

East Anglia TWO Offshore Windfarm

In Principle Site Integrity Plan for the Southern North Sea Special Area of Conservation

Applicant: East Anglia TWO Limited
Document Reference: 8.17
SPR Reference: EA2-DWF-ENV-REP-IBR-000951 Rev 01
Pursuant to APFP Regulation: 5(2)(q)

Date: October 2019
Revision: Version 1
Author: Royal HaskoningDHV

Prepared by:	Checked by:	Approved by:

Revision Summary				
Rev	Date	Prepared by	Checked by	Approved by
01	08/10/2019	Paolo Pizzolla	Julia Bolton	Helen Walker

Description of Revisions			
Rev	Page	Section	Description
01	n/a	n/a	Final for Submission

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Glossary of Acronyms

AA	Appropriate Assessment
ADD	Acoustic Deterrent Device
AEOI	Adverse Effect on Integrity
CI	Confidence Interval
COs	Conservation Objectives
cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
DML	Deemed Marine Licence
ETG	Expert Topic Group
EPS	European Protected Species
ES	Environmental Statement
FCS	Favourable Conservation Status
FID	Financial Investment Decision
HRA	Habitats Regulations Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
JNCC	Joint Nature and Conservation Committee
km	Kilometre
km ²	Kilometre squared
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
m	Metre
MMO	Marine Management Organisation
MMMP	Marine Mammal Mitigation Plan
MW	Megawatts
MU	Management Unit
NS	North Sea
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCI	Site of Community Importance
SIP	Site Integrity Plan
SNCBs	Statutory Nature Conservation Bodies
SNS	Southern North Sea
SoS	Secretary of State
SPR	Scottish Power renewables
TWT	The Wildlife Trust
UK	United Kingdom
UXO	Unexploded Ordnance
WDC	Whale and Dolphin Conservation

Glossary of Terminology

Applicant	East Anglia TWO Limited.
Construction, operation and maintenance platform	A fixed offshore structure required for construction, operation, and maintenance personnel and activities.
Development area	The area comprising the onshore development area and the offshore development area (described as the 'order limits' within the Development Consent Order)..
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one 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.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive, as defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017 and regulation 18 of the Conservation of Offshore Marine Habitats and Species Regulations 2017. These include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and the information required to support HRA.
Habitats Directive	European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora
Habitats Regulations	The Habitats Directive is transposed in UK law as The Conservation of Habitats and Species Regulations 2017.
Habitat Regulations Assessment (HRA)	Habitat Regulations Assessment is a recognised step by step process which helps determine likely significant effect and (where appropriate) assesses any adverse effects on the integrity of Natura 2000 sites.
Inter-array cables	Offshore cables which link the wind turbines to each other and the offshore electrical platforms, this will include fibre optic cables.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
Likely Significant Effect	Checking for the likelihood of significant effects on Natura sites is a part of HRA. Unless a significant effect can be ruled out, it is considered 'likely' and requires appraisal.
Meteorological mast	An offshore structure which contains meteorological instruments used for wind data acquisition.
Monitoring buoys	Buoys to monitor <i>in situ</i> condition within the windfarm, for example wave and metocean conditions.
Natura 2000 site	A site forming part of the network of European sites made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive.
Offshore cable corridor	This is the area which will contain the offshore export cable between offshore electrical platforms and landfall.
Offshore development area	The East Anglia TWO windfarm site and offshore cable corridor (up to Mean High Water Springs).
Offshore electrical infrastructure	The transmission assets required to export generated electricity to shore. This includes inter-array cables from the wind turbines to the offshore electrical

	platforms, offshore electrical platforms, platform link cables and export cables from the offshore electrical platforms to the landfall.
Offshore electrical platform	A fixed structure located within the windfarm area, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Offshore export cables	The cables which would bring electricity from the offshore electrical platforms to the landfall, this will include fibre optic cables.
Offshore infrastructure	All of the offshore infrastructure including wind turbines, platforms, and cables.
Offshore platform	A collective term for the offshore construction, operation and maintenance platform and the offshore electrical platforms.
Platform link cable	Electrical cable which links one or more offshore platforms. These cables will include fibre optic cables.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water.

1 Introduction

1.1 Purpose of this document

1. The purpose of this in principle Southern North Sea (SNS) Special Area of Conservation (SAC) Site Integrity Plan (SIP) is to set out the approach for East Anglia TWO Limited to deliver potential mitigation measures for the proposed East Anglia TWO project, to ensure the avoidance of Adverse Effect on Integrity (AEIOI) of the designated features of the SNS SAC.
2. The final SNS SAC SIP is to be submitted for approval as required under Conditions of the Development Consent Order (DCO). These state that:

“In the event that driven or part-driven pile foundations are proposed to be used, the licenced activities, or any phase of those activities must not commence until an East Anglia TWO Project Southern North Sea SAC Site Integrity Plan for Piling which accords with the principles set out in the in principle East Anglia TWO Project Southern North Sea SAC Site Integrity Plan has been submitted to the MMO [Marine Management Organisation] and the MMO is satisfied that the plan provides such mitigation as is necessary to avoid adversely affecting the integrity (within the meaning of the 2017 Regulations) of a relevant site, to the extent that harbour porpoise are a protected feature of that site.”
3. With regard to the clearance of unexploded ordnance (UXO), the draft DCO also includes the requirement of a SIP; which states that the following must be submitted for approval prior to any UXO clearance:

“an East Anglia TWO Project Southern North Sea SAC Site Integrity Plan for UXO Clearance which accords with the principles set out in the in principle East Anglia TWO Project Southern North Sea SAC Site Integrity Plan.”
4. The approach and measures listed in the in principle SIP are in relation to the proposed East Anglia TWO project only and are in response to the conclusions of the Information to Support Appropriate Assessment Report (document reference 5.3). The Information to Support Appropriate Assessment Report concluded that, subject to the final design of the proposed East Anglia TWO project, and the actual in combination scenario that overlaps with the proposed East Anglia TWO project, further mitigation and management measures may be necessary in relation to the potential in combination effects of pile driving and UXO noise in order to ensure there will be no adverse effect on the SNS SAC.
5. Following completion of the Appropriate Assessment (AA) by the Competent Authority, it is acknowledged that the proposed East Anglia TWO project SNS SAC SIP may require revision to reflect the conclusions of the AA, the final design

of the proposed East Anglia TWO project, and the actual in-combination scenario for offshore wind farm projects that could be constructing at the same time as the proposed East Anglia TWO project. The mitigation and management measures that may need to be secured in the SIP post-consent and pre-construction will be based on the AA as well as the final design of the proposed East Anglia TWO project, in relation to the potential in-combination effects of pile driving noise, in order to ensure there will be no adverse effect on the SNS SAC.

