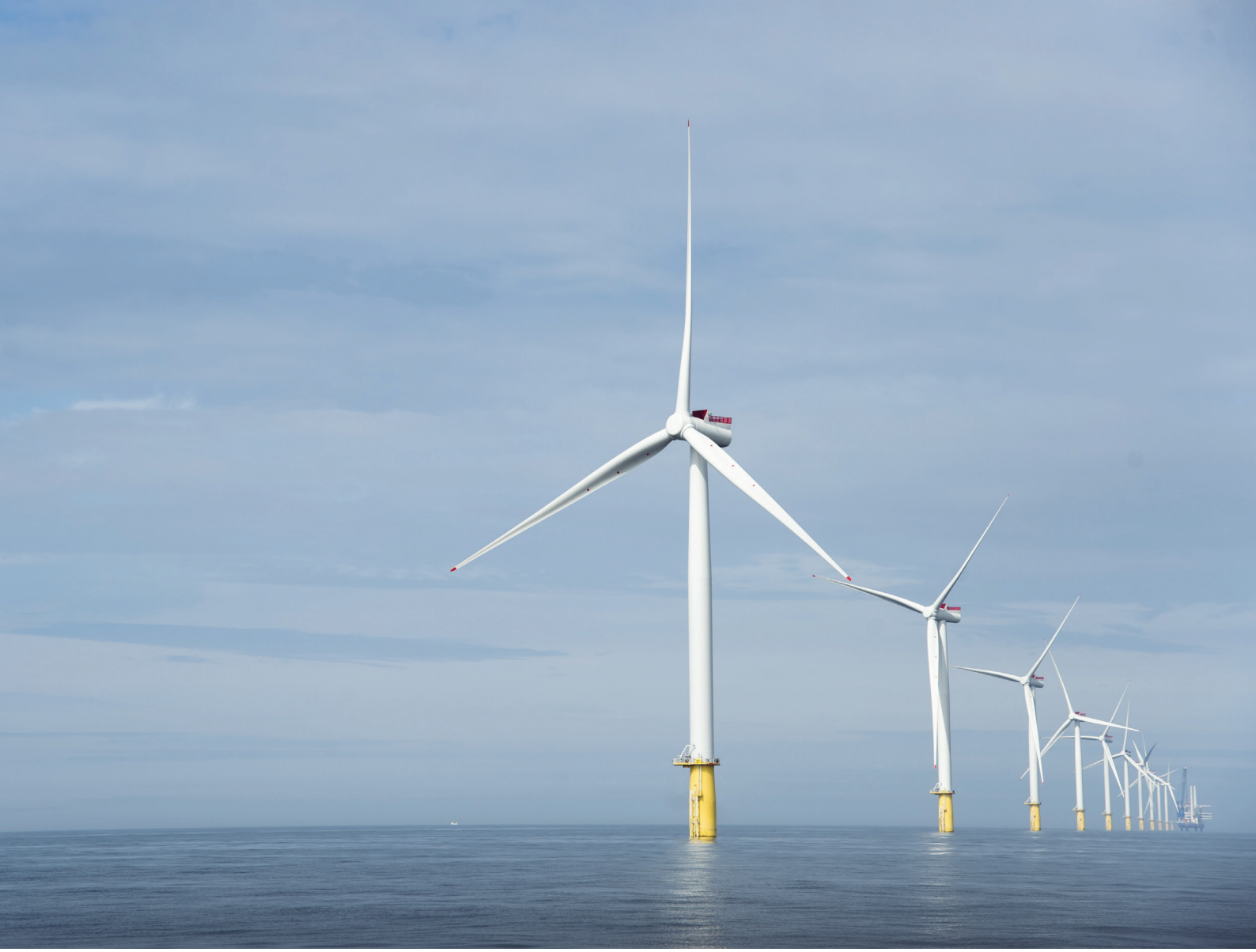

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

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

August 2022
Document Reference: 9.6
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Title**:** **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects** **DCO Application** **In Principle Site Integrity Plan for the Southern North Sea Special Area of Conservation**		
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Prepared by: **Royal HaskoningDHV**		
Approved by: **Sarah Chandler, Equinor**	Date: **August 2022**	

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Glossary of Acronyms

AA	Appropriate Assessment
AEOI	Adverse Effect on Integrity
BEIS	Department for Business, Energy and Industrial Strategy
CI	Confidence Interval
CV	Coefficient of Variation
DCO	Development Consent Order
DEP	Dudgeon Offshore Wind Farm Extension Project
DEPONS	Disturbance Effects of Noise on the Harbour Porpoise Population in the North Sea
DML	Deemed Marine Licence
DOW	Dudgeon Offshore Wind Farm
EDR	Effective Deterrent Radius
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
EPS	European Protected Species
ES	Environmental Statement
ETG	Expert Topic Group
FCS	Favourable Conservation Status
HRA	Habitats Regulations Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
JNCC	Joint Nature and Conservation Committee
km	Kilometre
km^2	Kilometre squared
kV	Kilovolt
LAT	Lowest Astronomical Tide
m	Metre
MMO	Marine Management Organisation
MMMP	Marine Mammal Mitigation Plan
MU	Management Unit
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PCoD	Population Consequences of Disturbance

RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SCANS	Small Cetaceans in the European Atlantic and North Sea
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SIP	Site Integrity Plan
SNCB	Statutory Nature Conservation Body
SNS	Southern North Sea
SoS	Secretary of State
SOW	Sheringham Shoal Offshore Wind Farm
TWT	The Wildlife Trusts
UK	United Kingdom
UXO	Unexploded Ordnance
WDC	Whale and Dolphin Conservation

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.
Designated site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.

SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.
Site Integrity Plan (SIP)	A plan detailing the commitments made by SEP and DEP to ensure no significant disturbance of harbour porpoise in the Southern North Sea (SNS) Special Area of Conservation (SAC) from underwater noise in-combination with other projects and activities.
The Applicant	Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited and Dudgeon Extension Limited are the named undertakers that have the benefit of the DCO. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

IN PRINCIPLE SITE INTEGRITY PLAN FOR THE SOUTHERN NORTH SEA SPECIAL AREA OF CONSERVATION

1.1 Introduction

1. This In Principle Site Integrity Plan (SIP) for the Southern North Sea (SNS) Special Area of Conservation (SAC) is for the proposed Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and the proposed Dudgeon Offshore Wind Farm Extension Project (DEP).
2. As the owners of SEP and DEP, Scira Extension Limited and Dudgeon Extension Limited are the named undertakers that have the benefit of the Development Consent Order (DCO). References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.
3. The In Principle SIP for the SNS SAC sets out the approach to delivering measures for SEP and DEP to ensure the avoidance of significant disturbance of harbour porpoise (*Phocoena phocoena)* during piling works, in relation to the SNS SAC Conservation Objectives.
4. The SNS SAC was designated for harbour porpoise in February 2019. Harbour porpoise is the primary and only listed feature of the site.
5. The SNS SAC has been recognised as an area with persistent high densities of harbour porpoise (Joint Nature and Conservation Committee (JNCC), 2017; JNCC and Natural England, 2019) and is the largest designated site for harbour porpoise in United Kingdom (UK) waters at the time of designation.

1.1.1 Purpose of this Document

6. The purpose of the In Principle SIP is to set out the approach for SEP and DEP to deliver potential mitigation measures that may be required to ensure the avoidance of Adverse Effect on Integrity (AEOI) of the designated feature of the SNS SAC (**Figure 8.1** of the **Report to Inform Appropriate Assessment (RIAA)** (document reference 5.4) shows the SNS SAC in relation to SEP and DEP).
7. The approach and measures in this In Principle SIP are in relation to SEP and DEP only and are in response to the conclusions of the **RIAA** (document reference 5.4). The **RIAA** concludes that, subject to the final design of SEP and DEP, and the actual in-combination scenario for offshore wind farm (OWF) projects that could be constructing at the same time, further mitigation and management measures may be necessary in relation to the potential in-combination effects of underwater noise during pile driving in order to ensure there will be no adverse effect on the designated feature of the SNS SAC.

8. Following completion of the Appropriate Assessment (AA) by the Competent Authority, it is acknowledged that the SIP may require revision to reflect the conclusions of the AA, the final design of SEP and DEP, and the actual in-combination scenario for OWF projects that could be constructing at the same time. The mitigation and management measures that may need to be secured in the final SIP at the pre-construction stage will be based on the AA as well as the final design of SEP and DEP, in relation to the potential in-combination effects of underwater noise during pile driving, in order to ensure there will be no AEOI on the designated feature of the SNS SAC.

9. It is also possible that mitigation and management measures will be required for other plans and projects located within the vicinity of SEP and DEP as part of the in-combination AA. However, it is not possible at this stage for the Applicant to detail what these will be or how they will be secured and therefore they are outside the scope of the In Principle SIP.

10. The In Principle SIP is based on the most appropriate project related measures, taking into account the current requirements, guidance, knowledge and proven available technology at the time of writing.

11. In its final form, the SIP will include any updated information on management measures, advice or guidance for the SNS SAC and the final design of SEP and DEP.

1.1.2 Scope of the Document

12. The scope of this document covers the potential for any significant disturbance of harbour porpoise from underwater noise during piling at SEP and DEP.

13. Any offshore unexploded ordnance (UXO) clearance required for SEP and DEP will be assessed and mitigation determined as part of a separate Marine Licence application at the pre-construction stage. Therefore, disturbance from underwater noise during UXO clearance at the SEP and DEP sites has not been included in this In Principle SIP as it will not be authorised under the DCO application for SEP and DEP.

14. It should be noted that the final Marine Mammal Mitigation Protocol (MMMP) to be produced at the pre-construction stage in accordance with the **Draft MMMP** (document reference 9.4) will provide details of the mitigation requirements during pile driving at SEP and DEP in relation to any physical or auditory injury to marine mammals, including harbour porpoise. In addition, any requirements to reduce disturbance in relation to European Protected Species (EPS) will be captured through the EPS Licensing process.

15. Indicative mitigation measures are outlined which would be developed in consultation with the Marine Management Organisation (MMO) and other relevant bodies (see **Section 1.3.2**) at the pre-construction stage, based on the final design of SEP and DEP. This document sets out how the Deemed Marine Licence (DML) Condition 14 of Schedules 10 and 11 (the Generation Deemed Marine Licences (DMLs)) and Condition 13 of Schedules 12 and 13 (the Transmission DMLs) will be met and provides a framework for further discussion and consultation by the Applicant with the MMO and other relevant stakeholders, including Statutory Nature Conservation Bodies (SNCB) and The Wildlife Trusts (TWT), to agree the exact details of any required project related management measures.

