to this species. The distance between the proposed project and the site precludes direct impact upon the site and its supporting habitats.

Site Code	Country	SAC name	Category of Interest Feature	Distance* (km)		Screening Decision	Reason for Screening Decision
				EA2	Cable corridor		
UK0013016	UK	River Avon SAC	1106 Atlantic salmon*	300km (shortest distance overland)		Out	Atlantic salmon could in theory be present in the vicinity of the proposed East Anglia TWO project, but the absence of designated sites in the southern North Sea reflects the lack of importance of the area to this species. The distance between the proposed project and the site precludes direct impact upon the site and its supporting habitats.
UK0030170	UK	Humber Estuary SAC	1095 Sea Lamprey** 1099 River lamprey**	178	164	Out	River lamprey are restricted to rivers and coasts so there can be no direct interaction with the proposed East Anglia TWO project. Sea lamprey could in theory be present in the vicinity of the proposed East Anglia TWO project, but given their life history interaction would be limited. The distance between the proposed project and the site precludes direct impact upon the site and its supporting habitats.
UK0030253	UK	River Derwent SAC	1099 River lamprey*	261	244	Out	

*Primary feature | **Qualifying feature

6.2.2 In-combination Effects

146. As there are no LSE for the project alone, there are no pathways for in-combination effects.

6.2.3 Fish Ecology Screening Summary

147. On the basis that there is no potential for direct or indirect effects which could result in LSE on any site, for the proposed East Anglia TWO project alone or in-combination, we propose to screen out all SACs with Annex II fish species interest features from the HRA.

7 Marine Mammals

7.1 Approach to Screening

7.1.1 Site Selection Criteria (Pathway)

148. For marine mammals, the approach to HRA screening primarily focuses on the potential for connectivity between individual marine mammals from designated sites and the proposed East Anglia TWO project (i.e. demonstration of a clear source-pathway-receptor relationship). This is based on the distance of the offshore development area from the designated site, the range of each effect and the potential for animals from the designated site to be within range of an effect.

149. This HRA screening exercise therefore considers designated sites which meet the following criteria:

- The distance between the potential effect of the proposed East Anglia TWO project and a designated site with a marine mammal interest feature is within the range for which there could be an interaction e.g. the pathway is not too great for significant noise propagation;
- The feature is commonly found within the offshore development area; and / or
- A foraging area or a migratory route occurs within the zone of influence of the offshore development area (applies to mobile interest features when outside the SAC).

150. Therefore, the key factors that will be considered during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to feature (distance between the proposed development and cSACs/SACs, migration routes) (pathway and receptor).

7.1.2 Potential Effects (Source)

151. Direct or indirect effects to marine mammals may arise from permanent or temporary physical presence or activities relating to the construction, operation or decommissioning of the proposed East Anglia TWO project and associated offshore infrastructure. Potential effects include indirect effects through impacts on prey species and direct effects from underwater noise and vessel interactions.

152. The potential effects on marine mammals from the proposed East Anglia TWO project were identified within the East Anglia TWO Scoping Report (SPR, 2017a) and discussed in the Scoping Opinion (The Planning Inspectorate, 2017). These

are summarised in ***Table 7.1.*** These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 7.1 Summary of Potential Effects – Marine Mammals (scoped in (✓) and scoped out (x))

Potential Effects	Construction	Operation	Decommissioning
Underwater noise during UXO clearance	✓	x	x
Underwater noise during piling	✓	x	x
Underwater noise from vessels and other activities, such as seabed preparations, cable installation and rock dumping	✓	✓	✓
Underwater noise from operational wind turbines	x	✓	x
Barrier effects from underwater noise	✓	✓	✓
Barrier effects from physical presence of turbines	x	x	x
Water quality caused by disturbance of sediment	✓	✓	✓
Electromagnetic fields (EMF)[6]	x	x	x
Vessel interactions (collision risk)	✓	✓	✓
Disturbance at seal haul-out sites[7]	x	x	x
Changes to prey resources	✓	✓	✓
In-combination effects of underwater noise	✓	✓	✓
In-combination effects of vessel interactions (collision risk)	✓	✓	✓
In-combination effects of changes to prey resources	✓	✓	✓

[6] Agreement has been made with NE, MMO, TWT and WDC through the Evidence Plan Process, via a marine mammals Expert Topic Group meeting on the 19th of March that potential impacts on marine mammals from EMF have been screened out.

[7] Justification for scoping out disturbance to seal haul-out sites has been provided to Natural England and The Wildlife Trust following a Marine Mammals evidence plan meeting on the 19th of March and summarised in Section 7.1.4.2.3 and Section 7.1.4.3.3 below. NE have agreed that disturbance to seal-haul outs can be scoped out, although consideration is required in relation to foraging areas.

153. In the Scoping Opinion (The Planning Inspectorate, 2017), PINS stated that insufficient evidence was presented to scope out two potential impacts. They confirmed that they would be content for these impacts to be scoped out of the assessment if further evidence was presented and the conclusions agreed with relevant stakeholders. Therefore, the following sections present the evidence to scope out:

- ***Section 7.1.2.1*** potential effects of EMF; and
- ***Section 7.1.2.2*** physical barrier effects.

154. This also provides the basis to screen out further consideration of these impacts from the HRA.

7.1.2.1 Screening out of any potential effects from EMF

155. Normandeau *et al.* (2011) modelled expected magnetic fields using design characteristics taken from a range of subsea cable projects. For eight of the ten AC cables modelled it was found that the intensity of the magnetic field (B) was approximately a direct function of voltage (ranging from 33kV to 345kV) although separation between the cables and burial depth also influenced field strengths. Similarly, the modelling carried out for nine DC cables also found that the B field was a function of voltage (ranging from 75 to 500kV) and cable configuration. For both AC and DC cables, the predicted B fields were strongest directly over the cables and decreased rapidly with vertical and horizontal distance from the cables (*Table 7.2*).

Table 7.2 Averaged Magnetic Field Strength Values from AC and DC* cables buried 1m (Normandeau *et al.*, 2011)

Distance (m) above seabed	Magnetic Fields Strength (μT) Horizontal distance (m) from cable					
	0m AC	0m DC*	4m AC	4m DC*	10m AC	10m DC*
0	7.85	78.27	1.47	5.97	0.22	1.02
5	0.35	2.73	0.29	1.92	0.14	0.75
10	0.13	0.83	0.12	0.74	0.08	0.46
*DC cables are not being considered for East Anglia TWO or East Anglia ONE North projects.						

156. For the proposed East Anglia TWO project all inter-array and offshore export cables will be AC. Cables and would be buried to a target depth of greater than 1m. Where substrate conditions prevent burial, and at cable or pipeline crossings, cable protection would be deployed. Any effect would therefore be

limited to the immediate vicinity of the cables (i.e. within metres), attenuating rapidly.

157. Although it is assumed that harbour porpoise are capable of detecting small differences in magnetic field strength, this is unproven and is based on circumstantial information. There is also, at present, no evidence to suggest that existing subsea cables have influenced cetacean movements. Harbour porpoise move in and out of the Baltic Sea with several crossings over operating subsea HVDC cables in the Skagerrak and western Baltic Sea without any apparent effect on their migration pattern (Walker, 2001). There is no evidence that pinnipeds respond to electromagnetic fields (Gill *et al*., 2005).

158. Data from operational windfarms show no evidence of exclusion of harbour porpoise or seals from within the windfarm (for example, Diederichs et al., 2008; Lindeboom et al., 2011; Marine Scotland, 2012; McConnell et al., 2012; Russell et al., 2014; Scheidat et al., 2011; Teilmann et al., 2006; Tougaard et al., 2005, 2009a, 2009b) and therefore effects of EMF have been scoped out. Agreement of scoping out of EMF has been reached through the Evidence Plan Process and is consistent with recent assessments such as the East Anglia THREE EIA (SPR, 2015) and Norfolk Vanguard PEI (RHDHV 2017) which only considered impacts on EMFs on prey species.

7.1.2.2 Screening out of barrier effects from the physical presence of turbines

159. The presence of a windfarm could be seen as having the potential to create a physical barrier, preventing movement or migration of marine mammals between important feeding and / or breeding areas, or potentially increasing swimming distances if marine mammals avoid the site and go around it. The East Anglia TWO windfarm site is not located on any known migration routes for marine mammals.

160. The minimum spacing between wind turbines will be 1,980m x 1,210m. This means that animals can be expected to move between devices and through the operational windfarm irrespective of layout.

161. Data from operational windfarms show no evidence of exclusion of harbour porpoise or seals from within the windfarm (for example, Diederichs *et al*., 2008; Lindeboom *et al*., 2011; Marine Scotland, 2012; McConnell *et al*., 2012; Russell *et al*., 2014; Scheidat *et al*., 2011; Teilmann *et al*., 2006; Tougaard *et al*., 2005, 2009a, 2009b), which indicates that turbines do not present a physical barrier.

162. Both harbour porpoise and seals have been shown to forage within operational wind farm sites (e.g. Lindeboom *et al*., 2011; Russell *et al*., 2014) indicating no restriction to movements in operational offshore wind farm sites.

7.1.3 Summary of Potential Effects

163. The following potential effects during construction, operation, maintenance and decommissioning are considered in the HRA process:

- Underwater noise, including UXO clearance, piling and other construction activities, vessels, operation and maintenance activities, operational turbines and decommissioning activities;
- Vessel interactions (increased collision risk);
- Changes to water quality;
- Changes to prey resources; and
- Any in-combination effects of (i) underwater noise; (ii) vessel interactions; and (ii) changes to prey resources.

7.1.4 Identification of sites and features (Receptor and Pathway)

164. Sites designated for marine mammals which have been considered in the screening exercise are shown in ***Figures 7.6a-d in Annex 1***.

165. Based on data collected during aerial surveys and a review of existing data sources (summarised in SPR, 2017a, SPR, 2017b), the Annex II species likely to occur in the proposed East Anglia TWO project and, therefore, considered in the HRA screening are:

- Harbour porpoise *Phocoena phocoena*;
- Grey seal *Halichoerus grypus*; and
- Harbour seal *Phoca vitulina*.

166. Bottlenose dolphin *Tursiops truncatus*, the only other Annex II marine mammal species, has not been positively identified during the aerial surveys of the East Anglia TWO windfarm site surveys (based on 20 months of data) or 24 months of aerial data for the East Anglia ONE and East Anglia THREE EIAs. During SCANS-III surveys in summer 2016, no bottlenose dolphins were recorded in or around the area of East Anglia TWO (Hammond *et al*., 2017). Taking into account that no sightings have been recorded in and around the East Anglia TWO windfarm site, bottlenose dolphin will not be considered further in this assessment.

167. The following sections (***sections 7.1.4.1 to 7.1.4.3***) describe the process used to define the list of designated sites for which there is theoretical connectivity and, therefore, potential for a source – pathway – receptor relationship for harbour porpoise, grey seal and harbour seal.

7.1.4.1 Harbour Porpoise

168. Harbour porpoise within the eastern North Atlantic are generally considered to be part of a continuous biological population that extends from the French coastline of the Bay of Biscay to northern Norway and Iceland (Tolley and Rosel, 2006; Fontaine *et al*., 2007, 2014; IAMMWG, 2015). However, for conservation and management purposes, it is necessary to consider this population as smaller Management Units (MUs). MUs provide an indication of the spatial scales at which effects of plans and projects alone, and in-combination, need to be assessed for the key cetacean species in UK waters, with consistency across the UK (IAMMWG, 2015). The Inter-Agency Marine Mammal Working Group (IAMMWG) defined three MUs for harbour porpoise: North Sea (NS); West Scotland (WS); and the Celtic and Irish Sea (CIS). East Anglia TWO is located within the North Sea MU (***Plate 7.1*;** IAMMWG, 2015). Therefore, all designated sites out with the North Sea MU have been screened out from further consideration.

169. For harbour porpoise, connectivity is considered potentially possible between the proposed East Anglia TWO project and any designated site within the North Sea MU, where the species is considered as a grade A, B or C feature[8].

[8] Grade D indicates a non-significant population (JNCC, 2009)

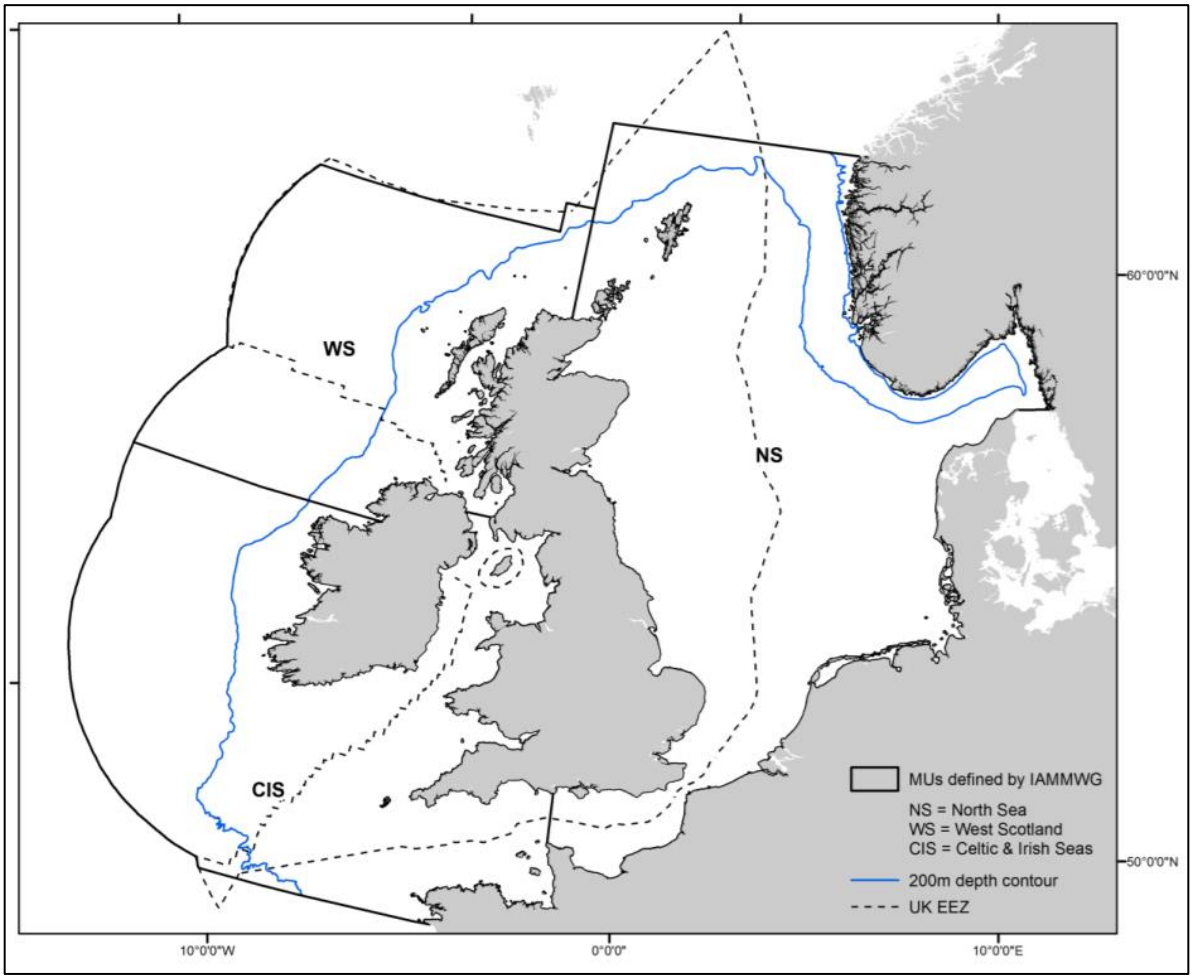

Plate 7.1: Harbour porpoise Management Units (IAMMWG, 2015)

170. ***Table 7.3*** shows a list of designated sites considered to have potential connectivity to the offshore development area. This list has been further refined and screened, in relation to the potential effects assessed below.

7.1.4.1.1 Underwater Noise

171. Marine Mammal Mitigation Plans (MMMPs) for unexploded ordnance (UXO) clearance and piling will be produced post-consent in consultation with relevant stakeholders and will be based on the latest scientific understanding and guidance, and detailed project design. The MMMP will contain measures that will reduce the risk of any lethal injury, physical injury or permanent auditory injury to harbour porpoise as a result of underwater noise during piling, such as the application of best practice mitigation at the time of construction. The commitment to the MMMP reduces the risk of lethal injury, physical injury and permanent auditory (PTS) injury. The HRA will assess the potential effects of any lethal injury, physical injury and permanent auditory (PTS) injury, taking into account embedded mitigation and the MMMPs.