6. The SIP provides a framework for further discussion and consultation by East Anglia TWO Limited with the MMO and other relevant stakeholders, including Statutory Nature Conservation Bodies (SNCBs), post-consent and pre-construction to agree the exact details of any required project related management measures. Indicative mitigation measures are outlined in this in principle SIP which would be developed in consultation with the MMO and other relevant bodies (see **section 3.1.2**), post consent and pre-construction based on the final design of the proposed East Anglia TWO project.
7. It is also possible that mitigation and management measures will be required for other plans and projects located within the vicinity of the proposed East Anglia TWO project as part of the in combination AA, however, it is not possible for East Anglia TWO limited to detail what these will be or how they will be secured and is therefore outside of the scope of the draft SNS SAC SIP.
8. At the time of writing, the management measures for the SNS SAC site are yet to be confirmed. As such, the SIP should be considered as '*In Principle*' until further guidance from Joint Nature and Conservation Committee (JNCC) and Natural England is provided. The approach is in line with that proposed within the draft Habitats Regulation Assessment (HRA) undertaken by the Secretary of State for Business Energy and Industrial Strategy (BEIS) as part of the Review of Consents for the SNS SAC (BEIS 2018). In its final form, the SIP will include any updated information on management measures, advice or guidance for the SNS SAC and final design of the project.

1.2 Project Background

9. East Anglia TWO Limited ('the Applicant', which is a wholly owned subsidiary of ScottishPower Renewables (SPR) UK Limited) is seeking a DCO for the proposed East Anglia TWO project, an offshore wind farm located in the southern North Sea.
10. The East Anglia TWO windfarm site will cover an area of approximately 218.4km² in the southern North Sea off the coast of East Anglia. Water depths within the site range from 33 to 67m (relative to the Lowest Astronomical Tide (LAT)), with water depths generally increasing in the southeast of the East Anglia TWO windfarm site.

11. Once built, the proposed East Anglia TWO project would comprise the following offshore components:
 - The offshore wind turbines and their associated foundations;
 - Scour protection around foundations as required;
 - Offshore electrical platforms supporting required electrical equipment, possibly also incorporating offshore facilities;
 - Up to one meteorological mast (met mast) and associated foundations for monitoring wind speeds during the operational phase;
 - Up to one construction, operation and maintenance platform may be required to house construction, operation and maintenance personnel and equipment; and
 - Subsea cables comprising inter-array, platform link and offshore export cables.
12. The detailed design of the proposed East Anglia TWO project (e.g. numbers of wind turbines, layout configuration, foundation type and requirement for scour protection) would not be determined until post-consent. Therefore, realistic worst-case scenarios in terms of potential impacts/effects are adopted to undertake a precautionary and robust impact assessment.
13. The proposed East Anglia TWO project would consist of a maximum of 60 x 300m or 75 x 250m blade tip height wind turbines (above LAT). Therefore, the assessments in the Environmental Statement (ES) and this in principle SIP are based on a worst case of either 60 x 300m or 75 x 250m turbines.
14. The full offshore construction window is expected to be approximately 27 months and offshore construction would be anticipated to commence around 2025.
15. There is the likely requirement for UXO clearance prior to construction. Whilst any underwater UXO that are identified would preferentially be avoided, it is necessary to consider the potential requirement for underwater UXO detonation where it is deemed unsafe to retrieve the UXO from the seafloor and avoidance is not possible. A detailed UXO survey would be completed prior to construction. The exact number of possible detonations and duration of UXO clearance operations is therefore not known at this stage however an assessment based on a worst case of up to 80 UXO detonations has been carried out in ES **Chapter 11 Marine Mammals** (document reference 6.1.11) and Information to Support Appropriate Assessment (document reference 5.3).

1.3 The Southern North Sea SAC

16. The East Anglia TWO windfarm site and cable corridor is located entirely within the SNS SAC winter area (**Figure 1.1**).
17. In January 2017, the SNS candidate Special Area of Conservation (cSAC) was submitted to the European Commission to become designated as a SAC. The SNS cSAC was adopted as a Site of Community Importance (SCI) by the European Commission and further adopted as a full SAC by the UK government in February 2019. It is therefore referred to throughout as the SNS SAC.
18. The SNS SAC is located within the Southern North Sea and wholly within the North Sea Management Unit (MU). Harbour porpoise *Phocoena phocoena* is the primary and only listed feature of the site.
19. Full details of the SNS SAC, including the Conservation Objectives (COs), are included in **section 3** of this document.

1.4 Requirement for this Document

20. Due to the long lead in times for the development of offshore wind farms, it is not possible to provide final detailed method statements for construction prior to consent, and as a result, the detail of any required mitigation also cannot be agreed at this stage. The agreement of guiding principles to mitigation, through this in principle SIP as part of consent, therefore permits the final mitigation to be specified post-consent and pre-construction as part of the detailed design and allows refinements to be made based on the best practice, available knowledge and technology at that time.
21. This in principle SIP reflects the commitment of the proposed East Anglia TWO project to undertake required measures to reduce the potential for any significant disturbance of harbour porpoise in the SNS SAC, whilst allowing scope for refinement of the measures through consultation once the management measures are available for the SNS SAC, and once final construction methods for the project have been confirmed. This will enable use of the most appropriate project related measures to be confirmed based on best knowledge, evidence and proven available technology at the time of construction.
22. A final detailed SIP will be produced at least six months prior to the commencement of pile driving, following revision and consultation, as per the outline schedule in **section 2.1**.
23. East Anglia TWO Limited acknowledges that any required mitigation or management measures should be precise, effective and deliverable in order to maintain the integrity of the SNS SAC for harbour porpoise. The SIP is designed to ensure that this will be the case once any required measures have been

defined. **Section 2.1** provides an outline of the proposed schedule for refinement and sign-off for the SIP.

24. East Anglia TWO Limited believes that the SIP is an appropriate mechanism to ensure mitigation is applied where necessary, whilst allowing scope for refinement of the precise mitigation measures to be adopted through consultation once final management measures are available for the SNS SAC, and once final construction methods for the project have been confirmed. This will enable use of the most appropriate project related measures to be confirmed based on best knowledge, evidence and proven available technology at the time of construction, and to enable the mitigation to be specific to the level of impact reduction deemed necessary, if required. This approach will also remove the need to revise the deemed Marine Licence (DML) condition should the most suitable measures to be adopted change between the time of consent and construction.
25. It should also be noted that the Marine Mammal Mitigation Plan (MMMP) for piling and for UXO clearance (a draft of which is also submitted with this DCO application, document reference 8.14) provides details of the mitigation requirements in relation to any physical or auditory injury to marine mammals in the event that piled foundations are proposed.
26. Any requirements to implement noise abatement technology would be subject to additional Marine Licencing process, if required.