1.1.3 Draft Development Consent Order / Deemed Marine Licences

16. The final SIP will be submitted for approval by the MMO which is secured in within the DML conditions of the **Draft DCO** (document reference 3.1).

17. The **Draft DCO** contains the following SIP condition to the DMLs, as recommended by the MMO:

(1) No piling activities can take place until a Site Integrity Plan ("SIP"), which accords with the principles set out in the in principle Site Integrity Plan for the Southern North Sea Special Area of Conservation, has been submitted to, and approved in writing, by the MMO in consultation with the relevant statutory nature conservation body.

(2) The SIP submitted for approval must contain a description of the conservation objectives for the Southern North Sea Special Area of Conservation ("SNS SAC") as well as any relevant management measures and it must set out the key statutory nature conservation body advice on activities within the SNS SAC relating to piling as set out within the JNCC Guidance and how this has been considered in the context of the authorised scheme.

(3) The SIP must be submitted to the MMO no later than four months prior to the commencement of piling activities.

(4) In approving the SIP the MMO must be satisfied that the authorised scheme at the preconstruction stage, in-combination with other plans and projects, is in line with the JNCC Guidance.

(5) The approved SIP may be amended with the prior written approval of the MMO, in consultation with the relevant statutory nature conservation body, where the MMO remains satisfied that the Project, in-combination with other plans or projects at the pre-construction stage, is in line with the JNCC Guidance.

1.1.4 Project Background

18. SEP and DEP are proposed extensions to the existing Sheringham Shoal Offshore Wind Farm (SOW) and Dudgeon Offshore Wind Farm (DOW), located in the SNS off the north Norfolk Coast.

19. The SEP wind farm site will cover an area of approximately 97.0 kilometre squared (km^2) and the DEP wind farm site will cover an area of approximately 114.7km^2. The closest point to the coast is 15.8 kilometres (km) from SEP and 26.5km from DEP. Depths range from 14m below Lowest Astronomical Tide (LAT) in the northwest of SEP to 36m in the northwest of the DEP North array area.

20. The detailed design of SEP and DEP (e.g. numbers of wind turbines and foundation type) will not be determined until the post-consent stage. Therefore, realistic worst-case scenarios have been adopted within the assessment which ensures the mitigation and management measures within this In Principle SIP are precautionary and robust.

21. The indicative construction programme assumes that the earliest any offshore construction works would start is 2027.

22. Offshore construction works would require up to two years per project (excluding pre-construction activities such as surveys), assuming SEP and DEP were built at different times. If built at the same time, offshore construction could be completed in two years.

1.1.5 Requirement for this Document

23. Due to the long lead in times for the development of OWFs, it is not possible to provide final detailed method statements for piling prior to consent and, as a result, the detail of any required mitigation can also not 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 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.

24. This In Principle SIP reflects the commitment of SEP and DEP 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 final construction methods for SEP and DEP 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.

25. A final SIP will be produced at least four months prior to the commencement of pile driving, following revision and consultation, as per the outline schedule in **Section 1.2.1**.

26. The Applicant 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 1.2.1** provides an outline of the proposed schedule for refinement and sign-off for the final SIP.

27. The Applicant considers that the In Principle 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 construction methods for SEP and DEP 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 DML condition should the most suitable measures to be adopted change between the time of consent and construction.

28. Any requirements to implement noise abatement technology would be subject to additional marine licensing processes, if required.

1.2 Consultation

29. A draft version of the In Principle SIP for the SNS SAC was shared for consultation with the marine mammals Expert Topic Group (ETG) on the 1st of February 2022. The comments received and the Applicant's responses are provided in **Table 1**.

30. Consultation on the structure and content of the final SIP will be conducted with the MMO and other relevant SNCBs throughout its development and a full consultation log will be maintained.

31. There will be an ongoing requirement to review the need for project mitigation and management measures with the MMO and other relevant organisations. The Applicant will consult with Natural England, TWT and Whale and Dolphin Conservation (WDC) on the development of the SIP as project design and construction plans are progressed.

32. A consultation programme will be developed at the pre-construction stage.

Table 1: Pre-Application Consultation Comments Received on the Draft In Principle SIP for the SNS SAC