172. The current SNCB advice is that a distance of 26km from an individual percussive piling location should be used to assess the area of the Southern North Sea cSAC habitat harbour porpoise may be disturbed from during piling operations (JNCC, 2017a, 2017b). This is based on the effective deterrent radius (EDR) for a single monopile of 26km (Tougaard *et al.*, 2013). 26km is also the advised disturbance range from UXO initiation.

173. This advice should be relevant for all cSAC sites. Therefore, all designated sites with the exception of the Southern North Sea cSAC are screened out with regard to noise impacts as all sites are greater than 26km from the East Anglia TWO windfarm site *(**Table 7.3**).*

174. The proposed East Anglia TWO project is located within the Southern North Sea cSAC winter area (***Figure 7.6 in Annex 1***). Therefore, any harbour porpoise affected by underwater noise from East Anglia TWO would be within or in close proximity to the Southern North Sea cSAC.

175. As harbour porpoise are wide-ranging within the North Sea MU, no discrete population can be assigned to an individual designated. It is, therefore, assumed that at any one time, harbour porpoise within or in the vicinity of the offshore development area are associated with the Southern North Sea cSAC (as they cannot simultaneously be part of the population of multiple designated sites, although all are part of the larger MU population). Therefore, with regard to the potential effects of underwater noise at the East Anglia TWO windfarm site connectivity of harbour porpoise from other designated sites, other than the Southern North Sea cSAC is screened out *(**Table 7.3**).*

176. The potential effects of underwater noise during construction of the proposed East Anglia TWO project alone that have the potential for LSE on the SNS cSAC and will be assessed further are:

- Potential risk of any permanent auditory injury (PTS) resulting from the underwater noise associated with clearance of UXO;
- Potential disturbance resulting from the underwater noise associated with clearance of UXO;
- Potential risk of any permanent auditory injury (PTS) resulting from the underwater noise during piling (single and concurrent);
- Potential disturbance resulting from underwater noise during piling (single and concurrent);
- Potential disturbance resulting from underwater noise during other construction activities, for example, seabed preparation, rock dumping and cable installation;
- Potential disturbance resulting from underwater noise from vessels; and

- Potential barrier effects as a result of underwater noise during construction.

177. The potential effects of underwater noise during the operation and maintenance of the proposed East Anglia TWO project alone that have the potential for LSE on the SNS cSAC and will be assessed further are:

- Potential disturbance resulting from operational turbines;
- Potential disturbance resulting from underwater noise during maintenance activities, for example, any additional rock dumping and cable re-burial;
- Potential disturbance resulting from underwater noise from vessels; and
- Potential barrier effects as a result of underwater noise during operation and maintenance.

178. The potential effects of underwater noise during decommissioning of the proposed East Anglia TWO project alone that have the potential for LSE on the SNS cSAC and will be assessed further are:

- Potential disturbance resulting from the noise associated with foundation removal (e.g. cutting);
- Potential disturbance resulting from underwater noise from vessels; and
- Potential barrier effects as a result of underwater noise during decommissioning.

179. The potential in-combination effects of disturbance from underwater noise will include:

- Offshore windfarm piling;
- UXO clearance;
- Seismic surveys;
- OWF construction activities (other than piling), including vessels; and
- Operational offshore windfarms including maintenance activities and vessels.

7.1.4.1.2 Vessel Interactions

180. It is likely that during construction, vessels will use regular routes between ports and the offshore development area which will allow marine mammals to become accustomed to vessels, in order to reduce any increased collision risk. Additionally, vessel operators will use good practice and common sense to reduce any risk of collisions with marine mammals.

181. Vessel activity will be concentrated in the vicinity of the offshore development area (beyond this, vessel activity will be dispersed and becomes part of the background vessel traffic, using already established vessel routes). Therefore, all animals affected would be within or in close proximity to the Southern North Sea cSAC. As outlined above, it is considered that all harbour porpoise in the area of the offshore development area are associated with the Southern North Sea cSAC and therefore all designated sites, with the exception of the Southern North Sea cSAC, are screened out with regard to any potential vessel interactions *(**Table 7.3**)*.

182. Applying the same approach, the in-combination assessment will also only consider the Southern North Sea cSAC.

7.1.4.1.3 Changes to water quality

183. Disturbance of seabed sediments has the potential to release any sediment-bound contaminants, such as heavy metals and hydrocarbons that may be present within them into the water column. The accidental release of contaminants (e.g. through spillage) also has the potential to effect water quality. There is the potential for increased suspended sediments. Any potential changes to water quality in the East Anglia TWO windfarm site will be considered further in the HRA.

184. As outlined above it is assumed that at any one time, harbour porpoise foraging in the proximity of the proposed project are associated with the Southern North Sea cSAC (see ***section 7.1.4.1.1***). As a result, connectivity with harbour porpoise from other designated sites which are foraging within the impact range of any changes to water quality is screened out for all sites, with the exception of the Southern North Sea cSAC.

7.1.4.1.4 Changes to Prey Resources

185. Preliminary site specific underwater noise modelling (ITAP, 2018, unpublished) indicates that noise impacts upon fish will be limited to less than 40km from a piling event[9]. Therefore, given that all designated sites with the exception of the Southern North Sea cSAC are greater than 40km from the proposed East Anglia TWO project, direct effects upon prey resources of all these sites are screened out *(**Table 7.3**)*.

[9] That is for possible behavioural effects (based on Popper *et al.* (2014) temporary threshold shift (TTS) criteria of 186dB SEL for 15m monopile with maximum hammer energy of 4,000kJ)

186. As stated above it is assumed that at any one time, harbour porpoise foraging in the proximity of the proposed East Anglia TWO project are associated with the Southern North Sea cSAC (see ***section 7.1.4.1.1***). As a result, connectivity with harbour porpoise from other designated sites which are foraging within the impact range of indirect changes to prey resource is screened out for all sites, with the exception of the Southern North Sea cSAC.

187. Applying the same approach, the in-combination assessment will also only consider the Southern North Sea cSAC.

7.1.4.2 Grey Seal

188. For grey seal, the screening process considers any designated site where the species is a grade A, B or C feature and there is the potential for connectivity between grey seals from the designated site and the offshore development area (i.e. demonstration of a clear source-pathway-receptor relationship).

189. Grey seals are wide ranging and can breed and forage in different areas (Russell *et al.,* 2013). For example, tags deployed on grey seals at Donna Nook and Blakeney Point in May 2015, indicated that they used multiple haul-outs sites; with one hauling out in the Netherlands and one in Northern France (Russell, 2016). ***Plate 7.2*** shows the tagged seal movements along the east coast of England and indicates that grey seal travel between haul-out sites along the east coast of England, as well as to the north of France and up to the Firth of Forth and across Fladden Ground and Dogger Bank (Russell, 2016).

190. Grey seals will typically forage in the open sea and return regularly to land to haul-out, although they may frequently travel up to 100km between haul-out sites. Foraging trips generally occur within 100km of their haul-out sites, although grey seal can travel up to several hundred kilometres offshore to forage (SCOS, 2017). Grey seal generally travel between known foraging areas and back to the same haul-out site, but will occasionally move to a new site. Movements have been recorded between haul-out sites on the east coast of England and the Outer Hebrides (SCOS, 2017).

191. To take the wide range and movements of grey seal into account, all designated sites in the Greater North Sea OSPAR region (***Plate 7.3***) were considered. All designated sites outwith this region were screened out from further consideration.

192. ***Table 7.3*** shows a list of designated sites considered to have potential connectivity to the proposed East Anglia TWO project. This list has been further refined and screened, in relation to the potential effects assessed below.

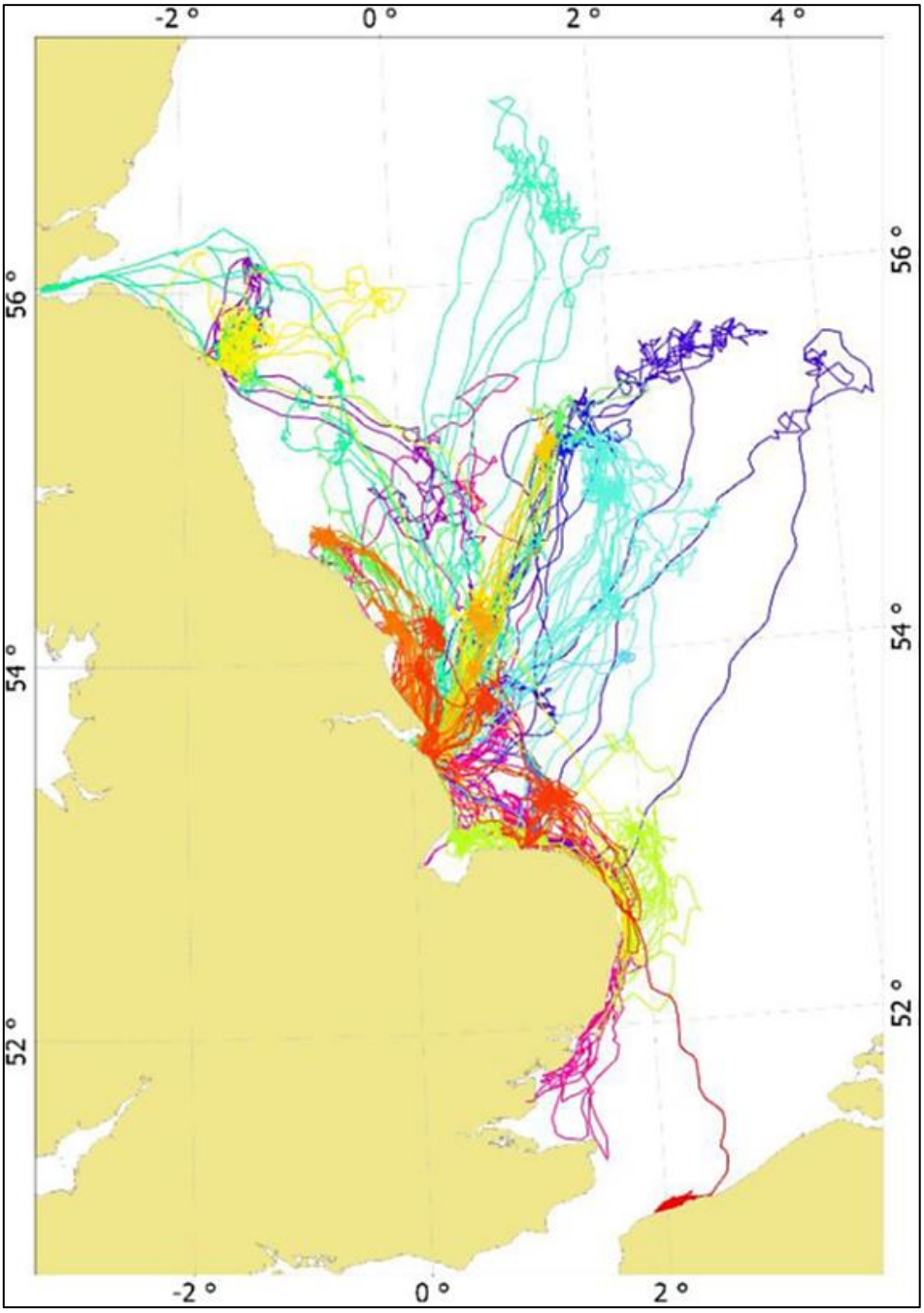

Plate 7.2 Tagged grey seal movements along the East coast of England (Russell, 2016)

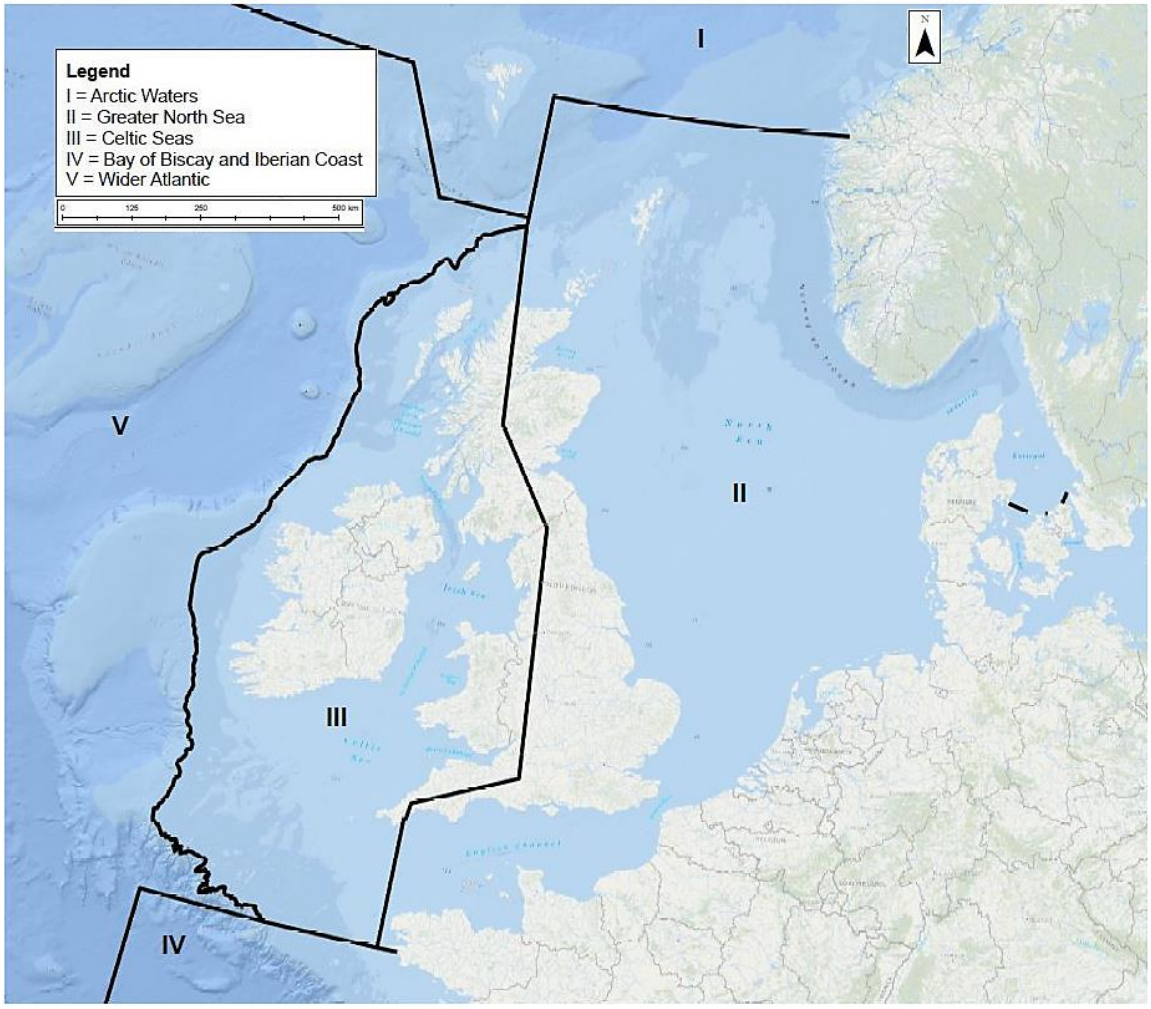

Plate 7.3 Greater North Sea OSPAR region

7.1.4.2.1 Underwater Noise

193. Studies on the interactions between seals and offshore windfarms, have shown avoidance of pile driving activity out to ranges of 25km, but did not show avoidance of general construction activity or of operational windfarms (Russell *et al*., 2016; SCOS, 2016). Therefore, with regard to direct underwater noise effects on designated sites or individual grey seals within them, all designated sites for grey seal are screened out as they are all located more than 25km from the East Anglia TWO windfarm site (***Table 7.2***).

194. As outlined above, grey seals could come from any of the Designated sites considered to have potential connectivity and as a result these may be affected within the potential disturbance range of 25km range.

195. However, it will be assumed, as a worst-case scenario, that at any one time, grey seal in the area of the proposed East Anglia TWO project are associated with the nearest designated site (as they cannot simultaneously be part of the population of multiple designated sites, although all are part of the larger North Sea

population). Therefore, connectivity of grey seals from all designated sites, other than the Humber Estuary SAC which is 164km at its closest point, is screened out with regard to the potential effects of underwater noise at the East Anglia TWO windfarm site *(Table 7.3).*

196. Applying the same approach, the in-combination assessment will also only consider the Humber Estuary SAC.

7.1.4.2.2 Vessel Interactions

197. As outlined in ***section 7.1.4.1.2***, concentrated vessel activity will occur in the vicinity of the East Anglia TWO windfarm site (beyond this, vessel activity will be dispersed and becomes part of the background vessel traffic).

198. The offshore development area has an area of approximately 437km^2, based on the estimated density of 0.12 grey seal per km^2 (calculated from the latest SMRU seal-at sea maps; Russell *et al*., 2017), the number of individuals that could be present within in the offshore development area is up to 53 individuals.