2 Consultation

27. Consultation on the structure and content of the SIP will be conducted with the MMO and other relevant SNCBs throughout the development of the final SIP for the SNS SAC, and a full consultation log maintained throughout.
28. There will be an ongoing requirement to review the need for project mitigation and management measures with the MMO and other relevant organisations, including Natural England, Whale and Dolphin Conservation (WDC) and The Wildlife Trust (TWT), as project design and construction plans are progressed.
29. A consultation programme will be developed at the post-consent and pre-construction stage.

2.1 Schedule for Agreement

30. It is not possible at this stage to determine exact dates for agreement and refinement of the SIP. However, the key milestones have been outlined in **Table 2.1** to indicate the likely development of the SIP between consent and construction.

Table 2.1 Indicative milestones for refinement and agreement of the SIP

Indicative Stage	When	Action for East Anglia TWO Limited	Relevant Authority / Consultee	Status
Consent determination and AA	Expected early 2021	Review in principle SIP, identify areas for revisions/updates.	Internal only	To be completed
Southern North Sea SAC final management measures are defined / further advice is provided.	Unknown	Review in principle SIP and identify areas for revisions/updates if any further guidance on the SAC is received.	MMO and Natural England, potentially Secretary of State, TWT and WDC	To be completed
Front End Engineering Design	Pre-construction	Any updates or changes during the pre-construction period, within the consented envelope. Any updated project design will also require consideration in the SIP.	Internal only	To be completed

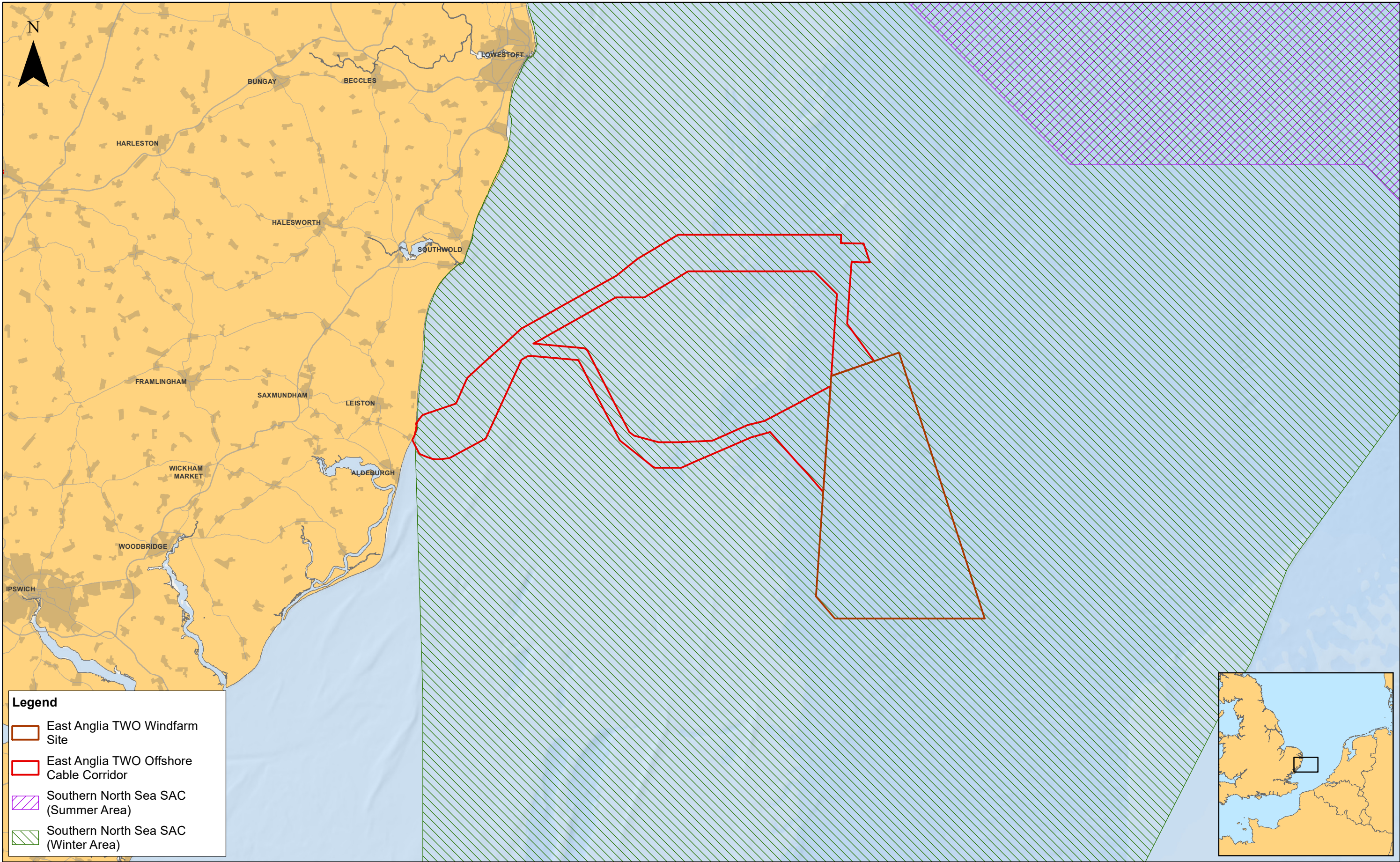
Indicative Stage	When	Action for East Anglia TWO Limited	Relevant Authority / Consultee	Status
Completion of UXO surveys	Pre-construction	Determining the location, number and expected size of UXO that could require detonation.	Internal only	To be completed
Submission and review of in principle SIP for UXO clearance and any associated documentation	Approximately 12 months prior to commencement of UXO clearance	The SIP for UXO clearance will be updated to capture all relevant assessments and mitigation measures. Alongside the in principle SIP for UXO clearance an implementation plan and any monitoring requirements will also be drafted for any required measures.	MMO and Natural England; draft Plan sent to TWT and WDC	To be completed
Submission and review of in principle SIP for piling and any associated documentation	Approximately 12 months prior to commencement of pile driving	The SIP for piling will be updated to capture all relevant assessments and mitigation measures. Alongside the in principle SIP for piling an implementation plan and any monitoring requirements will also be drafted for any required measures.	MMO and Natural England; draft Plan sent to TWT and WDC	To be completed
Final design	Approximately nine months prior to construction	Provide project details relevant to the piling and UXO SIP. In addition, accompanying environmental information, including an assessment of the efficacy of mitigation or management measures will be provided.	MMO, Natural England, and potentially Secretary of State; with copies sent to TWT and WDC.	To be completed
Final SIP for UXO clearance sign-off	Approximately six months prior to commencement of UXO clearance	The in principle SIP for UXO clearance will be updated and finalised. The final SIP for UXO clearance will be submitted approximately six months prior to the commencement of UXO clearance for written approval from the MMO prior to any UXO clearance works commencing.	MMO for sign off.	To be completed