Consultee	Date / Document	Comment Received	Project Response
Natural England	11/03/22 / 13015 Consultation: 382532	**Section 1.1.2, Paragraph 13**: We consider that UXO clearance at DEP and SEP is a reasonably foreseeable plan/project that must be included in the actual/updated in-combination assessment for projects that could be occurring at the same time.	As agreed with the MMO and Natural England at the Marine mammals ETG3 meeting on the 20th July 2021, any offshore UXO clearance required for SEP and DEP will be assessed and mitigation determined as part of a separate Marine Licence application at the pre-construction stage. Therefore, disturbance from underwater noise during UXO clearance at the SEP and DEP offshore sites has not been included in this In Principle SIP as it will not be authorised under the DCO application for SEP and DEP. The potential for in-combination effects from UXO clearance at other sites during piling at SEP and DEP has been included in the assessment.
Natural England	11/03/22 / 13015 Consultation: 382532	**Section 1.1.5**: We note that the indicative milestones for the SIP are reflected in Table 2. Please be advised, Natural England is currently undertaking internal discussion to agree a consistent position on the timing of SIP submission and will advise as soon as a standard practice is agreed internally. Further, we would welcome the securing of this in a licence condition.	Noted.
Natural England	11/03/22 / 13015 Consultation: 382532	We advise that any mitigation measures that are targeted at the reduction of the impact from DEP and SEP in isolation and together, but not in-combination with other plans or projects, should be detailed in the ES and secured through the DCO. The SIP should not be used to mitigate project alone effects, as these should already have been considered in full at the ES stage. We strongly advise that serious consideration is given to any mitigation measures that can be secured at this stage,	The SIP acts as the commitment by SEP and DEP to ensure no significant disturbance of harbour porpoise in the SNS SAC from underwater noise in-combination with other projects and activities. Therefore, **Section 1.5.1** includes the in-combination assessment from the RIAA.

Consultee	Date / Document	Comment Received	Project Response
		thereby reducing the overall project envelope (with regards to underwater noise disturbance).	Mitigation measures that are targeted at the reduction of the impact from SEP or DEP in isolation and SEP and DEP, but not in-combination with other plans or projects, are detailed in the **ES Chapter 10 Marine Mammal Ecology** (document referenced 3.1) and secured through the **Draft DCO** (document referenced 3.1). All mitigation measures that can be secured at this stage have been given serious consideration. However, further mitigation or management measures to reduce in-combination effects, if required, cannot be determined until the final project design has been agreed, including foundation type and installation method, and the final in-combination scenario agreed, which will be developed for the final SIP.

Consultee	Date / Document	Comment Received	Project Response
Natural England	11/03/22 / 13015 Consultation: 382532	**Section 1.5.1, Paragraph 68**: We advise that it is for the Regulators to determine an appropriate system to manage multiple projects with different lead in times, some of which are subject to the SIP process where others are not. We are concerned that projects with longer lead in times, like Offshore Wind Farms (OWFs), may essentially "book" a portion of the thresholds and so exclude other activities from occurring at the same time, which may particularly disadvantage other industries with shorter lead in times. We are also concerned with the headroom approach as there is no evidence of what other activities may be or when they may occur and therefore no way of knowing if sufficient 'headroom' has been left for them to take place and to remain within the thresholds.	The Applicant notes Natural England's concerns however the Applicant considers that the use of a SIP is an accepted and recognised method by which impacts from OWFs can be managed. The SIP provides an adaptive management framework to allow the MMO to regulate underwater noise, with the exact mechanism determined at a point in time where detailed design information is available. Where other projects are not subject to a SIP, the Applicant understands that the MMOs SNS Regulators Working Group is developing options for a noise management mechanism which takes account of the different industry and regulatory needs.
Natural England	11/03/22 / 13015 Consultation: 382532	**Section 1.6, Paragraphs 85-92**: We are supportive in principle of the possible mitigation measures included in the draft In-Principle SIP, which include: • Use of different foundation types and installation methods; • Noise mitigation systems; • Schedules of pile driving (including scheduling by regulators, and possible seasonal restrictions); and • Other potential measures. Generally, we are also supportive of the Regulators developing potential strategic management measures to achieve a coordinated approach with other developers.	Noted.

Consultee	Date / Document	Comment Received	Project Response
Natural England	11/03/22 / 13015 Consultation: 382532	**Section 1.6.2, Paragraph 88**: While, the use of noise mitigation systems may increase the duration of piling, we advise that, based on analysis of the data on JNCC's Marine Noise Registry, thus far the daily thresholds have been much closer to being exceeded than the seasonal threshold. We therefore consider noise mitigation systems as a useful tool in ensuring that the thresholds for significant disturbance are not exceeded.	Noise mitigation systems, as outlined in **Section 1.6.2**, are considered in the In Principle SIP. However, as outlined above, mitigation measures to reduce in-combination effects, if required, cannot be determined until the final project design has been agreed, including foundation type and installation method, and the final in-combination scenario agreed, which will be developed for the final SIP.
Marine Management Organisation	01/03/22 / DCO/2019/00004	**Section 1.1.3, Paragraph 16**: The MMO note that the final SIP will be submitted for approval to the MMO via a condition secured within the Deemed Marine Licenses ("DMLs") of the Development Consent Order("DCO"). The Applicant has provided an example of the expected wording, which is based on the Norfolk Boreas DCO Project. The Norfolk Boreas DCO was submitted for consent during the Review of Consents ("RoC"), which was undertaken by the Secretary of State for the Department for Business Energy and Industrial Strategy alongside the MMO, following the formal adoption of the Southern North Sea SAC in February 2019.	Noted.
Marine Management Organisation	01/03/22 / DCO/2019/00004		