199. There is little information on collision rates or avoidance behaviour in seals, however it should be noted that the majority of vessels within the offshore project area will be slow moving or stationary. It is also highly unlikely that every seal in the offshore project area will be at risk of vessel collision. Taking into account the potential for seals to detect and avoid vessels, e.g. with an illustrative 90-95% avoidance rate (as worst-case scenario), the number of seals that could be at increased collision risk is between two and five. This is 0.03-0.08% of the current South-east England MU of 6,085 grey seals (SCOS, 2017).

200. At this magnitude of effect it is not considered that there is potential for LSE on any site to which the individual could be attributed as a result of vessels within the offshore development area. Therefore, all designated sites are screened out with regard to vessel interaction within the East Anglia TWO windfarm site.

201. However, the potential effects of vessel movements out with the offshore development area in the vicinity of any designated sites as they move between the port and the East Anglia TWO windfarm site will be assessed. The port location is not confirmed at this stage, however if a port to the north (e.g. Hull) is selected there is potential for impact on the Humber Estuary SAC due to the proximity of this site to Hull port. If a port to the south is used (e.g. Great Yarmouth or Lowestoft) there will be no impact on grey seal SACs due to the distance of this site and the route vessels would be required to take from designated sites.

202. The number of vessel movements between the port and the East Anglia TWO windfarm site in relation to the existing vessel traffic will be assessed for any

potential effects on the Humber Estuary SAC. Therefore, all designated sites, other than the Humber Estuary SAC are screened out with regard to the potential effects of vessel interactions *(**Table 7.3**).*

203. Applying the same approach, the in-combination assessment will also only consider any potential effects of increased vessel interaction between the port and the East Anglia TWO windfarm site for the Humber Estuary SAC.

7.1.4.2.3 Disturbance at seal haul-out sites

204. There is no potential for any direct disturbance to haul-out sites as a result of activities within the East Anglia TWO windfarm site due to the distance between the site and the closest point onshore (31km).

205. There is also no potential for any direct disturbance as a result of activities within the East Anglia TWO offshore cable corridor due to the distance between the nearest major haul-out site at Winterton-Horsey and the cable landfall at Sizewell, which is located over 60km along the coast.

206. Although grey seal could haul-out at other sites along the coast, the number of seal at these sites is likely to be low; the sites infrequently used and are unlikely to be used by significant numbers of seals during the breeding and moult periods. It is also worth noting that the landfall area has Sizewell A and Sizewell B nuclear power station to the north, the village of Thorpeness to the south as well as small scale fishing and recreational activity, meaning the landfall and adjacent area is likely to be suboptimal as a haul-out location.

207. The response of seals to disturbance at haul-out sites can range from increased alertness to moving into the water (Wilson, 2014). The potential impact on pupping groups can include temporary or permanent pup separation, disruption of suckling, energetic costs and energetic deficit to pups, physiological stress and sometimes enforced move to distant or suboptimal habitat (Wilson, 2014). Potential impacts on moulting groups can include energy loss and stress, while impacts on other haul-out groups can cause loss of resting and digestion time and stress (Wilson, 2014). The potential impacts will be determined by the response of the seals, the duration and proximity of the disturbance to the seals.

208. Studies on the distance of disturbance, on land or in the water, from hauled-out seals have found that the closer the disturbance, the more likely seals are to move into the water. For the grey seal, mothers responded by moving into the water more due to boat speed rather than as a result of the distance, although movement into the water was generally observed to occur at distances of between 20 and 70m, with no detectable disturbance at 150m (Wilson, 2014; Strong and Morris, 2010). However, grey seals have also been reported to move

into the water when vessels are at a distance of approximately 200m to 300m (Wilson, 2014).

209. Vessels moving to and from the offshore windfarm and offshore export cable corridor would not be moving within 500m of the coast. There is therefore no potential for any direct disturbance to hauled out seals as a result of vessel presence. Vessels will use the most direct routes to and from the site and ports and would be located a safe distance from the shore to avoid the risk of collision and grounding.

210. The construction port is not yet known and could be located on the south east coast of England. Vessel movements to and from any port will be incorporated within existing vessel routes. However, taking into account the proximity of shipping channels to and from existing ports, it is likely that seals hauled-out along these routes and in the area of the ports would be habituated to the noise, movements and presence of vessels.

211. The potential for disturbance at seal haul-out sites as a result of vessels is highly unlikely and has been screened out from further assessment in the HRA. As this is screened out for the project-alone effects, it is also screened out from the in-combination assessment.

7.1.4.2.4 Changes to water quality

212. Disturbance of seabed sediments has the potential to release any sediment-bound contaminants, such as heavy metals and hydrocarbons that may be present within them into the water column. The accidental release of contaminants (e.g. through spillage) also has the potential to effect water quality. There is the potential for increased suspended sediments. Any potential changes to water quality in the East Anglia TWO windfarm site will be considered further in the HRA.

213. As outlined above, it is considered, as a worst-case, that all grey seal in the area of the offshore development area are associated with the nearest designated site, the Humber Estuary SAC and therefore all designated sites, with the exception of the Humber Estuary SAC, are screened out with regard to any potential changes to water quality within the East Anglia TWO windfarm site *(**Table 7.3**)*.

7.1.4.2.5 Changes to Prey Resources

214. Preliminary site specific underwater modelling results (ITAP, 2018 unpublished) indicates that noise impacts upon fish will be limited to a range of less than 40km. Therefore, given that all designated sites for grey seal are located at a distance of 50km or greater from the East Anglia TWO windfarm site direct effects on all sites are screened out *(**Table 7.3**)*.

215. As outlined above, it is considered, as a worst-case, that all grey seal in the area of the offshore development area are associated with the nearest designated site, the Humber Estuary SAC and therefore all designated sites, with the exception of the Humber Estuary SAC, are screened out with regard to any potential effects of changes to prey resources within the East Anglia TWO windfarm site itself *(**Table 7.3**)*.

216. Applying the same approach, the in-combination assessment will also only consider the Humber Estuary SAC.

7.1.4.3 Harbour Seal

217. For harbour seal, the screening process considers designated sites where the species is a grade A, B or C feature and there is the potential for connectivity between harbour seals from the designated site and the offshore development area (i.e. demonstration of a clear source-pathway-receptor relationship).

218. SMRU, in collaboration with others, has deployed around 344 telemetry tags on harbour seals around the UK between 2001 and 2012 (***Plate 7.4**;* Russell and McConnell, 2014). The spatial distributions indicate harbour seals persist in discrete regional populations, display heterogeneous usage, and generally stay within 50km of the coast (Russell and McConnell, 2014).

219. Harbour seals generally make smaller foraging trips than grey seal, typically travelling 40-50km from their haul-out sites to foraging areas (SCOS, 2017). Tracking studies have shown that harbour seals travel 50-100km offshore and can travel 200km between haul-out sites (Lowry *et al.,* 2001; Sharples *et al.,* 2012). The range of these trips varies depending on the location and surrounding marine habitat. Tagging studies undertaken on harbour seal at The Wash (2003-2005) have shown that this population travels larger distances for their foraging trips than for other harbour seal populations and repeatedly forage between 75km and 120km offshore (average was 80km), with one seal travelling 220km (Sharples *et al.*, 2012). Telemetry studies indicate that the tracks of tagged harbour seals have a more coastal distribution than grey seals and do not travel as far from haul-outs (Russell and McConnell, 2014).

220. To take the wide range and movements of harbour seal into account, all designated sites in the Greater North Sea OSPAR region ***Plate 7.2*** were considered. All designated sites out with this region were screened out from further consideration.

221. ***Table 7.3*** shows a list of designated sites considered to have potential connectivity to the offshore development area. This list has been further refined and screened, in relation to the potential effects assessed below.

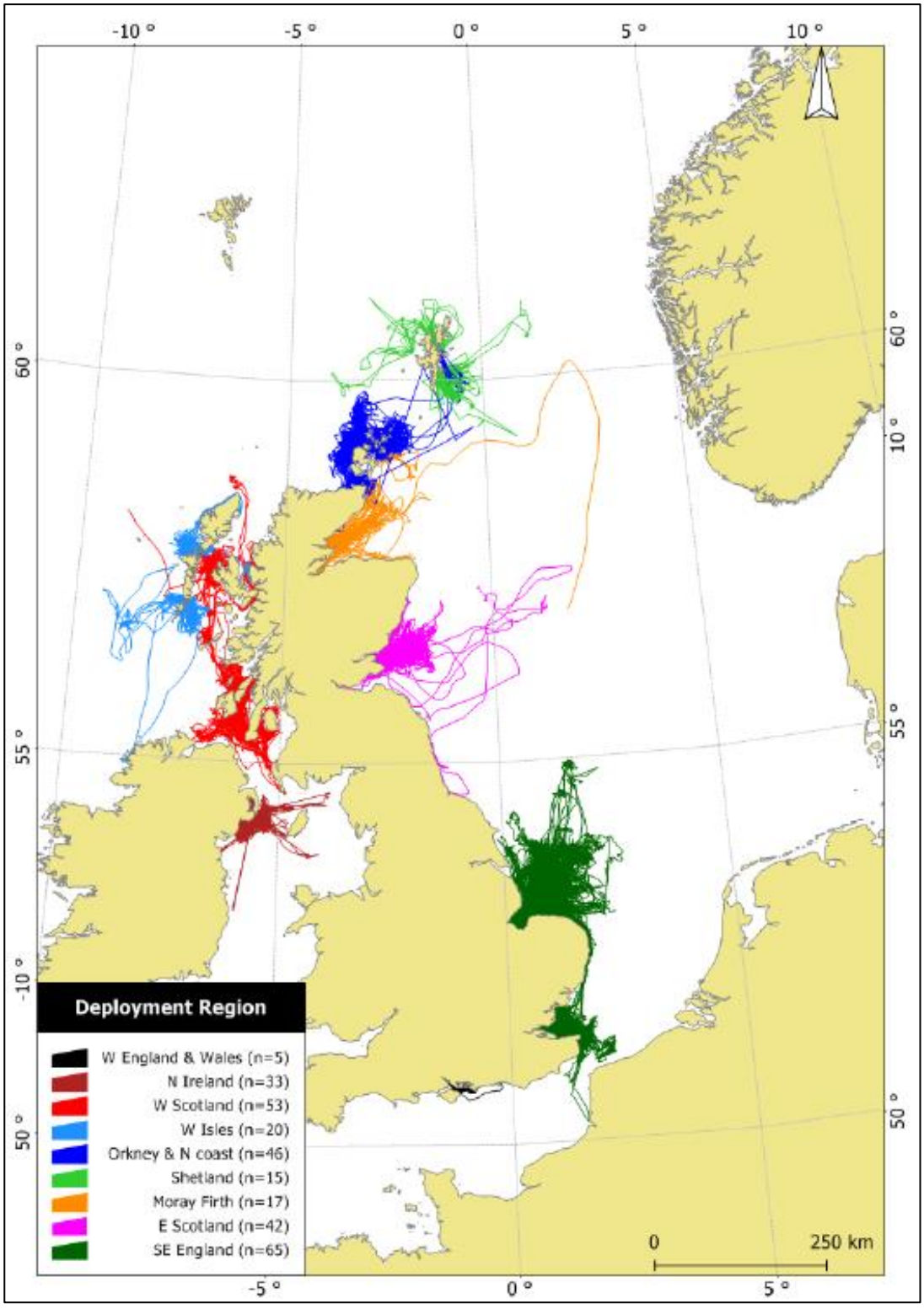

Plate 7.4 Telemetry tracks by deployment region for harbour seals aged one year or over (Russell and McConnell, 2014)

7.1.4.3.1 Underwater Noise

222. Following the same approach as used for grey seal, with regard to direct underwater noise effects on designated sites or individual harbour seals within them, all designated sites for harbour seal are screened out as they are all located more than 25km from the East Anglia TWO windfarm site *(**Table 7.3**)*.

223. As outlined above, harbour seals could come from any of the designated sites considered to have potential connectivity, given that harbour seal are highly mobile and as a result these may be affected within the potential disturbance range of 25km range.

224. As for grey seal it will be assumed, as a worst-case scenario, that at any one time, harbour seal in the offshore development area are associated with the nearest designated site. Therefore, connectivity of harbour seal from all designated sites, other than the Wash and North Norfolk SAC is screened out with regard to the potential effects of underwater noise at the East Anglia TWO windfarm site *(**Table 7.3**)*.

225. Applying the same approach, the in-combination assessment will also only consider the Wash and North Norfolk SAC.

7.1.4.3.2 Vessel Interactions

226. As outlined in ***section*** Vessel Interactions***7.1.4.2.2***, concentrated vessel activity will occur in the vicinity of the offshore development area (beyond this, vessel activity will be dispersed and becomes part of the background vessel traffic).

227. The offshore development area has an area of approximately 437km^2, based on the estimated density of 0.01 harbour seal per km^2 (calculated from the latest SMRU seal-at sea maps; Russell *et al*., 2017), the number of individuals that could be present within in the offshore development area is up to five individuals.

228. Using the same approach as for grey seal (see ***section 7.1.4.2.2***) with an illustrative 90-95% avoidance rate (as worst-case scenario), the number of seals that could be at increased collision risk is less than one (0.25-0.5 individuals). This represents 0.005-0.01% of the harbour seal south-east England MU of 5,061 harbour seals (SCOS, 2017).

229. At this magnitude of effect it is considered that there is no potential for LSE on any site to which the individual could be attributed. Therefore, all sites are screened out with regard to vessel interaction at the offshore development area.

230. However, the potential effects of vessel movements out with the offshore development area in the vicinity of any designated sites as they move between the port and the East Anglia TWO windfarm site will be assessed. The port

location is not confirmed at this stage, however if a port to the north (e.g. Hull) is selected there is potential for impact on the Wash and North Norfolk Coast SAC due to the proximity of this site to Hull port. If a port to the south is used (e.g. Great Yarmouth or Lowestoft) there will be no impact on harbour seal SACs due to the distance of this site and the route vessels would be required to take from designated sites.

231. The number of vessel movements in relation to the existing vessel traffic will be assessed for any potential effects on the Wash and North Norfolk Coast SAC. Therefore, all designated sites, other than the Wash and North Norfolk Coast SAC are screened out with regard to the potential effects of vessel interactions *(**Table 7.3**)*.

232. Applying the same approach, the in-combination assessment will also only consider any potential effects of increased vessel interaction between the port and the East Anglia TWO windfarm site for the Wash and North Norfolk Coast SAC.

7.1.4.3.3 Disturbance at seal haul-out sites

233. There is no potential for any direct disturbance as a result of activities within the East Anglia TWO windfarm site due to the distance between the site and the closest point onshore (31km).

234. There is also no potential for any direct disturbance as a result of activities within the East Anglia TWO offshore cable corridor due to the distance between the nearest major haul-out site at Winterton-Horsey and the cable landfall at Sizewell, which is located over 60km along the coast.

235. As for grey seal (see ***section 7.1.4.2.3***) although harbour seal could haul-out at other sites along the coast, these are likely to be a suboptimal haul-out locations with insignificant numbers hauled-out.

236. The responses of harbour seals to disturbance are the same as those discussed for grey seals in ***section 7.1.4.2.3***

237. As previously discussed, disturbance to seals from vessel movements have been reported at up to 300m (Wilson, 2014). Vessels moving to and from the offshore development area would not be moving less than 500m from the coast and there is, therefore, no potential for any direct disturbance to hauled-out seals as a result of vessels being present. Vessels will use the most direct routes to and from the site and ports and would be located a safe distance from the shore to avoid the risk of collision and grounding.

238. As previously discussed, the construction port is not yet known and could be located on the south east coast of England. Vessel movements to and from any port will be incorporated within existing vessel routes and it is likely that seals hauled-out along established vessel routes and near ports would be habituated to the noise, movements and presence of vessels.

239. The likelihood of disturbance at seal haul-out sites as a result of vessels is highly unlikely and has been screened out from further assessment in the HRA.

7.1.4.3.4 Changes to water quality

240. Disturbance of seabed sediments has the potential to release any sediment-bound contaminants, such as heavy metals and hydrocarbons that may be present within them into the water column. The accidental release of contaminants (e.g. through spillage) also has the potential to effect water quality. There is the potential for increased suspended sediments. Any potential changes to water quality in the East Anglia TWO windfarm site will be considered further in the HRA.

241. As outlined above, it is considered, as a worst-case, that all harbour seal in the area of the proposed East Anglia TWO project are associated with the nearest designated site, the Wash and North Norfolk Coast SAC and therefore all designated sites, with the exception of the Wash and North Norfolk Coast SAC, are screened out with regard to any potential changes to water quality *(**Table 7.3**)*.