Indicative Stage	When	Action for East Anglia TWO Limited	Relevant Authority / Consultee	Status
Final SIP for piling sign-off	Approximately six months prior to commencement of pile driving	The in principle SIP for piling will be updated and finalised. The final SIP for piling will be submitted for approval approximately six months prior to the commencement of pile driving for written approval from the MMO prior to any piling works commencing.	MMO for sign off.	To be completed
Construction monitoring and reporting	Construction	Monitoring/management reports will be submitted to the MMO.	MMO	To be completed

3 Southern North Sea SAC for Harbour Porpoise

31. The SNS SAC has been recognised as an area with persistent high densities of harbour porpoise (JNCC 2017; JNCC and Natural England 2019). The majority of the site is less than 40m in depth, reaching up to 75m in the northern most areas. The seabed is mainly sublittoral sand and sublittoral coarse sediment (JNCC 2017). The site overlaps with a number of existing Natura 2000 sites, including the Dogger Bank SAC, Margate and Long Sands SAC, Haisborough, Hammond and Winterton SAC and North Norfolk Sandbanks and Saturn Reef SAC, all of which have important sandbank and gravel beds.
32. The SNS SAC has a surface area of 36,715km² and covers both winter and summer habitats of importance to harbour porpoise, with approximately 27,018km² of the site being important in the summer and 12,697km² of the site being important in the winter period (JNCC 2017).
33. The SNS SAC Site Selection Report (JNCC 2017) identifies that the SNS SAC site supports approximately 18,500 individuals (95% Confidence Interval (CI) = 11,864 - 28,889) for at least part of the year (JNCC 2017). However, JNCC and Natural England (2019) states that because this estimate is from a one-month survey in a single year (the SCANS-II survey in July 2005) it cannot be considered as an estimated population for the site. It is therefore not appropriate to use site population estimates in any assessments of effects of plans or projects on the site (i.e. Habitats Regulation Assessment (HRA)), as they need to take into consideration population estimates at the MU level, to account for daily and seasonal movements of the animals (JNCC and Natural England 2019).
34. The proposed East Anglia TWO project is located within the SNS SAC winter area (**Figure 1.1**).

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						1:300,000		East Anglia ONE North and TWO Southern North Sea SAC		Drg No	EA2-DEV-DRG-IBR-721			
				Prepared:	AB	Scale @ A3				Rev	1	Datum: WGS 1984 Projection: Zone 31N		
	1	07/06/2019	AB	First Issue.	Checked:	PM	Source: © JNCC, 2019. Service Layer Credits: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org and other contributors This map has been produced to the latest known information at the time of issue, and has been produced for your information only. Please consult with the SPR Offshore GIS team to ensure the content is still current before using the information contained on this map. To the fullest extent permitted by law, we accept no responsibility or liability (whether in contract, tort (including negligence) or otherwise in respect of any errors or omissions in the information contained in the map and shall not be liable for any loss, damage or expense caused by such errors or omissions.			Date	07/06/19			
	Rev	Date	By	Comment	Approved:	PP				Figure	1.1			

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3.1.1 Conservation Objectives

35. The Conservation Objectives for the SNS SAC are designed to ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely.

36. The Conservation Objectives for the site are (JNCC and Natural England 2019):

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for the harbour porpoise in UK waters

In the context of natural change, this will be achieved by ensuring that:

- 1. Harbour porpoise is a viable component of the site;*
- 2. There is no significant disturbance of the species; and*
- 3. The condition of supporting habitats and processes, and the availability of prey is maintained.*

Conservation Objective 1: Harbour porpoise is a viable component of the site

37. The intent of this Conservation Objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise within the site. Specifically, this objective is concerned with operations within the site that would result in unacceptable levels of impact upon individuals using the site. Unacceptable levels are defined as those that would have an impact upon the FCS of the population. The Conservation Objectives state that, with regard to assessing impacts, *‘the reference population for assessments against this objective is the MU population in which the SAC is situated (Inter-Agency Marine Mammal Working Group (IAMMWG) 2015)’*.

38. Harbour porpoise are considered to a *viable component of the site* if they are able to live successfully within it. As this SAC has been selected primarily for its long term preferential use by harbour porpoise in contrast with other areas of the North Sea, with the implication being that it provides relatively good habitat for foraging, and may also be used for breeding and calving (JNCC and Natural England 2019).

39. Harbour porpoise are listed as European Protected Species (EPS) under Annex IV of the Habitats Directive, and are therefore protected from the deliberate killing (or injury), capture and disturbance throughout their range. Within the UK, The Habitats Directive is enacted through The Habitats Regulations 2017. Under these Regulations, it is deemed an offence if harbour porpoise are deliberately disturbed in such a way as to:

- a) Impair their ability to survive, to breed or reproduce, or to rear or nurture their young; or
- b) To affect significantly the local distribution or abundance of that species.

40. The term *deliberate* is defined as any action that is shown to be any action ‘by a person who knows, in the light of the relevant legislation that applies to the species involved, and the general information delivered to the public, that his action will most likely lead to an offence against a species, but intends this offence or, if not, consciously accepts the foreseeable results of his action’.

Conservation Objective 2: There is no significant disturbance of the species

41. Disturbance of harbour porpoise typically originated from operations that cause underwater noise including seismic surveys, pile driving and sonar. Responses to noise can be physiological and/or behavioural, however, disturbance is primarily a behavioural response to noise and may lead to harbour porpoise being displaced from the affected area. Therefore, operations within or affecting the site should be managed to ensure that any individuals potential usage of the site is maintained.
42. Disturbance is considered to be significant if it leads to the exclusion of harbour porpoise from a significant portion of the site for a significant period of time. Draft SNCB guidance for assessing the significance of noise disturbance to a site suggests:

“Noise disturbance within a SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than:

- 1. 20% of the relevant area of the site in any given day, and*
- 2. an average of 10% of the relevant area of the site over a season”.*

Conservation Objective 3: The condition of supporting habitats and processes, and the availability of prey is maintained.

43. Within this Conservation Objective, supporting habitats relates to the characteristics of the seabed and water column, and supporting processes encompass the movements and physical properties of the habitat. The maintenance of supporting habitats and processes contributes to ensuring that prey is maintained and available to individuals within the site. Harbour porpoise are strongly reliant on the availability of prey species due to their high energy demands and are highly dependent on being able to access prey species year-round. The densities of harbour porpoise within a site are therefore highly dependent on the availability of key prey species.

44. This Conservation Objective is designed to ensure that harbour porpoise are able to access food resources year round, and that activities occurring in the SNS SAC will not affect this.

3.1.2 Management Measures

45. Specific management measures are yet to be developed for the SNS SAC, however JNCC and Natural England (2016) advise that *'the site should be managed in a way that ensures that its contribution to the maintenance of the harbour porpoise population at FCS is optimised, and that this may require management of human activities occurring in or around the site if they are likely to have an adverse impact on the site's Conservation Objectives either directly or indirectly identified through the assessment process'*.
46. JNCC and Natural England (2016) also state that *'management measures are the responsibility of the relevant regulatory bodies, which consider the SNCBs' advice and hold appropriate discussions with the sector concerned, but the scale and type of mitigation is decided by the Regulators'*.