Consultee	Date / Document	Comment Received	Project Response
		Following the RoC the MMO has had the opportunity to review and refine this condition, and following discussions on the wording of the SIP condition can recommend the following wording: 1. No piling activities can take place until a Site Integrity Plan (SIP), which accords with the principles set out in the in principle XX Project Southern North Sea SAC Site Integrity Plan, has been submitted to, and approved in writing, by the MMO in consultation with the relevant statutory nature conservation body. 2. The SIP submitted for approval must contain a description of the conservation objectives for the Southern North Sea Special Area of Conservation (SNS SAC) as well as any relevant management measures and it must set out the key statutory nature conservation body advice on activities within the SNS SAC relating to piling as set out within the JNCC Guidance and how this has been considered in the context of the authorised scheme. 3. The SIP must be submitted to the MMO no later than six months prior to the commencement of the piling activities. 4. In approving the SIP the MMO must be satisfied that the authorised scheme at the preconstruction stage, in-combination with other plans and projects, is in line with the JNCC Guidance. 5. The approved SIP may be amended with the prior written approval of the MMO, in consultation with the relevant statutory nature conservation body, where the MMO remains satisfied that the Project, in-combination with other plans or projects at the pre-construction stage, is in line with the JNCC Guidance.	The wording of the SIP condition, that has been included in the **Draft DCO** is outlined in **Section 1.1.3**.

1.2.1 Schedule for Agreement

33. It is not possible at this stage to determine exact dates for agreement and refinement of the final SIP. However, the key milestones have been outlined in **Table 2** to indicate the likely development of the SIP from its current in principle status to the final version between consent award and the start of construction.

Table 2: Indicative Milestones for Refinement of the In Principle SIP towards Agreement of the Final SIP Pre-Construction

Indicative Stage	When	Action for the Applicant	Relevant Authority / Consultee	Status
Draft In Principle SIP	Prior to DCO submission	Draft In principle SIP to be sent out for review prior to DCO submission	MMO and Natural England; TWT	Complete
In Principle SIP	DCO submission	In principle SIP to be submitted with DCO application	Secretary of State (SoS)	This document
Update to In Principle SIP (if required)	During DCO examination process	If required, the In Principle SIP will be reviewed and updated during the DCO examination process	MMO and Natural England; TWT	To be completed
Consent determination and AA	Upon consent determination	Review In Principle SIP, identify areas for revisions/updates which will need to be carried forward into the final SIP.	Internal only	To be completed
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
Preparation and consultation on draft Final SIP	Approximately 12 months prior to commencement of pile driving	The SIP will be updated to capture all relevant assessments and mitigation measures.	MMO, Natural England, TWT and WDC	To be completed
Final design	Approximately six to nine months prior to construction	Provide project details relevant to the SIP. In addition, accompanying environmental information, including an assessment of the efficacy of mitigation or management measures will be provided.	MMO, Natural England; with copies sent to TWT and WDC	To be completed
Final SIP approval	Approximately four months prior to commencement of pile driving	The SIP will be updated and finalised. Within the final SIP, an implementation plan and details of any monitoring requirements to assess the	MMO for approval	To be completed

Indicative Stage	When	Action for the Applicant	Relevant Authority / Consultee	Status
		effectiveness of mitigation measures will be included. The final SIP will be submitted for approval approximately four months prior to the commencement of pile driving for written approval from the MMO prior to any piling works commencing.		
Construction monitoring and reporting	Construction	Monitoring/management reports will be submitted to the MMO.	MMO	To be completed

1.3 Southern North Sea SAC for Harbour Porpoise

34. The SNS SAC has been recognised as an area with persistent high densities of harbour porpoise (Joint Nature and Conservation Committee (JNCC), 2017; JNCC and Natural England, 2019) and is the largest designated site for harbour porpoise in the UK and European waters at the time of designation. The SNS SAC is located within the North Sea Management Unit (MU) for harbour porpoise (Inter-Agency Marine Mammal Working Group (IAMMWG), 2022).

35. The SNS SAC has a surface area of 36,951km^2 and covers both winter and summer habitats of importance to harbour porpoise, with approximately 27,028km^2 of the site being important in the summer period (183 days from April to September inclusive) and 12,696km^2 of the site being important in the winter period (182 days from October to March inclusive) (JNCC, 2017; JNCC *et al*., 2020).

36. The closest point to the SEP wind farm site is 25.6km from the SNS SAC winter area and the closest point to the DEP wind farm site is 13.9km from the SNS SAC summer area (**Table 3** and see **Figure 8.1** of the **RIAA** (document reference 5.4)).

Table 3: Distances of SEP and DEP to SNS SAC Summer and Winter Areas

Location	Closest point to SNS SAC summer area (km)	Closest point to SNS SAC winter area (km)
SEP wind farm site	31.1	25.6
DEP wind farm site	13.9	18.9

37. The majority of the site is less than 40m in depth, reaching up to 75m in the northern most areas. The sea bed is mainly sublittoral sand and sublittoral coarse sediment (JNCC, 2017). The site overlaps with a number of existing designated 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 bed features.

38. The SNS SAC Site Selection Report (JNCC, 2017) identified 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 Small Cetaceans in European Atlantic waters and the North Sea (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 assessment of effects of plans or projects on the site (i.e. Habitats Regulations 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).

1.3.1 Conservation Objectives

39. 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.

40. 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:*
>
> - *Harbour porpoise is a viable component of the site;*
> - *There is no significant disturbance of the species; and*
> - *The condition of supporting habitats and processes, and the availability of prey is maintained.*

41. These Conservation Objectives are "*a set of specified objectives that must be met to ensure that the site contributes in the best possible way to achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level*" (JNCC and Natural England, 2019).