7.1.4.3.5 Changes to Prey Resources

242. Preliminary site specific underwater modelling results (ITAP, 2018 unpublished) indicate that noise impacts upon fish will be limited to a range of less than 40km. Given that all designated sites for harbour seal are located at a distance of 50km or greater from the East Anglia TWO windfarm site; direct effects on all sites are screened out.

243. As outlined above, it is considered, as a worst-case, that all harbour seal in the area of the proposed East Anglia TWO project are associated with the nearest designated site, the Wash and North Norfolk Coast SAC and therefore all designated sites, with the exception of the Wash and North Norfolk Coast SAC, are screened out with regard to any potential effects of changes to prey resources *(**Table 7.3**)*.

7.1.5 Summary of Potential Impacts to be Considered

244. To summarise, the following species are considered within the HRA screening assessment:

- Harbour porpoise;

- Grey seal; and
- Harbours seal.

245. The following potential effects during construction, operation, maintenance and decommissioning are considered in the HRA screening process:

- Underwater noise, including UXO clearance, piling and other construction activities, vessels, operation and maintenance activities, operational turbines and decommissioning activities;
- Vessel interactions (increased collision risk);
- Changes to water quality;
- Changes to prey resources; and
- Any in-combination effects of (i) underwater noise; (ii) vessel interactions; (iii) any changes to water quality; and (iv) changes to prey resources.

7.2 Screening

7.2.1 Site Screening

246. There are three designated sites within the southern North Sea which have Annex II marine mammal species as qualifying features that have been screened in to the HRA *(**Table 7.3**)*

Table 7.3 List of cSACs SACs, SCIs and SPAs with their Respective Categories of Marine Mammal Interest Feature and Screening Decisions

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
BEMNZ0001	Belgium	Vlaamse Banken SAC	Harbour porpoise Harbour seal Grey Seal	59	72	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
BEMNZ0002	Belgium	SBZ 1 / ZPS 1 SPA	Harbour porpoise Grey seal Harbour seal	94	107	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
BEMNZ0003	Belgium	SBZ 2 / ZPS 2 SPA	Harbour porpoise Grey seal Harbour seal	84	100	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
BEMNZ0004	Belgium	SBZ 3 / ZPS 3 SPA	Harbour porpoise Grey Seal Harbour seal	92	108	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
BEMNZ0005	Belgium	Vlakte van de Raan SCI	Harbour porpoise Grey seal Harbour seal	89	107	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
DK00EY133	Denmark	Agger Tange, Nissum Bredning, Skibsted Fjord Og Agerø	Harbour seal	603	627	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00FX122	Denmark	Ålborg Bugt, Randers Fjord Og Mariager Fjord	Harbour seal	843	871	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00DX146	Denmark	Anholt Og Havet Nord For	Harbour seal Grey seal	904	959	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00EX026	Denmark	Dråby Vig	Harbour seal	642	681	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DK00VA259	Denmark	Gule Rev SCI	Harbour porpoise	659	658	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00FX257	Denmark	Havet Omkring Nordre Rønner	Harbour seal Grey seal	835	861	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK003X202	Denmark	Hesselø Med Omliggende Stenrev	Harbour seal Grey seal	976	1,000	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00FX113	Denmark	Hirsholmene, Havet Vest Herfor Og Ellinge Å's Udløb	Harbour seal Grey seal	813	853	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA302	Denmark	Knudegrund SAC	Harbour porpoise	765	764	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DK00EY124	Denmark	Løgstør Bredning, Vejlerne Og Bulbjerg	Harbour seal	679	697	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA301	Denmark	LØnstrup RØdgrund SAC	Harbour porpoise	738	737	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00EY134	Denmark	Lovns Bredning, Hjarbæk Fjord Og Skals, Simested Og Nørre Ådal, Samt Skravad Bæk	Harbour seal	676	708	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00FX123	Denmark	Nibe Bredning, Halkær Ådal Og Sønderup Ådal	Harbour seal	682	712	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA340	Denmark	Sandbanker ud for Thyboron SAC	Harbour porpoise	582	581	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA341	Denmark	Sandbanker ud for Thorsminde SAC	Harbour porpoise	582	581	Out	The distance between the potential impact range of the proposed project and the site is

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
							beyond that of potential for direct or indirect effects.
DK00FX112	Denmark	Skagens Gren og Skagerrak SAC	Harbour porpoise	770	769	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00FX010	Denmark	Strandenge På Læsø Og Havet Syd Herfor	Harbour seal Grey seal	843	871	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA258	Denmark	Store Rev SCI	Harbour porpoise	743	742	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA347	Denmark	Sydlige Nordsø SAC	Harbour porpoise Grey seal Harbour seal	457	456	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00VA348	Denmark	Thyboron Stenvolde SCI	Harbour porpoise	595	594	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DK00AY176	Denmark	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC	Harbour porpoise Grey seal Harbour seal	507	506	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DK00CY040	Denmark	Venø, Venø Sund	Harbour seal	626	662	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5300017	France	Abers - Côtes Des Legendes SAC	Grey seal	599	580	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR5300023	France	Archipel Des Glenan SAC	Grey seal	638	624	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR3102005	France	Baie de Canche et couloir des trois estuaires SAC	Harbour porpoise Grey seal Harbour seal	168	177	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR5300015	France	Baie De Morlaix SAC	Grey seal	552	534	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR2502020	France	Baie de Seine occidentale SAC	Harbour porpoise Harbour seal	350	341	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR2502021	France	Baie de Seine orientale SAC	Harbour porpoise Harbour seal	324	323	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR2500077	France	Baie Du Mont Saint-Michel	Harbour seal Grey seal	520	516	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR3102002	France	Bancs des Flandres SAC	Harbour porpoise Grey seal Harbour seal	82	93	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR5300020	France	Cap Sizun SAC	Grey seal	639	623	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR2500079	France	Chausey SAC	Grey seal	430	420	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR5302007	France	Chaussée de Sein	Grey seal	700	706	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5300009	France	Cote De Granit Rose-Sept-Iles SAC	Grey seal	512	494	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR3100474	France	Dunes De La Plaine Maritime Flamande SAC	Harbour seal	106	118	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR3100480	France	Estuaire De La Canche, Dunes Picardes Plaquees Sur L'ancienne Falaise, Foret D'hardelot Et Falaise D'equihen SAC	Harbour seal	155	164	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR2300121	France	Estuaire de la Seine SCI	Harbour porpoise Harbour seal	309	310	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR2200346	France	Estuaires et littoral picards (baies de Somme et d'Authie) SAC	Harbour porpoise Harbour seal	189	199	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR3100478	France	Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant SAC	Harbour porpoise Grey seal Harbour seal	131	141	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects. The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE. No potential connectivity.
FR2300139	France	Littoral Cauchois SAC	Harbour porpoise	228	236	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5300018	France	Ouessant-Molene SAC	Grey seal	630	611	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR2500088	France	Marais du Cotentin et du Bessin - Baie Des Veys	Harbour seal	378	386	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR7200811	France	Panache De La Gironde Et Plateau Rocheux De Cordouan (Système Pertuis Gironde) SAC	Grey seal	751	753	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5400469	France	Pertuis Charentais SAC	Grey seal	682	682	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5300019	France	Presqu'ile De Crozon SAC	Grey seal	630	612	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR2500085	France	Récifs et Marais Arrière-Littoraux du Cap Lévi À la Pointe de Saire	Grey seal Harbour seal	355	351	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
FR3102003	France	Recifs Gris-Nez Blanc-Nez SAC	Harbour porpoise Grey seal Harbour seal	123	131	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
FR3102004	France	Ridens et dunes hydrauliques du detroit du Pas-de-Calais SAC	Harbour porpoise Harbour seal Grey seal	132	137	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
FR5300010	France	Tregor Goëlo SAC	Grey seal	498	482	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
DE2104301	Germany	Borkum-Riffgrund SCI	Grey seal Harbour seal	320	320	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE1003301	Germany	Doggerbank SCI	Harbour seal	365	364	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DE1115391	Germany	Dünenlandschaft Süd-Sylt SAC	Grey seal	486	486	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2016301	Germany	Hamburgisches Wattenmeer SCI	Grey seal Harbour seal	444	444	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE1813391	Germany	Helgoland mit Helgolander Felssockel SAC	Harbour seal Grey seal	428	428	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2507301	Germany	Hund und Paapsand SCI	Harbour seal	339	339	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE1315391	Germany	Küsten- und Dünenlandschaften Amrums SAC	Grey seal	482	481	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DE2424302	Germany	Muhlenberger Loch/Nesssand SCI	Harbour seal	524	524	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2306301	Germany	Nationalpark Niedersachsisches Wattenmeer SAC	Grey seal Harbour seal	329	329	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE0916391	Germany	NTP S-H Wattenmeer und angrenzende Kustengebiete SAC	Grey seal Harbour seal	448	447	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2323392	Germany	Schleswig-Holsteinisches Elbastuar und angrenzende Flachen SAC	Harbour seal	470	470	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE1011401	Germany	SPA Ostliche Deutsche Bucht SPA	Harbour seal	434	434	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
DE1714391	Germany	Steingrund SAC	Harbour seal Grey seal	438	438	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE1209301	Germany	Sylter Außenriff SCI	Harbour seal Grey seal	400	400	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2018331	Germany	Unterelbe SCI	Harbour seal	470	469	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
DE2507331	Germany	Unterems und Aussenems SCI	Harbour seal	343	342	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
NL2008001	Netherlands	Doggersbank SAC	Harbour porpoise Grey seal Harbour seal	232	231	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
NL2008002	Netherlands	Klaverbank SAC	Harbour porpoise Grey seal Harbour seal	177	176	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.
NL9802001	Netherlands	Noordzeekustzone SAC	Harbour porpoise Grey seal Harbour seal	163	163	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.
NL3009016	Netherlands	Oosterschelde SAC	Harbour seal	104	121	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
NL2008003	Netherlands	Vlakte van de Raan SAC	Harbour porpoise Grey seal Harbour seal	82	99	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
NL4000017	Netherlands	Voordelta SAC and SPA	Grey seal Harbour seal	84	101	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
NL1000001	Netherlands	Waddenzee SAC	Grey seal Harbour seal	186	186	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
NL9802026	Netherlands	Westerschelde & Saeftinghe	Harbour seal	106	128	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
SE0510050	Sweden	Balgö	Harbour seal	903	948	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520171	Sweden	Gullmarsfjorden	Harbour seal	877	895	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
SE0520170	Sweden	Kosterfjorden-Väderöfjorden SAC	Harbour porpoise Harbour seal	889	888	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0510058	Sweden	Kungsbackafjorden	Harbour seal	877	921	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0510084	Sweden	Nidingen	Harbour seal	883	925	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520057	Sweden	Malmöfjord	Harbour seal	882	899	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520058	Sweden	Måseskär	Harbour seal	871	887	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520043	Sweden	Nordre Älvs Estuarium	Harbour seal	850	876	Out	The distance between the potential impact range of the proposed project and the site is

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
							beyond that of potential for direct or indirect effects.
SE0420360	Sweden	Nordvästra Skånes havsområde	Harbour seal Grey seal	975	999	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520176	Sweden	Pater Noster-Skärgården	Harbour seal	867	890	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520036	Sweden	Sälöfjorden	Harbour seal	858	871	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520188	Sweden	Soteskär	Harbour seal	885	908	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
SE0520001	Sweden	Vrångöskärgården	Harbour seal	862	878	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
UK0017072	UK	Berwickshire and North Northumberland Coast SAC	Grey seal	416	407	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result are negligible and would result in no potential for LSE.
UK0019806	UK	Dornoch Firth and Morrich More	Harbour seal	766	748	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
UK0017096	UK	Faray and Holm of Faray SAC	Grey seal	826	820	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
UK0030311	UK	Firth of Tay & Eden Estuary	Harbour seal	548	544	Out	The distance between the potential impact range of the proposed project and the site is beyond that of potential for direct or indirect effects.
UK0030170	UK	Humber Estuary SAC	Grey seal	178	164	In	Nearest SAC for grey seal to East Anglia TWO. Assumed that all grey seal in the East Anglia TWO area are associated with this SAC.
UK0030172	UK	Isle of May SAC	Grey seal	527	517	Out	The distance between the potential impact range of the proposed project and the extent

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
							of any impact on individuals from this site result in no potential for LSE.
UK9002361	UK	Mousa	Harbour seal	883	879	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.
UK0030069	UK	Sanday	Harbour seal	821	814	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.
UK0012687	UK	Yell Sound Coast	Harbour seal	938	924	Out	The distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site result in no potential for LSE.
	UK	Southern North Sea cSAC	Harbour porpoise	0.00	0.00	In	East Anglia TWO is within the cSAC. Assumed that all harbour porpoise in the East Anglia TWO area are associated with this cSAC.
UK0017075	UK	The Wash and North Norfolk Coast SAC	Harbour seal	99	90	In	Nearest SAC for harbour seal to East Anglia TWO.

Site code	Country	SAC/SPA name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
							Assumed that all harbour seal in the East Anglia TWO area are associated with this SAC.

** Distance measured from the closest point of East Anglia TWO to the closest point of the designated site rounded to the nearest kilometre.*

Please note that only sites listed as having a population of species of grade A, B or C within the Natura2000 Assessment From have been included within this screening table.

7.2.2 Marine Mammal Screening Summary

247. ***Table 7.4*** provides a summary of the sites screened in for further consideration in the HRA for both project alone and in-combination effects.

Table 7.4 Designated sites (where Marine Mammals are a Qualifying Feature) Screened into the HRA for Further Assessment

Site	Species/Feature	Reason for screening decision
Southern North Sea cSAC	Harbour porpoise	East Anglia TWO is within the cSAC. Assume that all harbour porpoise in the East Anglia TWO area are associated with this cSAC.
Humber Estuary SAC [UK0030170]	Grey seal	Nearest SAC for grey seal to East Anglia TWO. Assume, as worst-case scenario, that all grey seal in the East Anglia TWO area are associated with this SAC.
The Wash and North Norfolk Coast SAC [UK0017075]	Harbour seal	Nearest SAC for harbour seal to East Anglia TWO. Assume, as worst-case scenario, that all harbour seal in the East Anglia TWO area are associated with this SAC.

8 Offshore Ornithology

8.1 Approach to Screening

8.1.1 Site Selection Criteria (Receptor)

248. Direct or indirect impacts to seabirds may arise from permanent or temporary physical presence or activities relating to the construction, operation or decommissioning of the windfarm and associated infrastructure. Potential impacts include direct impacts from the presence of wind turbines and indirect impacts through effects on prey species.

249. For offshore ornithology, the approach to HRA screening primarily focuses on the potential for connectivity between seabirds from designated populations and the proposed East Anglia TWO project.

250. This HRA screening exercise therefore considers sites which meet the following criteria:

- A component of the proposed project directly overlaps a site whose interest features includes a species of bird (applies to SPAs and Ramsar sites);
- The distance between the proposed project and a site with a bird interest feature is within the range for which there could be an interaction i.e. the pathway is not too long (applies to SPAs and Ramsar sites). For seabirds in the breeding season this element of the screening process will be informed by published information on maximum foraging range (Thaxter *et al*., 2012);
- Assessment of species-specific risk which informs the extent to which populations of particular species may be vulnerable to collision mortality, displacement or barrier effects (Garthe & Hüppop 2004, Cook *et al*. 2012, Furness *et al*. 2013, Bradbury *et al*. 2014);
- The distance between the proposed project and resources on which the interest feature depends (i.e. an indirect effect acting through prey or access to habitat) is within the range for which there could be an interaction i.e. the pathway is not too long (applies to SPAs and Ramsar sites); and
- Evidence that a migratory route passes through the proposed project wind turbine array for bird species migrating to and / or from protected sites (applies to SPAs and Ramsar sites). This will be informed by published information on migration routes, principally Wright et al. (2012).

8.1.2 Potential Effects (Source)

251. The key factors that will be applied during the HRA screening process are:

- Potential effects (source); and

- Proximity of source to feature (distance between the proposed development and SPAs, migration routes) (pathway and receptor).

252. During construction of the proposed East Anglia TWO project, potential disturbance may occur due to the presence of vessels offshore and the installation of offshore infrastructure. Indirect impacts on prey species may also arise.

253. During operation, potential disturbance and displacement may occur due to the presence of vessels and offshore infrastructure. There is potential for collision risk or barrier effects due to the presence of turbines. Indirect impacts on prey species may also arise.

254. Decommissioning would require the removal of foundation structures and either the cutting or removal of subsea cables resulting in disturbance and displacement. Indirect impacts on prey species may also arise.