3.1.3 Advice on Activities

47. JNCC and Natural England (2019) have provided advice on activities that specifically occur within or near to the SNS SAC site that could be expected to impact on the site's integrity. The key impacts and activities that JNCC and Natural England (2019) consider to have the greatest impact on the population of UK harbour porpoise and therefore the SNS SAC are:
- Commercial fisheries with by-catch of harbour porpoise;
 - Increased contaminants from discharge / run-off from land fill, terrestrial and offshore industries;
 - Increased anthropogenic underwater noise from shipping, drilling, dredging and disposal, aggregate extraction, pile driving, acoustic surveys, underwater explosion, military activity, acoustic deterrent devices and recreational boating;
 - Death or injury by collision with, shipping, recreational boating and tidal energy installations; and
 - Reduction in prey resources by commercial fisheries.
48. The aim is that the advice should help identify the extent to which existing activities are, or can be made, consistent with the Conservation Objectives, and thereby focus the attention of Relevant and Competent Authorities and surveillance programmes to areas that may need management measures (JNCC and Natural England 2019).

4 Project Description

49. A full description of the project design envelope is available in the proposed East Anglia TWO project ES (see **Chapter 6 Project Description** and **Chapter 11 Marine Mammals**; document reference 6.1.6). However, as the project description is refined during final design this section will be updated as necessary to reflect any relevant changes.

5 Potential Effects

50. The HRA Screening in the Information to Support Appropriate Assessment Report (document reference 5.3) and consultation as part of Expert Topic Group (ETG) meetings (outlined in **Chapter 11 Marine Mammals** and **Appendix 11.4** of the ES), identified the following potential effects as a result of the proposed East Anglia TWO project on harbour porpoise, the qualifying feature of the SNS SAC that required further assessment:
- Underwater noise associated with the clearance of Unexploded Ordnance (UXO);
 - Underwater noise during piling;
 - Underwater noise during non-piling construction activities, for example, seabed preparation, rock dumping and cable installation;
 - Underwater noise and disturbance from vessels;
 - Barrier effects as a result of underwater noise associated with activities above;
 - Vessel interaction (collision risk);
 - Changes to prey resource; and
 - Changes in water quality.
51. The overriding purpose of the MMMPs for both piling works and for UXO clearance is to provide mitigation for the potential to kill or injure harbour porpoise during construction. The potential for any lethal effects, physical injury or auditory injury (including Permanent Threshold Shift (PTS)), associated with underwater noise will be mitigated through the MMMP (such as establishing mitigation zone based on the maximum potential range for PTS, soft-start and ramp-up, and activation of Acoustic Deterrent Devices (ADDs) prior to soft-start) which will ensure this is not a risk for harbour porpoise. As a result of the commitment to the MMMP, any potential lethal injury, physical injury and permanent auditory injury (PTS) from underwater noise associated with clearance of UXO clearance and piling does not require any further consideration in the SIP.
52. The Information to Support Appropriate Assessment Report (document reference 5.3) assessed the following potential effects during construction, operation and decommissioning of the proposed East Anglia TWO project (**Table 5.1**).

Table 5.1 Potential effects of the proposed East Anglia TWO project

Construction	Operation	Decommissioning
Permanent auditory injury resulting from the underwater noise associated with clearance of UXO.	N/A Not applicable as no UXO clearance during operational phase.	N/A Not applicable as no UXO clearance during decommissioning.
Potential disturbance resulting from the underwater noise associated with clearance of UXO.	N/A Not applicable as no piling during operational phase.	N/A Not applicable as no piling during decommissioning.
Permanent auditory injury resulting from the underwater noise during piling.	N/A Not applicable as no piling during operational phase.	N/A Not applicable as no piling during decommissioning.
Potential disturbance resulting from underwater noise during piling.	Potential disturbance resulting from the underwater noise associated with operational turbines.	Potential disturbance resulting from the noise associated with foundation removal (e.g. cutting).
Potential disturbance resulting from underwater noise during other construction activities, for example, seabed preparation, rock dumping and cable installation.	Potential disturbance resulting from the underwater noise associated with maintenance activities, such as any additional rock dumping and cable re-burial.	Potential disturbance resulting from the underwater noise associated with decommissioning activities, including infrastructure removal.
Potential barrier effects from underwater noise.	N/A Not applicable as no piling during operational phase.	Potential barrier effects from underwater noise.
Potential disturbance resulting from underwater noise and presence of vessels.	Potential disturbance resulting from underwater noise and presence of vessels.	Potential disturbance resulting from underwater noise and presence of vessels.
Vessel interaction (collision risk).	Vessel interaction (collision risk)	Vessel interaction (collision risk)
Changes to prey resource.	Changes to prey resource.	Changes to prey resource.
Changes to water quality	N/A Not applicable as no potential changes to water quality during operational phase.	N/A Not applicable as no potential changes to water quality during decommissioning.

5.1.1 Summary of Potential Effects of the proposed East Anglia TWO Project Alone

53. **Table 5.2** summarises the potential effects of the proposed East Anglia TWO project alone.
54. The Information to Support Appropriate Assessment Report (document reference 5.3) indicates there is no predicted adverse effect on the integrity of the SNS SAC from the proposed East Anglia TWO project alone.

Table 5.2 Summary of the potential effects of the proposed East Anglia TWO project alone

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
During Construction			
Risk of permanent auditory injury (PTS) associated with underwater noise during UXO clearance.	Without mitigation, up to 0.08% of NS MU reference population could be at increased risk.	N/A Assessment based on number of individuals at potential risk.	No with the implementation of MMMP for UXO clearance
Potential disturbance from underwater noise associated with UXO clearance.	0.5% or less of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would be less than 20% of the seasonal component of the SNS SAC area (up to 16% of the winter area; up to 0.2% of summer area) at any one time and on average would not exceed 10% (up to 7%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Risk of permanent auditory injury (PTS) associated with underwater noise during piling.	Without mitigation, up to 0.21% of the NS MU reference population could be at increased risk.	N/A Assessment based on number of individuals at potential risk.	No with the implementation of MMMP for piling
Potential disturbance from underwater noise during proposed mitigation (e.g. 10	0.0005% or less of the NS MU reference population could	Temporary displacement of harbour porpoise would be less than 20% of the seasonal component of the SNS SAC area (up to 0.02% of the winter area) at any one time and on average	No

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
minute ADD activation)	be temporarily disturbed.	would not exceed 10% (up to 0.02%) of the seasonal component of the SNS SAC area over the duration of that season.	
Potential disturbance from underwater noise during piling.	0.85% or less of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would be less than 20% of the seasonal component of the SNS SAC area (up to 16% of the winter area; up to 0.2% of summer area) at any one time and on average would not exceed 10% (up to 4%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential disturbance from underwater noise during other construction activities.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential disturbance from vessels during construction.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential barrier effects from underwater noise during construction at East Anglia TWO	Up to 0.9% of the NS MU reference population could be temporarily affected.	N/A Assessment based on number of individuals potentially affected	No