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

42. This Conservation Objective is designed to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the SAC. Specifically, this objective is primarily concerned with operations that would result in unacceptable levels of impact on harbour porpoise using the SAC. Unacceptable levels are defined as those that would have an impact upon the FCS of the population of the species in their natural range.

43. Harbour porpoise are considered to be a *viable component of the site* if they are able to live successfully within it. This SAC has been selected primarily for its long term, relatively higher densities of harbour porpoise in contrast with other areas of the North Sea. The implication is that it provides relatively good habitat for foraging and may also be used for breeding and calving (JNCC and Natural England 2019). However, because the number of harbour porpoise using the site naturally varies there is no exact value for the number of animals expected within the site (JNCC and Natural England, 2019).

44. 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 Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. Under these Regulations, it is an offence if harbour porpoise are deliberately disturbed in such a way as to:

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

45. 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"*.

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

46. Disturbance of harbour porpoise typically, but not exclusively, originates from operations that cause underwater noise, including activities such as 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 SAC should be managed to ensure that any individuals potential usage of the site is maintained.

47. JNCC *et al*. (2020) have produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise.

48. 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. The current SNCB guidance for the assessment of significant noise disturbance on harbour porpoise in the SNS SAC (JNCC *et al*., 2020) is that:

> "*Noise disturbance within an SAC from a plan/project individually or in combination, is significant if it excludes harbour porpoises from more than:*
>
> - *20% of the relevant area[1] of the site in any given day[2], or*
> - *an average of 10% of the relevant area of the site over a season[3, 4]".*

[1] The relevant area is defined as that part of the SAC that was designated on the basis of higher persistent densities for that season (summer defined as April to September inclusive, winter as October to March inclusive).
[2] To be considered within the HRA and, if needed, licence conditions should ensure that daily thresholds are not exceeded. Day to day monitoring of compliance is not practicable and therefore retrospective compliance monitoring is required to test whether the licence conditions are being adhered to.
[3] Summer defined as April to September inclusive, winter as October to March inclusive.
[4] For example, a daily footprint of 19% for 95 days would result in an average of 19x95/183 days (summer) = 9.86%

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

49. Within this Conservation Objective, supporting habitats relates to the characteristics of the sea bed 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 harbour porpoise using the SAC. 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.

50. 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.

1.3.2 Management Measures

51. Specific management measures are yet to be developed for the SNS SAC, however JNCC and Natural England (2019) 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'*.

52. JNCC and Natural England (2019) 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'*.

1.3.3 Advice on Activities

53. 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 site integrity. The key impacts and activities that JNCC and Natural England (2019) consider as having 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.

54. 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).

1.4 Project Description

55. A full description of the SEP and DEP design envelope is presented in the Environmental Statement (ES) (see **Chapter 4 Project Description** and **Chapter 10 Marine Mammals**). This section will be completed as the final project design is confirmed at the pre-construction stage.

1.5 Approach to Assessing Potential In-Combination Effects

56. The approach to the in-combination assessment for the potential disturbance of harbour porpoise in the SNS SAC summer area from underwater noise follows the current advice from the SNCBs (currently JNCC *et al*., 2020), that:

- Displacement of harbour porpoise should not exceed 20% of the relevant area of the site in any given day or on average exceed 10% of the relevant area of the site over a season.
- The effect of the project should be considered in the context of the seasonal components of the SAC area, rather than the SAC area as a whole.
- For monopiles, a distance of 26km (Effective Deterrent Radius; EDR) from an individual percussive piling location should be used to assess the area of SAC habitat that harbour porpoise may be disturbed from during piling operations for monopiles, with a potential disturbance area of 2,124km^2.

57. The JNCC *et al*. (2020) recommended EDRs are not equivalent to 100% deterrence/disturbance in the associated area (i.e. some animals show greater reaction than others) but nor do they represent the limit range at which effects have been detected.

58. The summer area is approximately 27,028km^2 and the summer period is from 1st April to 30th September (183 days) and the winter area is approximately 12,696km^2 and the winter period is from 1st October to 31st March (182 days) (JNCC *et al*., 2020).

59. The seasonal averages are calculated by multiplying the average potential area of effect on any one day by the proportion of days within the season piling could occur (i.e. taking into account the average area of overlap with the summer area of the SNS SAC and number of piling days in that season). For example, a daily footprint of 19% for 95 days would result in an average of 19x95/183 days (summer) = 9.86% (JNCC *et al*., 2020).

60. Seasonal averages are assessed based on the number of piling days in the summer period that could overlap with the summer area of the SAC and the number of piling days in the winter period that could overlap with the winter area of the SAC. This is be based on the worst-case and include an additional two days recovery period (as assessed in Department for Business, Energy and Industrial Strategy (BEIS) (2020)).

61. The number of harbour porpoise that could be disturbed is based on the latest density estimates from the SCANS-III survey (Hammond *et al*., 2021). The reference population for harbour porpoise is the North Sea MU. Currently the population estimate for the harbour porpoise North Sea MU is 346,601 (coefficient of variation (CV) = 0.09; 95% Confidence Interval (CI) = 289,498 – 419,967; IAMMWG, 2022).