255. The potential effects on seabirds from the proposed East Anglia TWO project have been identified within the East Anglia TWO Scoping Report (SPR, 2017a) and Scoping Opinion (The Planning Inspectorate, 2017). These are provided in ***Table 8.1*****.** These are therefore the potential effects which could affect a receptor (site or feature) if there is a pathway.

Table 8.1 Summary of Potential Effects – Ornithology Ecology (scoped in (✓) and scoped out (x))

Potential Effects	Construction	Operation	Decommissioning
Direct disturbance and displacement due to work activity and vessel movements	✓	✓	✓
Direct disturbance and displacement due to the presence of turbines, other infrastructure and work vessels.	✓	✓	✓
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 within the windfarm site.	✓	✓	✓
Indirect impacts through effects on habitats and prey species within the offshore cable corridor.	✓	✓	✓

Potential Effects	Construction	Operation	Decommissioning
Disturbance due to lighting[10]	✓	x	x
Cumulative (in-combination) disturbance and displacement due to the presence of turbines, other infrastructure and work vessels.	✓	✓	✓
Cumulative (in-combination) collision risk due to the presence of turbines.	x	✓	x
Cumulative (in-combination) barrier effects due to the presence of turbines.	x	✓	x
Transboundary impacts[11]	x	x	x

8.1.3 Identification of sites and features (Pathway)

256. Based on data collected from site specific surveys for the proposed East Anglia TWO project and a review of existing data sources, the bird species likely to occur in the East Anglia TWO windfarm site can be grouped into a series of categories. 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.

257. From an initial consideration of all SPAs in the UK and in neighbouring Member States, those SPAs for which there is either no connectivity with the East Anglia TWO windfarm site, or it has been assessed as negligible, have been screened out. This applies to most SPAs that are distant from the proposed project.

[10] Lighting impacts were agreed to be screened out of the assessment during Evidence Plan discussions (6th March 2018) and further information provided to NE and RSPB and are not considered further for HRA.

[11] Scoping out of transboundary impacts has been provisionally agreed through Evidence Plan discussions (6th of March, 2018) on the understanding that SNH agree that Scottish designated sites are considered as part of the UK baseline and the term transboundary relates to non-UK designated sites. SNH have been contacted for comment.

However, some bird species are highly mobile and may interact with the proposed East Anglia TWO project because they range over considerable distances. This mainly applies to seabirds, but can also include terrestrial species which may pass through the site on migration.

258. Bird species that are SPA features, such as shorebirds, may migrate from mainland Europe to eastern England (for example from SPAs in Netherlands to the Wash or Thames estuaries) so these birds need to be considered. Migrating shorebirds and other coastal birds tend to initiate migration under favourable weather conditions which allow them to fly at altitudes above collision risk heights. Consequently, these species have rarely been recorded in collision studies at coastal and offshore wind farms (Hüppop *et al.* 2006). Indeed, Hüppop *et al*. (2006) reported that only six out of 442 collision carcasses in their study were non-passerine birds. Assessments of collision risk for migrating shorebirds at offshore wind farms in UK waters has also indicated that the risk is low and for most species does not represent a hazard that would require HRA assessment (Wright *et al.* 2012; WWT 2013).

259. The Netherlands Ministry of Infrastructure and the Environment stated in a letter of 7 July 2014 that they had a concern that the proposed projects in the former East Anglia Zone could have an effect on the seabirds of Bruine Bank pSPA. The non-breeding seabirds that are the interest feature of the Bruine Bank (Brown Ridge) pSPA are primarily auks. An assessment of potential impacts on auks was conducted as part of the East Anglia THREE EIA (SPR, 2015) in relation to construction and operational disturbance and displacement. In all cases, impacts were found to be minor or negligible, based on Biologically Defined Minimum Population Scale (BDMPS) populations in UK North Sea waters (Furness, 2015). Assessment of impacts over the whole North Sea (i.e. including non-UK waters) would greatly increase the estimated seabird population sizes and only slightly increase cumulative impacts (as most offshore wind farms are in UK waters). Accordingly, a likely significant effect on the Bruine Bank (Brown Ridge) pSPA can be screened out.

260. The Netherlands Ministry of Infrastructure and Water Management (Rijkswaterstaat) also stated in their letter of 7 July 2014 that ‘onshore bird colonies in the Netherlands are all situated more than 100km from the Dutch-UK border, so no effects are to be expected there’. We agree with that interpretation (with one exception discussed below), particularly since seabirds that breed in the Netherlands are predominantly species with coastal and relatively short foraging ranges, such as terns, cormorants and gulls, and there is no evidence that breeding birds from those populations cross into the UK while they are breeding.

261. However, lesser black-backed gulls breed in large numbers in The Netherlands. Between 32,000 and 57,000 pairs were estimated to breed in The Netherlands in 1992-97 (Mitchell et al. 2004) and the numbers subsequently increased to a peak of over 90,000 pairs in 2005 (Camphuysen, 2013). With a mean maximum foraging range of 141km from breeding colonies (Thaxter *et al.* 2012a), there is theoretical potential for connectivity between some colonies in The Netherlands and the offshore development area. However, extensive colour ringing and tracking of breeding lesser black-backed gulls from multiple colonies in The Netherlands has found no evidence for connectivity during the breeding season between birds breeding in those colonies and the UK, and also that there is remarkably little migration of birds from the colonies in The Netherlands through UK waters outside the breeding season (Camphuysen, 2013). Not only do breeding adult lesser black-backed gulls from colonies in The Netherlands normally remain on the continental side of the North Sea while breeding, but 95% of their foraging trips are less than 135km from those colonies (Camphuysen 1995, 2013), so would be very unlikely to reach the offshore development area. These studies therefore rule out any transboundary impacts of the proposed East Anglia TWO project on any of these breeding lesser black-backed gull populations. It should be noted that the Rijkswaterstaat agreed with the conclusions of the East Anglia THREE HRA screening as stated in the Statement of Common Ground (SPR, 2016a).

262. Similarly, impacts on seabird breeding populations in Germany, Belgium and France can be screened out due to the distance of colonies in those countries from the proposed East Anglia TWO project, which, with two exceptions discussed below, are more than twice the maximum foraging range of the relevant species (Thaxter *et al.* 2012a).

263. There are two gannet breeding colonies for which the East Anglia TWO windfarm site lies within the species' reported maximum foraging range (590km, Thaxter *et al.* 2012a); Seevogelschutzgebiet Helgoland SPA (Germany) and Littoral Seino-Marin SPA (France). However, neither of these is within the species' mean maximum range (229km) and tracking studies of breeding adults at each of these colonies have shown that birds from those colonies forage relatively close to their breeding colonies and are therefore very unlikely to travel as far as the East Anglia TWO windfarm site (Stefan Garthe, *pers. comm.*, Wakefield *et al.* 2013).

264. Following the above considerations, no trans-boundary issues have been screened in for further assessment.

265. Many protected sites in the UK can also be screened out as having negligible or no connectivity with the East Anglia TWO windfarm site due to their distance from the windfarm site. Due to the proximity of the East Anglia TWO windfarm site to the consented East Anglia ONE and East Anglia THREE sites it has been

assumed that SPAs screened from those assessments can be screened out for proposed East Anglia TWO project (DECC, 2013, BEIS, 2017). Screening of sites undertaken for East Anglia TWO windfarm site has concluded that four sites have been screened in for further detailed assessment: Alde-Ore Estuary SPA, Flamborough & Filey pSPA, Greater Wash SPA and Outer Thames Estuary pSPA.

266. The Alde-Ore Estuary SPA is a minimum of 37km from the East Anglia TWO windfarm site. Thaxter *et al*. (2012a) report that lesser black-backed gull have a maximum foraging range of 181km, a mean maximum of 141km and a mean of 71.9km. Therefore, since the East Anglia TWO windfarm site is within the mean range of this species some breeding birds from the Alde-Ore Estuary SPA may forage there. Further consideration will also be given to specific evidence regarding the foraging of lesser black-backed gulls from the Alde-Ore Estuary SPA, especially in relation to tracking work (Thaxter *et al.* 2012b, 2015), and the extent to which connectivity with the East Anglia TWO windfarm site may occur.

267. Thaxter *et al.* (2012a) report that herring gull have a maximum foraging range of 92km, a mean maximum of 61.1km and a mean of 10.5km. Therefore, since the East Anglia TWO windfarm site is within the mean maximum range of this species some breeding birds from the Alde-Ore Estuary SPA may forage there.

268. The Flamborough and Filey Coast pSPA is a minimum of 248km from the East Anglia TWO windfarm site. Thaxter *et al.* (2012a) report that gannet have a maximum foraging range of 590km and a mean maximum of 229km, puffins have a maximum range of as 200km and a mean maximum of 105km, guillemots have a maximum of 135km and a mean maximum of 84km, kittiwakes have a maximum of 120km and a mean maximum of 60km, and razorbills have a maximum of 95km and a mean maximum of 48km.

269. While RSPB tracking studies of gannets breeding at Flamborough and Filey Coast pSPA suggest low connectivity with the East Anglia TWO windfarm site (RSPB 2012), the proposed development is within the maximum foraging range (590km) of this species. In addition, some individuals from that colony are likely to pass through the East Anglia TWO windfarm site during migrations. Consequently, connectivity and the potential for an LSE cannot be ruled out.

270. While the East Anglia TWO windfarm site is beyond the maximum reported foraging range for kittiwake breeding at Flamborough and Filey Coast pSPA (120km), this population has been found to undertake longer trips than previously thought, with trips extending far out into the Dogger Bank area to forage while breeding (Carroll et al. (2017). In addition, some individuals from that colony are likely to pass through the East Anglia TWO windfarm site during migrations. Consequently, connectivity and the potential for an LSE cannot be ruled out.

271. The East Anglia TWO windfarm site is beyond the maximum foraging ranges of puffin (200km), guillemot (135km) and razorbill (95km; Thaxter *et al.* 2012a) which breed at Flamborough and Filey Coast pSPA. However, as this is the nearest notable breeding colony for these species it is possible that some individuals from these populations pass through the East Anglia TWO windfarm site or overwinter in the region of this project. Consequently, there may be some connectivity and the potential for an LSE, although small, cannot be ruled out.

272. Assessed impacts on these populations need to also consider the conservation status of the designated populations e.g. increases in gannet numbers (Trinder 2012, WWT 2012, Murray *et al.* 2015) but declines in kittiwake and many other seabird breeding numbers. In addition, there is a need to consider other factors driving population change, such as breeding success (Coulson 2017), the influences on this of changes in fish stocks and fisheries (ICES 2013, Carroll *et al.* 2017), and winter distributions of birds (Frederiksen *et al.* 2012).

273. The Greater Wash SPA is approximately 26km from the East Anglia TWO windfarm site at its closest point (note that this is from the marine extent; the East Anglia TWO windfarm site is approximately 44km from the closest point on shore). Although this is less than the mean maximum foraging range of Sandwich tern, the breeding colonies themselves (already designated as North Norfolk Coast SPA) are beyond foraging range of the East Anglia TWO windfarm site. This means that there will be little or no breeding season connectivity. Proportions of these populations migrating through the East Anglia TWO windfarm site are likely to be small as these species are thought to remain close to shore during much of their migration through UK waters. Migrations of non-breeding seabirds (red-throated divers, little gulls and common scoters; Lawson *et al*. 2016) from this pSPA are likely to result in small numbers passing through the site during migration. Given the proximity of the site to this pSPA, further, more detailed assessment of the potential for an LSE is therefore appropriate.

274. The Outer Thames Estuary SPA is less than 10km from the East Anglia TWO windfarm site at its closest (marine) extents. Although this SPA includes breeding common tern and little tern, on the basis of foraging ranges for these species from their breeding colonies (located at specific sites within the SPA) the potential for connectivity with these species is negligible. The marine component of the SPA is predominantly informed by the distribution of over-wintering red-throated divers. This species is known to be particularly sensitive to disturbance. Therefore, both construction and operation (and potentially decommissioning) of the offshore elements of the proposed development and installation of the offshore export cable corridor (which will traverse the SPA) have the potential to result in LSE and further, more detailed assessment is appropriate.

8.2 Screening

8.2.1 Site Screening

275. There are 86 designated sites within the southern North Sea which have Annex II seabird within 950km of the East Anglia TWO windfarm site which have been considered for the HRA screening (*Table 8.2*). Due to the reasons outlined in section 8.1.3, of these, the following SPAs have been identified for further consideration within the HRA:

- Outer Thames Estuary SPA and pSPA extension;
- Greater Wash SPA;
- Alde-Ore Estuary SPA and Ramsar; and
- Flamborough and Filey Coast pSPA.

276. The remaining sites are not considered to be within a range or have a pathway that has the potential to result in LSE and are therefore proposed to be ruled out of further consideration within the HRA.

277. Results of the HRA screening and justification for scoping out sites is presenting in ***Table 8.2*** below.

Table 8.2 List of SPA and Ramsar Sites with their Respective Categories of Bird Interest Feature and Screening Decisions

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
BEMNZ0004	Belgium	SBZ 3 / ZPS 3 (off Molenhoek)	Non-breeding seabirds	92	108	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
BEMNZ0003	Belgium	SBZ 2 / ZPS 2 (off Ostend)	Non-breeding seabirds	84	100	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
BEMNZ0002	Belgium	SBZ 1 / ZPS 1 (off Nieuwpoort)	Non-breeding seabirds	94	107	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
FR2310045	France	Littoral Seino-Marin SPA	Breeding seabirds	229	233	Out	East Anglia TWO is within the theoretical maximum foraging range of breeding gannets from this SPA, but tracking data show that breeding gannets from the SPA do not reach East Anglia TWO. The SPA is far beyond maximum foraging range of other designated seabird

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are likely to be extremely small relative to BDMPS.
FR2502020	France	Baie de Seine Occidentale SPA	Breeding, wintering and passage waterbirds	350	341	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
FR2510099	France	Falaise du Bessin Occidental SPA	Breeding seabirds	365	357	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
DE2104301	Germany	Borkum-Riffgrund SPA	Non-breeding seabirds	320	320	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
DE1209301	Germany	Sylter Außenriff SPA	Non-breeding seabirds	400	400	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
DE1813491	Germany	Seevogelschutzgebiet Helgoland SPA	Breeding seabirds	428	428	Out	Tracking data from gannets breeding on Helgoland show these birds do not travel in the direction of or as far as East Anglia TWO despite this site being within theoretical maximum foraging range of gannet. The site is beyond the maximum foraging range of other seabird species at Helgoland. Proportions of these populations migrating through East Anglia TWO are likely to be very small relative to BDMPS regional populations.
DE1011401	Germany	Östliche Deutsche Bucht SPA	Non-breeding seabirds	434	434	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
DE0916491	Germany	Ramsar-Gebiet S-H Wattenmeer und	Breeding, wintering	448	447	Out	Survey data show little or no evidence of SPA features occurring in East Anglia

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)		Screening decision	Reason for screening decision
				EA2	Cable corridor		
		angrenzende Küstengebiete SPA	and passage waterbirds				TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
N/A	Netherlands	Bruine Bank (Brown Ridge) pSPA	Non-breeding seabirds	c. 20 (estimate as no detailed maps available)**		Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
N/A	Netherlands	Frisian Front pSPA	Non-breeding seabirds	c. 100**		Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through East Anglia TWO during migration relative to the size of BDMPS regional populations.
NL4000017	Netherlands	Voordelta SPA	Wintering and passage waterbirds	84	101	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
NL9801001	Netherlands	Waddenzee (Wadden Sea) SPA	Wintering and passage waterbirds	186	186	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9020309	UK	Outer Thames Estuary SPA and pSPA extension	Wintering marine birds and breeding terns	0	0	In	SPA is beyond maximum foraging range of designated breeding seabird species (terns) and tern foraging tends to be coastal so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are likely to be small as these species are thought to remain close to shore during much of their migration through UK waters. Given the proximity of the site to this pSPA further more detailed assessment is appropriate. Disturbance to red-throated diver is possible, especially during export cable installation.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9009101	UK	Minsmere - Walberswick SPA and Ramsar	Breeding, wintering and passage waterbirds	34	2	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009253	UK	Broadland SPA and Ramsar	Wintering and passage waterbirds	34	21	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
N/A	UK	Greater Wash SPA	Non-breeding seabirds and breeding terns	c. 35 **		IN	SPA is beyond maximum foraging range of designated seabird species (terns) and tern foraging tends to be coastal so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are likely to be small as these species are thought to remain close to shore during much of their migration through UK waters. Migrations of non-breeding seabirds from this pSPA are likely to result in small numbers passing through