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
Possible vessel interaction (collision risk).	Up to 0.008% of the NS MU reference population could be at increased risk.	N/A	No
Potential changes to prey resource.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential changes to water quality.	Up to 0.08% of the NS MU reference population could be temporarily affected.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
UXO detonation in cable corridor and piling at windfarm site – winter	Up to 0.9% of the reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise could exceed 20% of the seasonal component of the SNS SAC area (up to 29.5% of winter area) at any one time and could on average exceed 10% (10.1%) of the seasonal component of the SNS SAC area over the duration of that season, if all piling and UXO activities were to take place within the winter period..	No with implementation of the SIP which would deliver any project mitigation or management measures in relation to the SNS SAC for harbour porpoise, to ensure no adverse effect on the integrity of the SNS SAC for harbour porpoise.

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
UXO detonation in cable corridor and piling at windfarm site – summer	Less than 0.9% of the reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 0.3% of summer area) at any one time and would not on average exceed 10% (up to 0.13%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Piling at windfarm site and other construction activities and vessels in cable corridor	0.5% or less of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 17.9% of winter area; up to 0.2% of summer area) at any one time and on average would not exceed 10% (up to 7.5%) of the seasonal component of the SNS SAC area over the duration of that season.	No
During Operation and Maintenance			
Potential disturbance from the underwater noise associated with operational turbines.	0.05% or less of the NS MU reference population could be disturbed.	Displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 2% of winter area) at any one time and on average would not exceed 10% (up to 2%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential disturbance from the underwater noise associated with maintenance activities.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
Potential disturbance from vessels during operation and maintenance.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Possible vessel interaction (collision risk).	Up to 0.008% of the NS MU reference population could be at increased risk.	N/A	No
Potential changes to prey resource.	Up to 0.08% of the NS MU reference population could be displaced.	Displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential overall effects during operation and maintenance.	Up to 0.08% of the NS MU reference population could be displaced.	Displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
During Decommissioning			
Potential disturbance from the underwater noise associated with foundation removal.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the	No

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
		seasonal component of the SNS SAC area over the duration of that season.	
Potential disturbance from underwater noise and disturbance from vessels.	Up to 0.08% of the NS MU reference population could be temporarily disturbed.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Possible vessel interaction (collision risk).	Up to 0.008% of the NS MU reference population could be at increased risk.	N/A	No
Potential changes to prey resource.	Up to 0.08% of the NS MU reference population could be temporarily displaced.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential changes to water quality.	Up to 0.08% of the NS MU reference population could be temporarily affected.	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	No
Potential overall effects during decommissioning.	Up to 0.08% of the NS MU reference	Temporary displacement of harbour porpoise would not exceed 20% of the seasonal	No

Potential Effect	Assessment in relation to the North Sea MU population	Spatial assessment in relation to the SNS SAC summer and winter areas	Adverse effect on site integrity
	population could be temporarily affected.	component of the SNS SAC area (up to 3% of winter area) at any one time and on average would not exceed 10% (up to 3%) of the seasonal component of the SNS SAC area over the duration of that season.	

55. **Table 5.2** summarises the potential effects of the proposed East Anglia TWO project alone in relation to the Conservation Objectives of the SNS SAC for harbour porpoise.
56. The Information to Support the Appropriate Assessment Report (document reference 5.3) indicates that, based on the Conservation Objectives, development of the proposed East Anglia TWO project alone would allow the Conservation Objectives to be upheld, and there would be no potential for an AEOI of the SNS SAC in relation to the Conservation Objectives for harbour porpoise (**Table 5.2**).

Table 5.3 Summary of the assessment of the potential effects of the proposed East Anglia TWO project (alone) on the SNS SAC in relation to the Conservation Objectives for harbour porpoise

Conservation Objectives	Auditory injury from underwater noise	Disturbance / barrier effects from underwater noise	Vessel interaction	Changes to prey resources	Changes to water quality
Harbour porpoise is a viable component of the site	x	x	x	x	x
There is no significant disturbance of the species	x	x	x	x	x
The condition of supporting habitats and processes, and the availability of their prey is maintained	x	x	x	x	x

x = No potential for any AEOI of the site in relation to the conservation objectives.

5.1.2 Summary of Potential In-Combination Effects

57. **Table 5.4** summarises the potential in-combination effects during construction of the proposed East Anglia TWO project. Further details on the assessment methodology and in-combination scenarios are provided within the Information to Support Appropriate Assessment Report (document reference 5.3). The in-combination effects during operation and maintenance or decommissioning would be less than those assessed for construction.
58. As a result of the in combination effect of underwater noise during the construction of the proposed East Anglia TWO project, the Information to Support the Appropriate Assessment Report (document reference 5.3) indicates that there is the potential for Likely Significant Effects (LSE), and that without the SIP, there could be the potential for an AEOI of the SNS SAC.

Table 5.4 Summary of the potential in combination effects for the proposed East Anglia TWO project

Potential in combination effect	Assessment in relation to the North Sea MU population	Spatial and seasonal assessment in relation to the Southern North Sea SAC summer and winter areas	Adverse effect on site integrity
Disturbance from underwater noise	13,458 harbour porpoise (up to 4% of NS MU)	<u>Spatial:</u> Maximum overlap with winter area = 45.6% Maximum overlap with summer area = 32.6% <u>Seasonal:</u> Seasonal average for winter area = 26.04% Seasonal average for summer area = 22.8%	No The use of appropriate management measures to be implemented through the SIP would result in no significant disturbance and no AEOI on the Southern North Sea SAC in relation to the conservation objectives for harbour porpoise.
Indirect effects – changes in prey resources	No additional effects to those assessed for underwater noise		No
Direct interaction - collision risk	Less than 0.1% of the NS MU reference population	N/A	No Less than 0.1% of the NS MU reference population could be at increased collision risk, without taking into account the potential disturbance of harbour porpoise as a result of underwater noise.