1.5.1 Assessment of Potential In-Combination Effects

62. There is the potential for in-combination effects from underwater noise with other projects and activities during piling at SEP and DEP to disturb harbour porpoise in the SNS SAC summer and winter areas.

63. The approach to the in-combination assessments for the disturbance of harbour porpoise follows the current advice from the SNCBs (JNCC *et al*., 2020), using the recommended EDRs for activities that could generate underwater noise.

64. The in-combination assessment is based on both SEP and DEP being constructed at the same time, as the worst-case scenario. If only SEP or DEP were to be developed, all potential in-combination effects would be less than those assessed.

65. Further details are provided in **Chapter 8** of the **RIAA**.

66. The in-combination assessments are based on the maximum potential overlap with SNS SAC summer and winter areas based on 26km EDR at closest point for SEP and DEP (**Table 4**).

Table 4: Maximum Potential Overlap with SNS SAC Summer and Winter Areas Based on 26km EDR at Closest Point for SEP and DEP

Location	Maximum area of overlap with SNS SAC summer area (% of SNS SAC summer area)	Maximum area of overlap with SNS SAC winter area (% of SNS SAC winter area)
SEP & DEP	356km^2 (1.32%)	32.7km^2 (0.26%)

67. For the potential in-combination scenarios, other noise generating activities where there is a high likelihood that the activity could occur at the same time as piling at SEP and DEP has been determined. This is to ensure that the SIP provides a realistic in-combination assessment for the activities that could be occurring at the same time.

68. The approach to the in-combination assessments is based on a precautionary approach to determine the worst-case scenario for piling and / or other activities that could result in underwater noise and the potential disturbance of harbour porpoise in the SNS SAC. As previously outlined, the in-combination assessment will be reviewed and updated as the SIP is developed, and more information is available on the schedules for other projects and activities.

69. Activities and other noise sources considered for in-combination effects of underwater noise which could disturb harbour porpoise currently include:

- piling at OWFs, including SEP and DEP
- other construction activities at OWFs (vessels, cable installation works, dredging, sea bed preparation and rock placement)
- geophysical surveys for other OWFs
- aggregate extraction and dredging
- subsea cable and pipelines
- oil and gas seismic surveys
- UXO clearance (other than for SEP and DEP)

70. The potential piling period for SEP and DEP has been based on the widest likely range of offshore construction and piling dates, dependent on the construction scenario, as a very precautionary approach. It should be noted that while the projects included within the assessment have the potential to overlap with SEP and DEP, there is a lot of uncertainty on when OWFs could be piling. This assessment is therefore considered worst-case.

71. Under the SNCB guidance for assessing the potential for effect from disturbance as a result of piling, it is important to consider projects that have the potential for disturbance effects to overlap with the SNS SAC. Therefore, OWF projects that are either within the SNS SAC, or within 26km of the SNS SAC included in the assessment are:

- Dogger Bank South is within the summer area.
- East Anglia ONE North is within the winter area, and partly within the summer area.
- East Anglia TWO is within the winter area, and partly within 26km of the summer area.
- Five Estuaries is within the winter area.
- Hornsea Project Four is within the summer area.
- North Falls is within the winter area.
- Outer Dowsing is within the summer area.

72. The in-combination assessment has been based on a single piling event within SEP or DEP, with single piling occurring in the other OWFs, as it is considered unlikely that all OWFs would or could be undertaking simultaneous piling all at the same time.

73. The approach to the in-combination assessment, based on single piling, would allow for some of the OWFs not to be piling at the same time while others could be simultaneously piling. This is considered to be the most realistic worst-case scenario, as it is highly unlikely that all OWFs would or could be simultaneously piling at exactly the same time or even on the same day as piling at SEP and / or DEP.

74. The assessments for all OWFs are based on the worst-case for piling of monopiles with no noise abatement or reduction (26km EDR). It should be noted that the potential areas of disturbance assume that there is no overlap in the areas of disturbance between different projects and are therefore highly conservative.

75. The potential in-combination effects from all potential noise sources during piling at SEP and DEP are summarised in **Table 5**.

76. Based on the worst-case scenarios and precautionary approach, there is the potential for up to 34.5% of the summer area, with a seasonal average of 6.21%, or up to 69.6% of the winter area, with a seasonal average of 12.0%, to be affected. With up to 18,181 harbour porpoise (5.25% of the NS MU reference population) potentially disturbed (**Table 5**).

77. Therefore, the development of the SIP for SEP and DEP and SIPs for other OWF projects will be required to deliver the appropriate mitigation and management measures across projects and management by the MMO, to ensure that there would be no significant disturbance and no AEOI of the Southern North Sea SAC in relation to the conservation objectives for harbour porpoise.

78. As both SEP and DEP are located outside of the SNS SAC summer and winter areas, there is the potential for several options to reduce the potential contribution to the underwater noise in-combination effects, as outlined in **Section 1.6.3**.