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							the site during migration, but given the proximity of the site to this pSPA further more detailed assessment of that is appropriate.
UK9009112	UK	Alde-Ore Estuary SPA and Ramsar	Breeding seabirds and breeding, wintering and passage waterbirds	37	4	IN	Lesser black-backed gull and herring gull populations may have connectivity with East Anglia TWO. This SPA holds the closest large colony of these species to East Anglia TWO, and some birds from that SPA may pass through East Anglia TWO during migration.
UK9009271	UK	Great Yarmouth and North Denes SPA	Breeding seabirds	43	34	Out	SPA is beyond maximum foraging range of designated seabird species (little tern) and little tern foraging tends to be coastal so has no breeding season connectivity. Proportions of this populations migrating through East Anglia TWO are likely to be small as the species is thought to remain close to shore during much of its migration through UK waters.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9009181	UK	Breydon Water SPA and Ramsar	Wintering and passage waterbirds	44	33	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009261	UK	Deben Estuary SPA and Ramsar	Wintering and passage waterbirds	50	20	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009031	UK	North Norfolk Coast SPA and Ramsar	Wintering and passage waterbirds	99	87	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009121	UK	Stour & Orwell Estuaries SPA and Ramsar	Wintering and passage waterbirds	57	31	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							numbers passing through the site during migration.
UK9008021	UK	The Wash SPA and Ramsar	Wintering and passage waterbirds	128	106	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009131	UK	saxa Water SPA and Ramsar	Wintering and passage waterbirds	61	38	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9008022	UK	Gibraltar Point SPA and Ramsar	Wintering and passage waterbirds	149	131	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009243	UK	Colne Estuary SPA and Ramsar	Wintering and	77	55	Out	Survey data show little or no evidence of SPA features occurring in East Anglia

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
			passage waterbirds				TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK0030170	UK	Humber Estuary SPA and Ramsar	Wintering and passage waterbirds	178	164	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009141	UK	Abberton Reservoir SPA and Ramsar	Wintering and passage waterbirds	88	62	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009245	UK	Blackwater Estuary SPA and Ramsar	Wintering and passage waterbirds	88	64	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9009242	UK	Dengie SPA and Ramsar	Wintering and passage waterbirds	87	66	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009246	UK	Foulness SPA and Ramsar	Wintering and passage waterbirds	85	69	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009244	UK	Crouch & Roach Estuaries SPA and Ramsar	Wintering and passage waterbirds	96	78	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9012071	UK	Thanet Coast and Sandwich Bay SPA and Ramsar	Wintering and passage waterbirds	87	88	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							numbers passing through the site during migration.
UK9009171	UK	Benfleet & Southend Marshes SPA and Ramsar	Wintering and passage waterbirds	110	93	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9012011	UK	The Swale SPA	Wintering and passage waterbirds	109	98	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9012021	UK	Thames Estuary and Marshes SPA and Ramsar	Wintering and passage waterbirds	116	99	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9012031	UK	Medway Estuary & Marshes SPA and Ramsar	Wintering and passage waterbirds	118	101	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9006171	UK	Hornsea Mere SPA	Wintering and passage waterbirds	235	223	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9006101	UK	Flamborough and Filey Coast pSPA	Breeding seabirds	248	239	IN	Potential connectivity due to uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations migrating through East Anglia TWO. Max foraging distances suggest only gannet has potential for connectivity during the breeding season but tracking data indicate no connectivity of breeding gannets.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9006061	UK	Teesmouth and Cleveland Coast SPA and Ramsar	Wintering and passage waterbirds	332	321	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9006131	UK	Northumbria Coast SPA and Ramsar	Wintering and passage waterbirds	350	339	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9011011	UK	Chichester & Langstone Harbours SPA	Migratory waterbirds	245	225	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9011051	UK	Portsmouth Harbour SPA	Migratory waterbirds	261	239	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							numbers passing through the site during migration.
UK9011061	UK	Solent & Southampton Water SPA	Migratory waterbirds	267	244	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9006031	UK	Coquet Island SPA	Breeding seabirds	414	404	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9006021	UK	Farne Islands SPA	Breeding seabirds	442	433	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9006011	UK	Lindisfarne SPA and Ramsar	Wintering and	446	437	Out	Survey data show little or no evidence of SPA features occurring in East Anglia

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
			passage waterbirds				TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9010091	UK	Chesil Beach & The Fleet SPA	Migratory waterbirds	360	336	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK0030281	UK	St Abbs Head to Fast Castle SPA	Breeding seabirds	487	478	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9004411	UK	Firth of Forth SPA	Wintering and passage waterbirds	511	501	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9010081	UK	Exe Estuary SPA	Migratory waterbirds	416	390	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004171	UK	Forth Islands SPA	Breeding seabirds	519	509	Out	Tracking data show breeding gannets from Bass Rock do not commute to East Anglia TWO although the site is just within maximum foraging range. Except for gannet, SPA is far beyond maximum foraging range of other designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9004451	UK	Imperial Dock Lock, Leith SPA	Breeding seabirds	535	524	Out	SPA is far beyond maximum foraging range of designated seabird species (common tern) so has no breeding season connectivity. Proportions of these populations migrating through East

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							Anglia TWO are small relative to BDMPS.
UK9004121	UK	Firth of Tay & Eden Estuary SPA	Wintering and passage waterbirds	551	542	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004031	UK	Montrose Basin SPA	Wintering and passage waterbirds	572	563	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002271	UK	Fowlsheugh SPA	Breeding seabirds	580	572	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9002491	UK	Buchan Ness to Collieston Coast SPA	Breeding seabirds	615	608	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002221	UK	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Wintering and passage waterbirds	615	608	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002211	UK	Loch of Strathbeg SPA	Wintering and passage waterbirds	642	635	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002471	UK	Troup, Pennan and Lion`s Heads SPA	Breeding seabirds	657	650	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							migrating through East Anglia TWO are small relative to BDMPS.
UK9001625	UK	Moray and Nairn Coast SPA	Wintering and passage waterbirds	679	671	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001624	UK	Inner Moray Firth SPA	Wintering and passage waterbirds	703	694	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001623	UK	Cromarty Firth SPA	Wintering and passage waterbirds	716	707	Out	Survey data show little or no evidence of SPA features occurring in East Anglia TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001622	UK	Dornoch Firth and Loch Fleet SPA	Wintering and	722	714	Out	Survey data show little or no evidence of SPA features occurring in East Anglia

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
			passage waterbirds				TWO and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001182	UK	East Caithness Cliffs SPA	Breeding seabirds	741	733	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9001181	UK	North Caithness Cliffs SPA	Breeding seabirds	769	762	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9001131	UK	Pentland Firth Islands SPA	Breeding seabirds	777	770	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9002151	UK	Copinsay SPA	Breeding seabirds	789	782	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002141	UK	Hoy SPA	Breeding seabirds	793	786	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002431	UK	Calf of Eday SPA	Breeding seabirds	825	818	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002091	UK	Fair Isle SPA	Breeding seabirds	830	825	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							migrating through East Anglia TWO are small relative to BDMPS.
UK9002371	UK	Rousay SPA	Breeding seabirds	826	819	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002121	UK	Marwick Head SPA	Breeding seabirds	829	822	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002101	UK	West Westray SPA	Breeding seabirds	837	830	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9002111	UK	Papa Westray (North Hill and Holm) SPA	Breeding seabirds	842	836	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002511	UK	Sumburgh Head SPA	Breeding seabirds	862	857	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002361	UK	Mousa SPA	Breeding seabirds	878	873	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002081	UK	Noss SPA	Breeding seabirds	889	884	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
							migrating through East Anglia TWO are small relative to BDMPS.
UK9002061	UK	Foula SPA	Breeding seabirds	902	897	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002051	UK	Papa Stour SPA	Breeding seabirds	922	917	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002031	UK	Fetlar SPA	Breeding seabirds	932	928	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.

Site code	Country	SPA/ Ramsar site name	Category of interest feature	Distance* (km)			
				EA2	Cable corridor	Screening decision	Reason for screening decision
UK9002041	UK	Ronas Hill - North Roe and Tingon SPA	Breeding seabirds	938	933	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.
UK9002011	UK	Hermaness, Saxa Vord and Valla Field SPA	Breeding seabirds	954	949	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through East Anglia TWO are small relative to BDMPS.

* Distance measured from the closest point of East Anglia TWO to the closest point of the designated site rounded to the nearest kilometre.
** Estimated distance due to insufficient information.

8.2.2 Ornithology Screening Summary

278. Of the 86 designated sites within 953km of the East Anglia TWO windfarm site, it is proposed that the four sites within ***Table 8.3*** will be considered further as part of the HRA.

Table 8.3 Summary of HRA Screening Assessment for Ornithology

Site	Species/Feature	Reason for screening decision
Outer Thames Estuary SPA and pSPA Extension	Wintering marine birds and breeding terns.	East Anglia TWO offshore cable corridor is within the SPA and pSPA extension.
Greater Wash SPA	Non-breeding seabirds	Proximity to the East Anglia TWO windfarm site may result in small numbers of migratory non-breeding sea birds passing through the East Anglia TWO windfarm site. Whilst breeding terns are a feature of the SPA, East Anglia TWO is beyond the maximum foraging range for breeding terns.
Alde-Ore Estuary SPA and Ramsar	Breeding seabirds and breeding, wintering and passage waterbirds	Lesser black-backed gull and herring gull populations may have connectivity with East Anglia TWO. This SPA holds the closest large colony of these species to East Anglia TWO, and some birds from that SPA may pass through East Anglia TWO during migration.
Flamborough and Filey Coast pSPA	Breeding seabirds	Potential connectivity due to uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations migrating through East Anglia TWO. Max foraging distances suggest only gannet has potential for connectivity during the breeding season but tracking data indicate no connectivity of breeding gannets.

9 Summary

279. The results of the HRA screening exercise proposes screening out of all designated sites for terrestrial ecology receptors based on the proximity of sites being too far from the onshore indicative development area to have the potential to result in LSE.

280. Similarly, the results of the HRA screening exercise proposes screening out of all designated sites for benthic ecology and fish receptors based on the proximity of sites being too far from East Anglia TWO windfarm site to have the potential to result in LSE

281. Sites proposed to be screened into the draft HRA report are presented in ***Table 9.1*** below.

Table 9.1 Summary of Designated sites and Interest Features Screened in

Site	Features	Rationale
Onshore Sites		
Sandlings SPA	Breeding populations of nightjar and woodlark Woodland and heath	There is potential for both direct and indirect effects upon both the features of the sites and the supporting habitats
Offshore Sites		
Southern North Sea cSAC	Harbour porpoise	Offshore development area is within the cSAC. Assume that all harbour porpoise in this area are associated with this cSAC.
Humber Estuary SAC	Grey seal	Nearest SAC for grey seal to offshore development area. Assume, as worst-case scenario, that all grey seal in this area are associated with this SAC.
The Wash and North Norfolk Coast SAC	Harbour seal (and grey seal)	Nearest SAC for harbour seal to offshore development area. Assume, as worst-case scenario, that all harbour seal in this area are associated with this SAC. Although not qualifying feature, potential for disturbance of grey seal at haul-out sites, depending on vessel route.
Outer Thames Estuary SPA and pSPA Extension	Wintering marine birds and breeding terns.	East Anglia TWO offshore cable corridor is within the SPA and pSPA extension. The East Anglia TWO windfarm site is not within the SPA or pSPA.

Site	Features	Rationale
Greater Wash SPA	Non-breeding seabirds	Proximity to the East Anglia TWO windfarm site may result in small numbers of migratory non-breeding sea birds passing through the East Anglia TWO windfarm site. Whilst breeding terns are a feature of the SPA, East Anglia TWO is beyond the maximum foraging range for breeding terns.
Alde-Ore Estuary SPA and Ramsar	Breeding seabirds and breeding, wintering and passage waterbirds	Lesser black-backed gull and herring gull populations may have connectivity with East Anglia TWO. This SPA holds the closest large colony of these species to East Anglia TWO, and some birds from that SPA may pass through East Anglia TWO during migration.
Flamborough and Filey Coast pSPA	Breeding seabirds	Uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations most likely migrate through East Anglia TWO windfarm site. Only gannet has potential for connectivity during the breeding season based on maximum foraging range but tracking data indicate no connectivity of breeding gannets. Potential connectivity due to uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations migrating through East Anglia TWO. Maximum foraging distances suggest only gannet has potential for connectivity during the breeding season but tracking data indicate no connectivity of breeding gannets.

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Annex 1 Supporting Figures

N

Legend

- EA1N/EA2 Export Cable Corridor Area of Search
- Onshore Study Area

Indicative Onshore Development Area

- Landfall Refined Area of Search
- Onshore Cable Corridor Refined Area of Search
- Substation Refined Area of Search
- Indicative National Grid Overhead Line Realignment Area
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserves (LNR)
- Woodland
- Ancient Woodland
- Historic Environmental Record

SCOTTISHPOWER RENEWABLES

Rev	Date	By	Comment		
				Prepared:	AB
1	04/10/2019	AB	First Issue.	Checked:	RJ
				Approved:	AH

1:30,000 Scale @ A3

0 0.5 1 Km

East Anglia TWO

Onshore Development Area

Drg No	EA2-DEV-DRG-IBR-001016
Rev	1
Date	04/10/19
Figure	1.1

Coordinate System: BNG Datum: OSGB36

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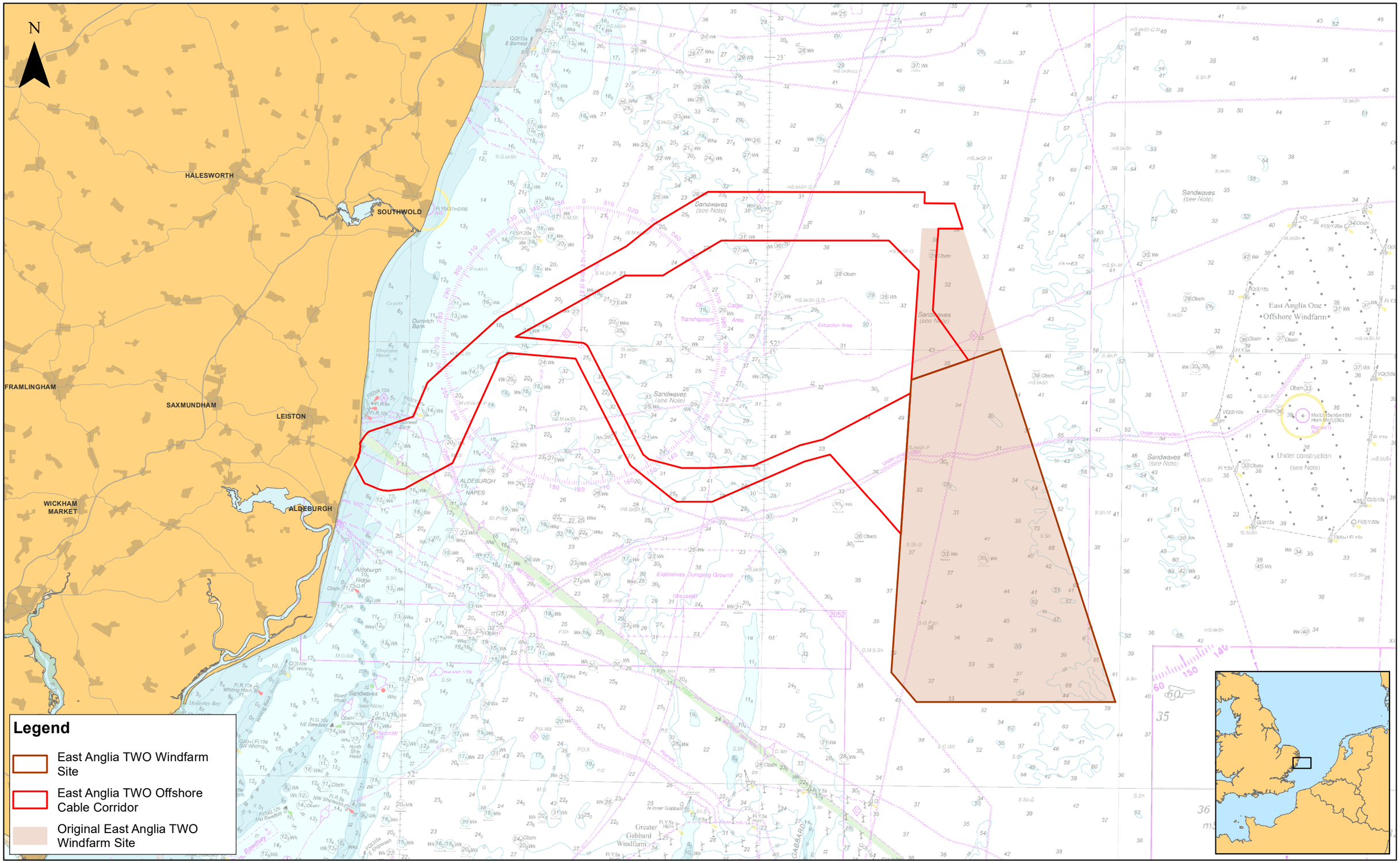

SCOTTISHPOWER RENEWABLES

Rev	Date	By	Comment
1	04/09/2019	FC	First Issue.