59. The in-combination assessment on potential changes to prey availability has assumed that any potential effects on harbour porpoise prey species from underwater noise, including piling, would be the same or less than those for harbour porpoise. Therefore, there would be no additional effects other than those assessed harbour porpoise, i.e. if prey species are disturbed from an area as a result of underwater noise, harbour porpoise will be disturbed from the same or greater area, therefore any changes to prey availability would not affect harbour porpoise as they would already be disturbed from the same area. Any measures to reduce underwater noise and the disturbance to harbour porpoise would also reduce the disturbance of prey species.
60. As a precautionary approach, the number of harbour porpoise that could be at increased collision with vessels was been assessed based on the number of animals that could be present in the wind farm areas, taking into account a worst-case of 5% increased collision risk. This is very precautionary, as it is highly unlikely that all marine mammals present in the wind farm areas would be at increased collision risk with vessels. In addition, based on the assumption that harbour porpoise would be disturbed as a result of underwater noise from piling, other construction activities, operational and maintenance activities and vessels, there should be no potential for increased collision risk with vessels.
61. As a result, the SIP will focus on potential disturbance and displacement as a result of increased underwater noise levels during UXO clearance and piling.
62. **Table 5.5** summarises the potential in-combination effects during the construction period at the proposed East Anglia TWO project in relation to the Conservation Objectives of the SNS SAC for harbour porpoise.
63. The Information to Support the Appropriate Assessment Report (document reference 5.3) indicates that, without the SIP, there is the potential for an anticipated AEOL of the SNS SAC in relation to the Conservation Objectives for harbour porpoise, from the potential in-combination effects of underwater noise during the construction of the proposed East Anglia TWO project (**Table 5.5**).

Table 5.5 Summary of the assessment of the potential in-combination effects during the proposed East Anglia TWO construction period on the SNS SAC in relation to the Conservation Objectives for harbour porpoise

Conservation Objectives	Disturbance from underwater noise	Increased collision risk	Changes to prey resources
Harbour porpoise is a viable component of the site	x	x	x
There is no significant disturbance of the species	?	x	x
The condition of supporting habitats and processes, and the availability of their prey is maintained	x	x	x

x = No potential for any adverse effect on the integrity of the site in relation to the conservation objectives.

? = Potential adverse effect on the integrity of the site in relation to the conservation objectives, without Site Integrity Plan

64. In order to reach a conclusion of no AEOI, the Information to Support the Appropriate Assessment Report (document reference 5.3) concluded that, in-combination with other plans or projects, further mitigation and management measures may be necessary in relation to potential disturbance from underwater noise during the construction of the proposed East Anglia TWO project. The potential for an AEOI was not concluded for any of the other in-combination assessments.

65. As such, only mitigation or management measures in relation to disturbance from UXO clearance and pile driving noise at the proposed East Anglia TWO project are considered in this SIP, as these are the potential noise sources that could result in the significant disturbance of harbour porpoise in-combination with other underwater noise sources during the construction of the proposed East Anglia TWO project. Significant disturbance is based on the current SNCBs thresholds for the site of:

“Noise disturbance within a SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than:

- 1. 20% of the relevant area of the site in any given day, and*
- 2. an average of 10% of the relevant area of the site over a season.”*

66. However, until a) further revisions are made to the other plan and project descriptions and timelines included in the in-combination assessment and b) further guidance is provided by the JNCC and Natural England on management measures for the Southern North Sea SAC, the potential mitigation and

management measures in the SIP cannot be fully defined. Therefore, the proposed East Anglia TWO project has listed project-specific measures that may be required, and that can be secured through the SIP, if necessary (see **section 6.1**).

67. It is acknowledged that following completion of the AA by the competent authority, the SIP may require revision to reflect the conclusions of the AA.

6 Mitigation and Management Measures

6.1 East Anglia TWO commitments

68. In addition to the embedded mitigation secured through the MMMP (such as establishing a mitigation zone based on the maximum potential range for PTS, soft-start and ramp-up, and activation of ADDs prior to soft-start), the Applicant has also committed to the following:
- Only one UXO would be detonated at a time during UXO clearance operations in the East Anglia TWO offshore development area. There would be no simultaneous UXO detonations, but potentially more than one UXO detonation could occur in a 24 hour period.
 - There would be no concurrent piling at East Anglia TWO, with only one pile being installed at a time, with no overlap in the piling duration of any two piles. Piles will be installed sequentially, and more than one pile could be installed in a single 24 hour period.
 - There would be no UXO detonation in the East Anglia TWO offshore development area at the same time as piling in the East Anglia TWO offshore development area during the winter period, in that although they may occur in the same day or 24 hour period, they would not occur at exactly the same time.
 - There would be no concurrent piling or UXO detonation between the proposed East Anglia TWO and East Anglia ONE North projects if both projects are constructed at the same time.
69. The commitments apply irrespective of any additional measures agreed through the development of the SIP.

6.2 In Principle East Anglia TWO Project Southern North Sea SAC SIP Management and Mitigation Measures

70. As discussed in **section 5**, the Information to Support Appropriate Assessment Report (document reference 5.3) has determined that project management and mitigation measures may be required, regarding the potential for significant disturbance to harbour porpoise from the in-combination effects of underwater noise with other plans or projects, during the construction of the proposed East Anglia TWO project.

71. This section of the in principle SIP outlines the measures currently available, or likely to be available in the future, which could be applicable to UXO clearance and pile driving noise at the proposed East Anglia TWO project. For each of the measures, information will be provided to detail how the measure will result in the avoidance of significant disturbance to harbour porpoise, and hence allow the conclusion of '*no adverse effect*' on the SNS SAC. It should be noted that the following factors need to be considered and taken into account in the final SIP:
- The SNS SAC management measures are currently unavailable;
 - The proposed East Anglia TWO project design parameters have not yet been finalised, and the Information to Support the Appropriate Assessment Report was based on the predicted worst-case scenario;
 - The final design and programme of other plans and projects has not yet been finalised, and therefore the actual in-combination scenario is currently unknown; and
 - Potential strategic management measures such as scheduling of pile driving (**section 6.2.3**) would need to be carefully managed to achieve a coordinated approach with other developers.
72. The adopted project measures would be agreed and secured in the period between consent and the commencement of piling, following an updated assessment of the potential impacts from pile driving and an assessment of their efficacy (see **Table 2.1**).
73. Potential measures are outlined in this section of the in principle SIP, however, as previously noted, confirmation of any measure(s) that will be employed cannot be confirmed until both the project design parameters are finalised, and the management measures are known for the SNS SAC. At that point, it will be clear what any required measures will be seeking to achieve in terms of mitigation.
74. Potential mitigation that could be delivered by the project management measures include:
- **Spatial:** Minimising the total area of '*significant disturbance*' at any one time. This could be a reduction in the area of the Southern North Sea SAC which is subject to noise levels that may cause significant disturbance to harbour porpoise; and / or
 - **Temporal:** Minimising the duration of additional underwater noise generated through UXO clearance and piling events over any given time frame that may cause '*significant disturbance*' to harbour porpoise in the North Sea MU or the Southern North Sea SAC.

6.2.1 Measure 1: Alternate Foundation Methodologies

75. The use of alternate foundation methods, within the consented project envelope, such as gravity base foundations, will be considered and assessed, along with any other relevant technologies or methodologies, based on technical feasibility and commercial availability considerations and assessments, alongside cost benefit analysis, during the final design of the proposed East Anglia TWO project. This would be informed by post-consent site investigation and technology developments. If possible, the use of foundation types and/or installation methodology other than pile driving would result in lower noise levels during the construction of the windfarm.
76. Developments are on-going in relation to methods such as double walled piles, which also have the potential to greatly reduce the area of potential disturbance from pile driving.