Table 5: Overall In-Combination Assessment for the Potential Disturbance of Harbour Porpoise from All Possible Noise Sources during Piling at SEP and DEP

Potential noise source	Area of disturbance of the SNS SAC summer area	Area of disturbance of the SNS SAC winter area	Seasonal average for summer area	Seasonal average for winter area	Potential number of harbour porpoise disturbed (% of NS MU)
Piling at OWFs including piling at SEP and DEP	5,733.75km^2	5,978.7km^2	3.82%	8.54%	16,310 (4.7% of the NS MU)
Non-piling construction activities and vessels at other OWFs	11.52km^2	0	0.01%	0	14 (0.004% of the NS MU)
Geophysical surveys	512km^2	256km^2	0.34%	0.37%	266 (0.08% of the NS MU)
Aggregate extraction and dredging	12.43km^2	12.43km^2	0.008%	0.018%	6 (0.002% of the NS MU)
Subsea cables and pipelines	18.84km^2	18.84km^2	0.013%	0.027%	10 (0.003% of the NS MU)
Seismic surveys	904.8km^2	452.4km^2	0.60%	0.65%	470 (0.1% of the NS MU)
UXO clearance	2,123.7km^2	2,123.7km^2	1.42%	2.39%	1,104 (0.3% of the NS MU)
Total (seasonal average based on up to 33 days in summer and 26 days in winter for piling at SEP and DEP)	**9,317km^2 (34.5% of the summer area)**	**8,842km^2 (69.6% of the winter area)**	**6.21%**	**12.0%**	**18,181 (5.25% of the NS MU)**
Potential for significant disturbance of harbour porpoise in SNS SAC	**Yes Exceeds 20% of summer SNS SAC area**	**Yes Exceeds 20% of winter SNS SAC area**	**No Less than 10% seasonal average for summer SNS SAC area**	**Yes Exceeds 10% seasonal average for winter SNS SAC area**	**Yes More than 5% of NS MU temporarily affected**

1.6 In Principle Management and Mitigation Measures

79. 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 reduce the in-combination effects of underwater noise disturbing harbour porpoise in the SNS SAC during pile driving at SEP and DEP.

80. For each of the measures, information will be provided in the final SIP 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. The final SIP will also provide details of measures that will not be implemented with justification.

81. 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 final design parameters for SEP and DEP have not yet been determined, and the **RIAA** (document reference 5.4) was based on the predicted worst-case scenario;
- The final design and programme of other plans and projects has not yet been determined, and therefore the actual in-combination scenario is currently unknown; and
- Potential strategic management measures such as scheduling of pile driving (**Section 1.6.3**) would need to be carefully managed to achieve a coordinated approach with other developers. The mechanism for managing activities is currently being developed by the MMO as part of the SNS Regulators Forum which includes the SNS activity tracker[5].

82. 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 and an assessment of the efficacy of proposed management measures.

83. 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 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.

[5] https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation#offshore-petroleum-activities-conservation-of-habitats-regulations-2001-as-amended

84. Potential mitigation that could be delivered by the SEP and DEP 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 SNS 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 SNS SAC.

1.6.1 Measure 1: Different Foundation Types and Installation Methods

85. The use of different foundation types and installation methods within the consented project envelope, such as suction bucket and gravity base structure foundations, will be considered and assessed during the final design of SEP and DEP. This will include consideration of relevant technologies or methodologies, based on technical feasibility and commercial availability. This would be informed by pre-construction site investigation and technology developments. If possible, the use of foundation types and/or installation methodologies other than pile driving would result in lower noise levels during the construction of the wind farms.

86. Developments are on-going in relation to various methods (such as double walled piles), which also have the potential to greatly reduce the area of potential disturbance from pile driving.

1.6.2 Measure 2: Noise Mitigation Systems

87. 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.

88. 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.

89. 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.

1.6.3 Measure 3: Scheduling of Pile Driving

90. Subject to the final design and programme of SEP and DEP alongside other OWFs, 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 SNS 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).

91. The SEP and DEP wind farm sites are not located within the SNS SAC summer or winter area, however, based on a 26km EDR for monopiles (without mitigation), there is the potential for the disturbance area to overlap with the SNS SAC (**Table 3**). Therefore, the location and season in which piling is undertaken will be considered to reduce the potential impacts on the seasonal areas.

1.6.4 Other Potential Measures

92. Given the time lag between consent and the start of offshore construction, it is possible that new measures will become available. As such, the final SIP will not be restricted only to potential measures outlined above. Rather, the SIP allows the consideration and assessment of other relevant technologies or methodologies that may have emerged by the time of offshore construction. This will ensure that any new technologies or methods that may be developed can be used during construction of SEP and DEP.

1.6.5 Assessment of Efficacy of Measures and Implementation

93. 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.

94. The Applicant will work with the MMO and other consultees to ensure that any approach to such assessment, is done in timely manner, and using the most robust approach possible.

95. Following assessment of project mitigation and management measures, the Applicant 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.

1.6.6 Population Modelling

96. If required, population modelling, such as Population Consequences of Disturbance (PCoD) or Disturbance Effects of Noise on the Harbour Porpoise Population in the North Sea (DEPONS), will be considered in developing the SIP. Population modelling would allow consideration of the biological fitness consequences of disturbance from underwater noise, and the conclusions of a quantitative assessment to be put into a population level context.

1.6.7 EPS Licence

97. 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.

1.6.8 Additional Marine Licence/s

98. Any requirements to implement noise abatement technology could be subject to additional marine licensing processes, as required.

1.7 Summary

99. 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 SEP and DEP. The final SIP will also be used to record all consultation on the proposed project management or mitigation measures it contains.

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