Prepared: FC
Checked: PM
Approved: PP

1:225,000 Scale @ A3

0 2.5 5 10 Km

East Anglia TWO

Offshore Development Area

Drg No	EA2-DEV-DRG-IBR-001017
Rev	1
Date	04/09/19
Figure	1.2

Datum: WGS 1984
Projection: Zone 31N

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N

Legend

- Onshore Study Area
- East Anglia ONE North Onshore Development Area

Special Area of Conservation (SAC)

- Alde-Ore & Butley Estuaries (SAC)
- Minsmere to Walberswick Heaths & Marshes (SAC)
- Orfordness-Shingle Street (SAC)
- Staverton Park & The Thicks, Wantisden (SAC)

SCOTTISHPOWER RENEWABLES

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1	10/09/2019	FC	First Issue.

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Approved: AH

1:100,000
Scale @ A3

0 2.5 5 Km

East Anglia ONE North

Sites Designated for Terrestrial Ecology considered in the Screening Exercise

Drg No	EA1N-DEV-DRG-IBR-001037
Rev	1
Date	10/09/19
Figure	3.1

Coordinate System: BNG Datum: OSGB36

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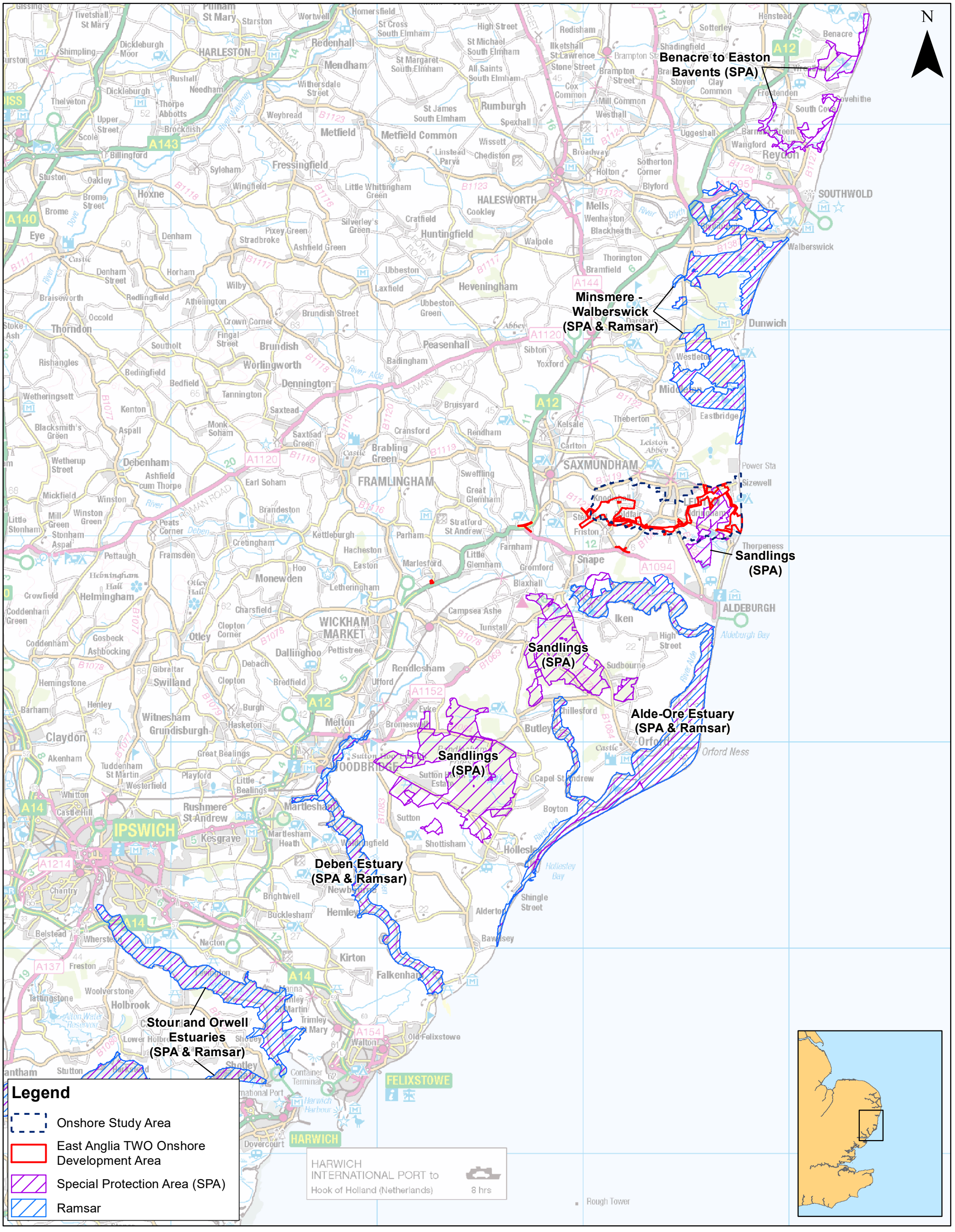

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East Anglia TWO

Sites Designated for Onshore Ornithology considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
1	05/09/19	FC	First Issue.	Checked:	RJ
				Approved:	AH

Scale @ A3: 1:175,000 (0 2.5 5 10 Km)

Figure	Date	Dwg No.	
4.1	05/09/19	EA2-DEV-DRG-IBR-001019	Coordinate System: BNG Datum: OSGB36

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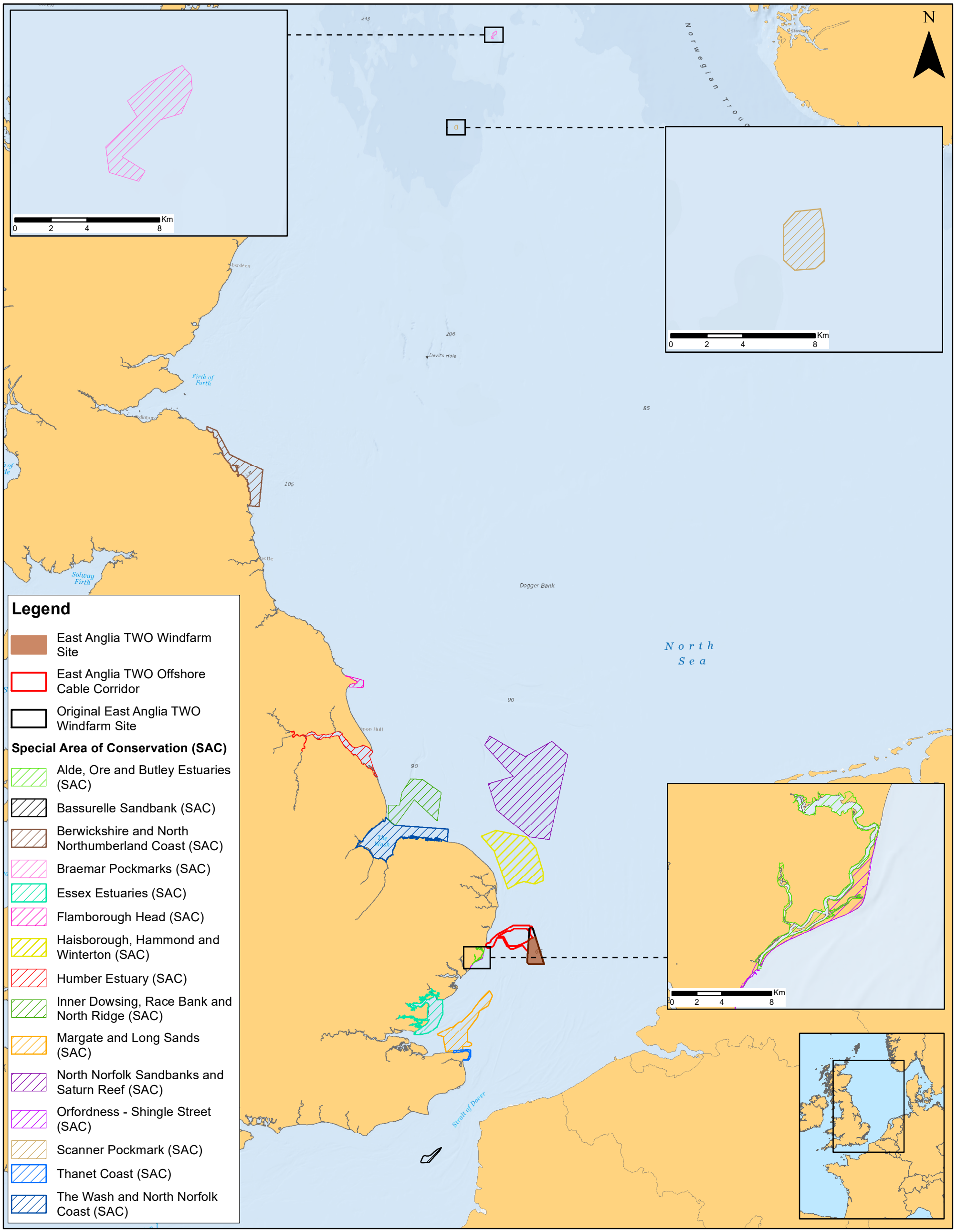

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East Anglia TWO

Sites Designated for Offshore Habitats considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
1	05/09/19	FC	First Issue.	Checked:	PM
				Approved:	PP

Scale @ A3: 1:3,000,000

Figure	Date	Dwg No.	
5.1	05/09/19	EA2-DEV-DRG-IBR-001020	Datum: WGS 1984 Projection: Zone 31N

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N

River Derwent (SAC)

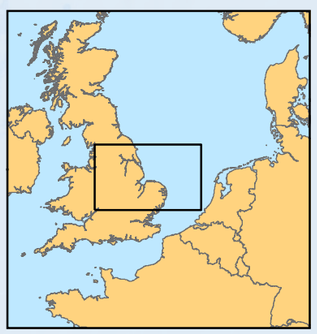
Humber Estuary (SAC)

Legend

- East Anglia TWO Windfarm Site
- East Anglia TWO Offshore Cable Corridor
- Original East Anglia TWO Windfarm Site

Special Area of Conservation (SAC)

- Humber Estuary (SAC)
- River Derwent (SAC)



SCOTTISHPOWER RENEWABLES

Rev	Date	By	Comment
1	05/09/2019	FC	First Issue.

Prepared: FC
Checked: PM
Approved: PP

1:1,100,000
Scale @ A3

0 12.5 25 50 Km

East Anglia TWO

Sites Designated for Migratory Fish considered in the Screening Exercise

Drg No	EA2-DEV-DRG-IBR-001021
Rev	1
Date	05/09/19
Figure	6.1a

Datum: WGS 1984
Projection: Zone 31N

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N

Severn Estuary (SAC)

River Avon (SAC)

Plymouth Sound & Estuaries (SAC)

Legend

- East Anglia TWO Windfarm Site
- East Anglia TWO Offshore Cable Corridor
- Original East Anglia TWO Windfarm Site

Special Area of Conservation (SAC)

- Plymouth Sound & Estuaries (SAC)
- River Avon (SAC)
- Severn Estuary (SAC)

SCOTTISHPOWER RENEWABLES

Rev	Date	By	Comment
1	05/09/2019	FC	First Issue.

Prepared: FC
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Approved: PP

1:1,500,000
Scale @ A3

0 12.5 25 50 Km

East Anglia TWO

Sites Designated for Migrator Fish considered in the Screening Exercise

Drg No	EA2-DEV-DRG-IBR-001021
Rev	1
Date	05/09/19
Figure	6.1b

Datum: WGS 1984
Projection: Zone 31N

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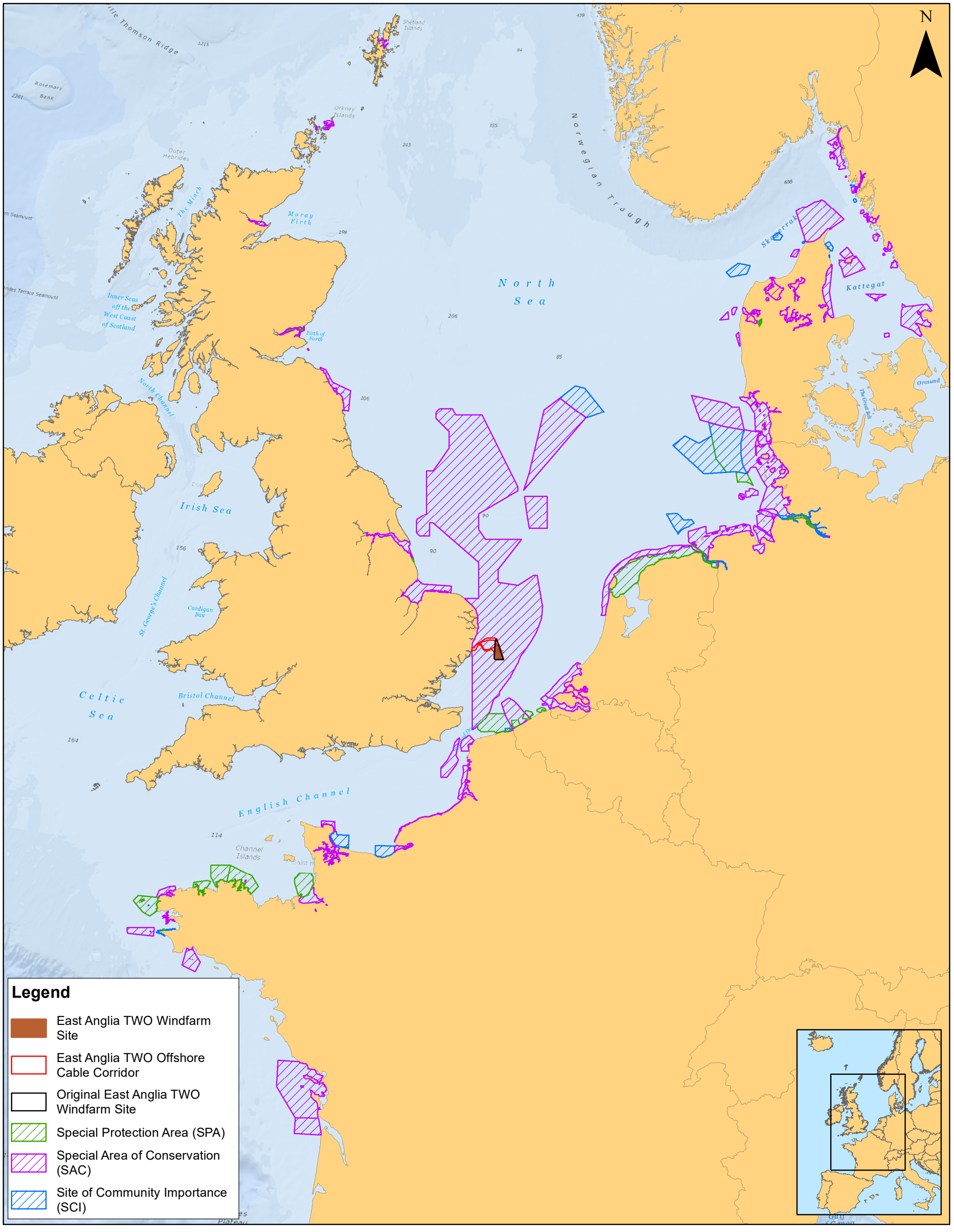

SCOTTISHPOWER RENEWABLES

East Anglia TWO

Sites Designated for Marine Mammals considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
1	05/09/19	FC	First Issue.	Checked:	PM
				Approved:	PP

Scale @ A3: 1:5,500,000 (0 50 100 200 Km)

Figure	Date	Dwg No.	
7.6a	05/09/19	EA2-DEV-DRG-IBR-001022	Datum: WGS 1984 Projection: Zone 31N

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N

Km
0 1 2 4

Km
0 0.5 1 2

Isle of May

Doggersbank

Southern North Sea

1. Dornoch Firth and Morrich More
2. Faray and Holm of Faray
3. Sanday
4. Yell Sound Coast
5. Mousa
6. Firth of Tay and Eden Estuary
7. Isle of May
8. Berwickshire and North Northumberland Coast
9. Doggerbank
10. Klaverbank
11. Noordzeekustzone
12. Humber Estuary
13. Waddenzee
14. The Wash and North Norfolk Coast
15. Oosterschelde
16. Voordelta
17. Vlakte van de Raan
18. Westerschelde & Saeftinghe
19. SBZ 3 / ZPS 3
20. SBZ 2 / ZPS 2
21. Vlaamse Banken
22. SBZ 1 / ZPS 1
23. Bancs des Flandres
24. Dunes de la plaine maritime flamande
25. Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
26. Récifs Gris-Nez Blanc-Nez
27. Baie de Canche et couloir des trois estuaires
28. Ridens et dunes hydrauliques du détroit du Pas-de-Calais
29. Estuaires et littoral picards (baies de Somme et d'Authie)