6.2.2 Measure 2: Noise Mitigation Systems

77. Noise mitigation systems are currently being developed and improved that enable a reduction of pile driving noise (decibels) at source. These methods currently include various types of bubble curtain, hydro-sound dampers, screens or tubes.
78. A reduction in the noise at source would reduce the total area of potential disturbance to harbour porpoise. However, it should also be noted that many of these measures may increase the total duration of disturbance from underwater noise during foundation installation and this should be a consideration in an assessment of their efficacy.
79. It should be noted that suitability of any noise mitigation system will be dependent on a number of factors including pile diameter and length, ground conditions, and water depth. These factors will be considered in any assessment of the efficacy of the measure. The information to inform this selection will be contingent on the selection of the chosen foundation type and supplier which will only be available once contracts are being finalised post consent and Financial Investment Decision (FID).

6.2.3 Measure 3: Scheduling of Pile Driving and UXO Clearance

80. Subject to the final design and programme of the proposed East Anglia TWO project alongside other offshore wind farms, and the potential for other management measures, refinement of the piling programme could potentially allow a reduction in the total in-combination area of disturbance from multiple projects, if required. This would reduce the area of the Southern North Sea SAC that harbour porpoise may be displaced from at any one time. It could also be used as a measure to reduce the duration of any in-combination continuous disturbance within a given time period (month, season or year).

81. The East Anglia TWO windfarm site is located within the Southern North Sea SAC winter area, therefore, the season in which, for example, UXO clearance is undertaken, could be considered to reduce the potential impacts on the winter area during the winter season.
82. Seasonal considerations for pile driving and UXO clearance may be applicable to other projects in order to restrict pile driving or UXO clearance to a season in which harbour porpoise are less reliant on part of the seasonal area of the Southern North Sea SAC.

6.2.4 Other Potential Measures

83. Given the time lag between consent and the start of offshore construction; it is possible that new measures will become available. The SIP should not be restricted only to potential measures at the time of consent.
84. The SIP allows the consideration and assessment of other relevant technologies or methodologies that may emerge in the future, such as deflagration of UXO. This will ensure that any new technologies or methods that may develop prior to construction can be used during construction of the project.

6.2.5 Measures Not Applicable

85. Changes in the location of wind turbines or offshore platforms are not included in the SIP as a potential project mitigation or management measure. The proposed East Anglia TWO project is located entirely within the Southern North Sea SAC winter area, as such it is not possible to relocate wind turbines or offshore platforms to locations outside the SNS SAC winter area, or to maximise distance from the SNS SAC boundary.

6.2.6 Assessment of Efficacy of Measures and Implementation

86. Prior to the potential implementation of project mitigation or management measures, an assessment of the ability of each measure (alone or in conjunction with other measures) will be required to ensure the approach is able to contribute to a reduction in disturbance to harbour porpoise within the SNS SAC. The assessment is expected to include a degree of likely confidence in each measure.
87. The proposed East Anglia TWO project will work with the MMO and other statutory consultees to ensure that any approach to such assessment, is done in timely manner, and using the most robust approach possible.
88. Following assessment of project mitigation and management measures, the proposed East Anglia TWO project will work with the MMO to develop a timescale for the delivery of any measures, an implementation plan, as well as agreeing any reporting or monitoring requirements. The implementation plan will include the approach to enforcement of the measures, and how any failures will be rectified.

89. It is anticipated that following the provision of the final management measures, details of acceptable levels of disturbance will be provided, as well as noise thresholds considered to disturb harbour porpoise. This will enable an approach to assessment to be agreed, which will then enable the requirements of any project mitigation and management measures employed by the proposed East Anglia TWO project to be identified and consulted upon, and appropriate implementation plans to be developed.

6.3 Other Mitigation Measures outside the Scope of the SIP

90. The project measures outlined in the SIP are in addition to the following mitigation secured within the MMMPs.
91. Embedded mitigation (i.e. those measures that have been incorporated into the design of the development to prevent or reduce any significant adverse effects) would include soft-start and ramp-up of piling activity in order to minimise potential impacts on physical and auditory injury. Appropriate mitigation measures considered adequate to exclude marine mammals from within a mitigation zone will be implemented prior to piling, to reduce the risk of any PTS.
92. The MMMP for piling will detail the proposed mitigation measures to reduce the risk of any physical or permanent auditory injury to marine mammals during all piling operations. This will include details of the embedded mitigation, for the soft-start, ramp-up and mitigation zone, as well as details of any further mitigation that could be required.
93. The MMMP for piling will be developed in the pre-construction period and will be based upon best available information and methodologies at that time in consultation with the relevant authorities.
94. A detailed MMMP will also be prepared for UXO clearance. The MMMP for UXO clearance will ensure there are effective mitigation measures to prevent the risk of any physical or permanent auditory injury to marine mammals, if UXO clearance is required. The MMMP for UXO clearance would be developed in the pre-construction period, when there is more detailed information on what UXO clearance could be required and what the most suitable mitigation measures are, based upon best available information and methodologies at that time, in consultation with the relevant authorities.
95. Mitigation for cumulative disturbance impacts will be discussed with the MMO and other relevant bodies, and options will be outlined within the SIP, where relevant (see **section 6.1**).

6.4 EPS Licence

96. An EPS Licence will be sought from the MMO supported by a detailed risk assessment of the potential risk to harbour porpoise (and any other EPS deemed necessary at the time of application) based on the finalised project parameters and piling schedule / details.
97. As discussed above and outlined in **Chapter 11 Marine Mammals** of the ES (document reference 6.1.11), the proposed East Anglia TWO project commits to the use of soft-start procedures and appropriate mitigation measures considered adequate to exclude marine mammals from within the mitigation zone to reduce the risk of physical and auditory injury to EPS as a result of underwater noise during pile driving activities.

6.5 Additional Marine Licence

98. Any requirements to implement noise abatement technology would be subject to additional Marine Licencing process, if required.

7 Summary

99. The management measures for the site are yet to be confirmed. Once further guidance from JNCC and Natural England is provided, this in principle SIP will be updated in consultation with the MMO and other relevant bodies.
100. The final SIP will be used to identify and assess any potential management or mitigation measures that could ensure '*no adverse effect*' on the SNS SAC for the significant disturbance of harbour porpoise based on the final design of the proposed East Anglia TWO project. The final SIP will also be used to record all consultation on the proposed project management or mitigation measures it contains.

8 References

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JNCC and Natural England (2019). Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations. Advice under Regulation 21 of The Conservation of Offshore Marine Habitats and Species Regulation 2017 and Regulation 37(3) of the Conservation of Habitats and Species Regulations 2017

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