Legend

- East Anglia TWO Windfarm Site
- East Anglia TWO Offshore Cable Corridor
- Original East Anglia TWO Windfarm Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Community Importance (SCI)

SCOTTISHPOWER RENEWABLES

East Anglia TWO

Sites Designated for Marine Mammals considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
1	05/09/19	FC	First Issue.	Checked:	PM
				Approved:	PP

Scale @ A3: 1:3,500,000

Km
0 50 100 200

Figure	Date	Dwg No.	
7.6b	05/09/19	EA2-DEV-DRG-IBR-001022	Datum: WGS 1984 Projection: Zone 31N

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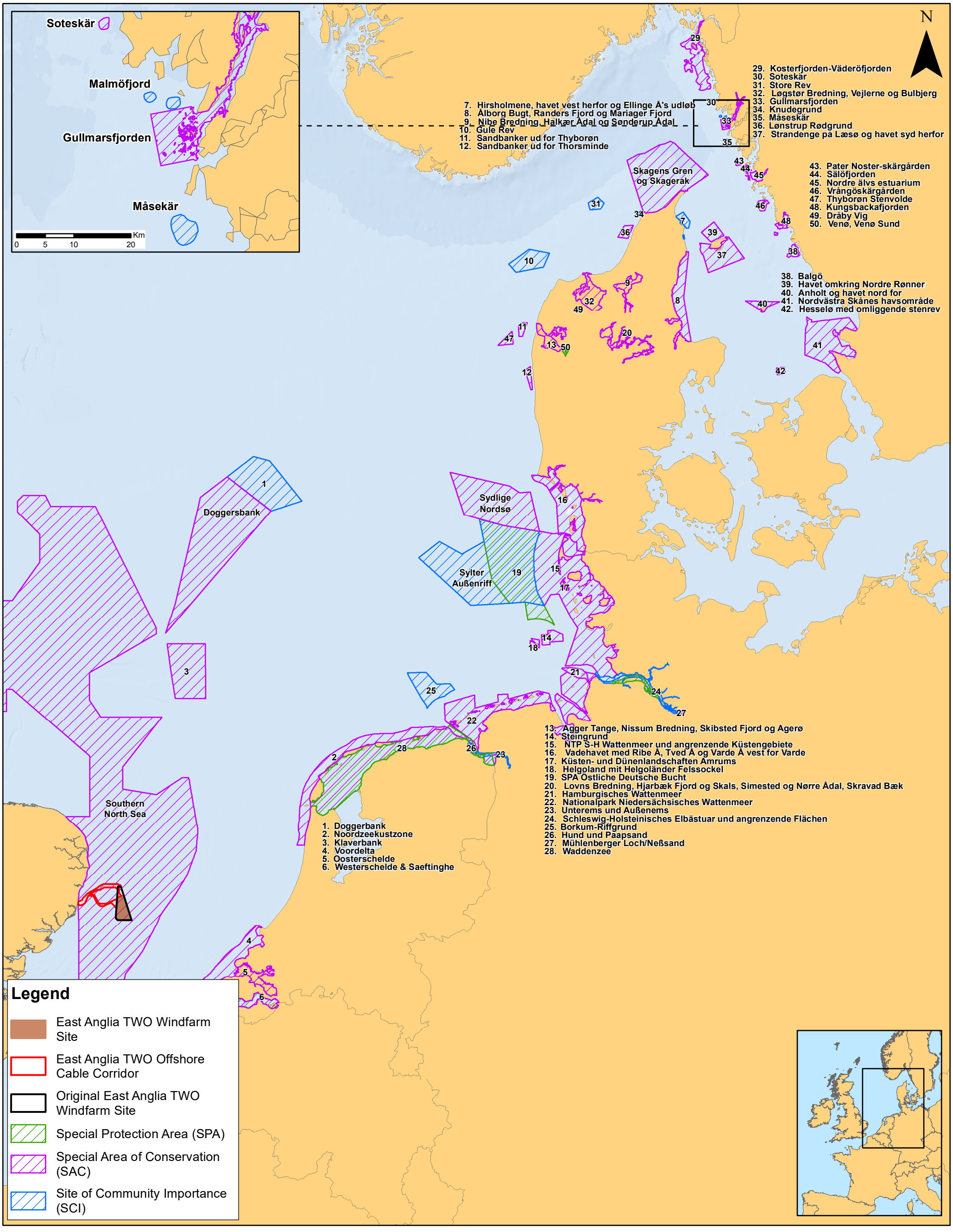

SCOTTISHPOWER RENEWABLES

East Anglia TWO

Sites Designated for Marine Mammals considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
1	05/09/19	FC	First Issue.	Checked:	PM
				Approved:	PP

Scale @ A3: 1:3,250,000 (0 50 100 200 Km)

Figure	Date	Dwg No.	
7.6c	05/09/19	EA2-DEV-DRG-IBR-001022	Datum: WGS 1984 Projection: Zone 31N

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N

Southern North Sea

Bancs des Flandres

25. Vlaamse Banken
26. SBZ 1 / ZPS 1
27. Vlakte van de Raan
28. SBZ 2 / ZPS 2
29. Récifs Gris-Nez Blanc-Nez
30. Voordelta
31. SBZ 3 / ZPS 3
32. Westerschelde & Saeftinghe
33. Littoral Cauchois

16. The Wash and North Norfolk Coast
17. Ridens et dunes hydrauliques du détroit du Pas-de-Calais
18. Baie de Canche et couloir des trois estuaires
19. Dunes de la plaine maritime flamande
20. Estuaires et littoral picards (baies de Somme et d'Authie)
21. Estuaire de la Seine
22. Baie de Seine orientale
23. Baie de Seine occidentale
24. Marais du Cotentin et du Bessin - Baie des Veys

1. Baie de Morlaix
2. Côte de Granit Rose-Sept Iles
3. Abers - Côte des légendes
4. Ouessant-Molène
5. Presqu'Ile de Crozon
6. Cap Sizun
7. Chaussée de Sein
8. Archipel des Glénan

9. Chausey
10. Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire
11. Baie du Mont Saint-Michel
12. Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
13. Tregor Goëlo
14. Estuaire de la Canche, dunes picardes plaquées sur l'ancienne falaise, forêt d'Hardelot et falaise d'Equihen
15. Panache de la Gironde et plateau rocheux de Cordouan (Système Pertuis Gironde)

Pertuis Charentais

Legend

- East Anglia TWO Windfarm Site
- East Anglia TWO Offshore Cable Corridor
- Original East Anglia TWO Windfarm Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Community Importance (SCI)

East Anglia TWO

Sites Designated for Marine Mammals considered in the Screening Exercise

Rev	Date	By	Comment
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Scale @ A3: 1:2,750,000 (0 25 50 100 Km)

Figure	Date	Dwg No.	
7.6d	05/09/19	EA2-DEV-DRG-IBR-001022	Datum: WGS 1984 Projection: Zone 31N

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N

Shetland Islands
Orkney Islands
Outer Hebrides
Le Thomson Ridge
The Minch
Moray Firth
Firth of Forth
North Channel
Irish Sea
St. George's Channel
Cardigan Bay
Bristol Channel
Norwegian Trough
Skagerrak
North Sea
Strait of Dover

1215 84 439 155 243 695 199 206 85 106 90 90 156

Legend

- East Anglia TWO Windfarm Site
- East Anglia TWO Offshore Cable Corridor
- Original East Anglia TWO Windfarm Site
- Special Protection Area (SPA)
- Potential Special Protection Area (pSPA)
- Special Protection Area (SPA) and Ramsar

SCOTTISHPOWER RENEWABLES

East Anglia TWO

Sites Designated for Offshore Ornithology considered in the Screening Exercise

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				Approved:	PP

Scale @ A3: 1:4,000,000 (0 50 100 200 Km)

Figure	Date	Dwg No.	
8.1a	06/09/19	EA2-DEV-DRG-IBR-001033	Datum: WGS 1984 Projection: Zone 31N

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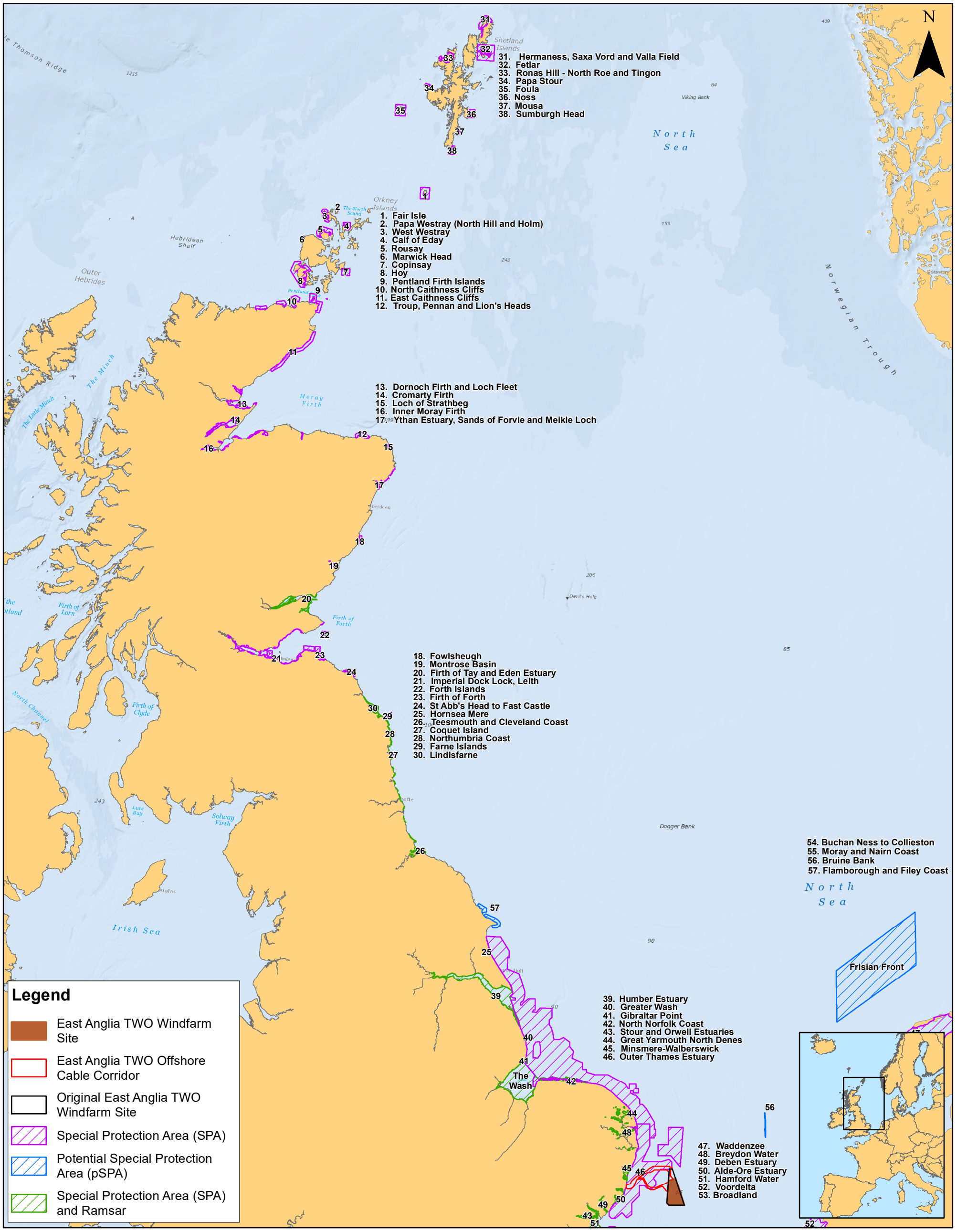

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East Anglia TWO

Sites Designated for Offshore Ornithology considered in the Screening Exercise

Rev	Date	By	Comment
1	06/09/19	FC	First Issue.

Prepared:	FC
Checked:	PM
Approved:	PP

Scale @ A3: 1:3,000,000

0 50 100 200 Km

Figure	Date	Dwg No.	
8.1b	06/09/19	EA2-DEV-DRG-IBR-001033	Datum: WGS 1984 Projection: Zone 31N

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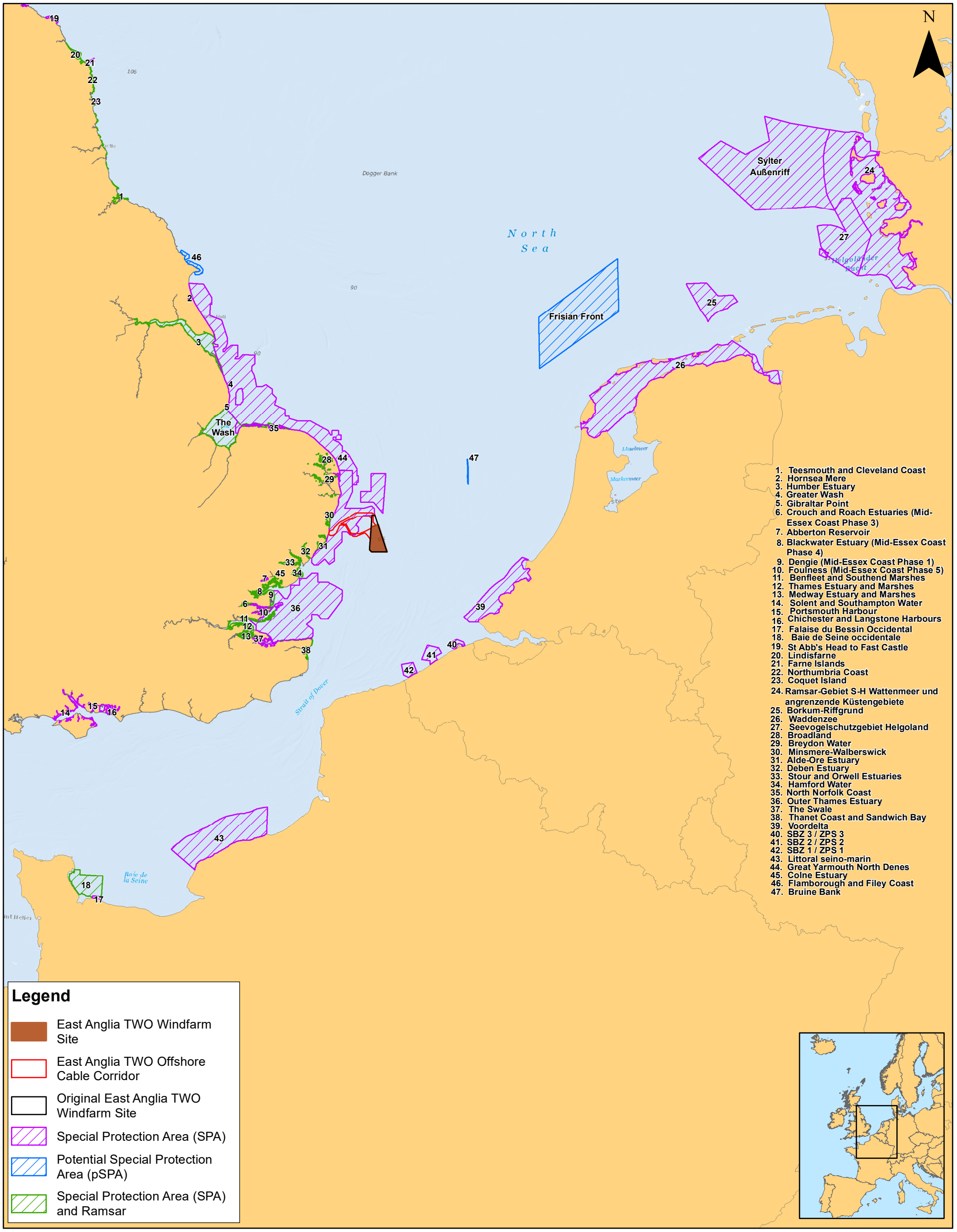

SCOTTISHPOWER RENEWABLES

East Anglia TWO

Sites Designated for Offshore Ornithology considered in the Screening Exercise

Rev	Date	By	Comment		
				Prepared:	FC
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				Approved:	PP

Scale @ A3: 1:3,000,000 (0 – 50 – 100 – 200 Km)

Figure	Date	Dwg No.	
8.1c	06/09/19	EA2-DEV-DRG-IBR-001033	Datum: WGS 1984 Projection: Zone 31N

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