

East Anglia ONE North Offshore Windfarm

Appendix 11.1

Marine Mammals Consultation Responses

Environmental Statement Volume 3

Applicant: East Anglia ONE North Limited
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Table A11.1.1	Marine Mammals Consultation Responses

Glossary of Acronyms

ADD	Acoustic Deterrent Device
CIA	Cumulative Impact Assessment
dB	Decibel
DCO	Development Consent Order
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries Organisation
EMF	Electro Magnetic Field
EPP	Evidence Plan Process
EPS	European Protected Species
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Appraisal
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MU	Management Unit
MW	Megawatt
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
ORJIP	Offshore Renewable Joint Industry Programme
PAM	Passive Acoustic Monitoring
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SCANS	Small Cetacean in European Atlantic waters and the North Sea
SCI	Site of Community Importance
SEL	Sound Exposure Level
SIP	Site Integrity Plan
SNCB	Statutory Nature Conservation Body
SNS	Southern North Sea
SPR	ScottishPower Renewables
TWT	The Wildlife Trust
UXO	Unexploded Ordnance
WDC	Whale and Dolphin Conservation Society

Glossary of Terminology

Applicant	East Anglia TWO Limited
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one offshore construction operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
Horizontal directional drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
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.
Meteorological mast	An offshore structure which contains metrological instruments used for wind data acquisition.
Marking buoys	Buoys to delineate spatial features / restrictions within the offshore development area.
Offshore cable corridor	This is the area which will contain the offshore export cables between offshore electrical platforms and landfall transition jointing bays located at landfall.
Offshore development area	The East Anglia ONE North windfarm site and offshore cable corridor (up to Mean High Water Springs).
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 platform	A collective term for the offshore construction operation and maintenance platform and the offshore electrical platforms.
Platform link cable	An electrical cable which links one or more offshore platforms, this will include fibre optic cables.
Safety zones	A marine area declared for the purposes of safety around a renewable energy installation or works / construction area under the Energy Act 2004.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water

11.1 Marine Mammals Consultation Responses

11.1 Introduction

1. This appendix covers those statutory consultation responses that have been received as a response to the Scoping Report (SPR 2017), the Preliminary Environmental Information Report (PEIR) (SPR 2019), the draft Habitats Regulations Appraisal (HRA) (SPR 2019a) submitted as part of Section 42 consultation and Expert Topic Group (ETG) Meetings.
2. Responses from stakeholders and regard given by the Applicant have been captured in **Table A11.1.1** for responses to the Scoping Report, PEIR and ETG meetings.
3. As Section 42 consultation for the proposed East Anglia ONE North project was conducted in parallel with the proposed East Anglia TWO project, where appropriate, stakeholder comments which were specific to East Anglia TWO, but may be of relevance East Anglia ONE North, have also been included in the consultation responses for East Anglia ONE North.

Table A11.1.1 Consultation Responses Related to Chapter 11 Marine Mammals

Consultee	Date/ Document	Comment	Response / where addressed in the ES
<p>The following comments were received prior to consultation on the PEIR and were in response to the Scoping Report or direct consultation with stakeholders. These comments were taken into account in the production of the PEIR.</p>			
Natural England	08/12/2017 Scoping Response	Please can it be considered that the site selection document for the Southern North Sea candidate Special Area of Conservation (cSAC; now SAC) states it is estimated the site supports approximately 18,500 individuals (harbour porpoise) and this number should not be referred to as an estimated population. Therefore, Natural England considers impacts should be assessed against the North Sea MU reference population only.	Impacts for the Southern North Sea (SNS) SAC have been assessed against the North Sea Management Unit (MU) population throughout the ES.
Natural England	08/12/2017 Scoping Response	Natural England notes that barrier effects are not explicitly listed as a potential impact.	Any potential barrier effects as result of underwater noise has been considered within the ES in section 11.6.1.7 of this chapter.
Natural England	08/12/2017 Scoping Response	Natural England agrees that the focus of the assessment should be harbour porpoise, grey seal and harbour seal. However, we note that dolphin species and minke whale have been captured in survey data and impacts to these species may need to be considered, particularly in relation to the use of Acoustic Deterrent Devices (ADDs). Work has been undertaken on this issue through the Offshore Renewables Joint Industry Programme (ORJIP) which is due to report soon and will be able to inform future discussions.	The primary species assessed in the ES are harbour porpoise, grey seal and harbour seal, however, the presence and therefore the potential for impact of minke whale and white-beaked dolphin around the East Anglia TWO windfarm site has been considered in Appendix 11.2 and screened out of further assessment. The use of ADDs and the ORJIP report will be reviewed when preparing the Marine Mammal Mitigation Protocol (MMMP). The Applicant will review best practice mitigation prior to construction.
Natural England	08/12/2017	Natural England does not consider that disturbance at seals haul-out sites should be scoped out. The nearest haul-out	Through the EPP, Natural England have agreed that direct disturbance at seal haul-out sites can be scoped out

Consultee	Date/ Document	Comment	Response / where addressed in the ES
	Scoping Response	site may be tens of kilometres away from the landfall location, but until factors such as the port to be used during construction and the increased level of vessel movements are known, they have the potential to impact seals at haul-out sites and this should be included in the assessment.	of the EIA. The potential interaction of seal foraging areas and the East Anglia TWO offshore development area have been assessed in sections 11.5.2 and 11.5.3 of this chapter and Appendix 11.2 .
Natural England	08/12/2017 Scoping Response	Natural England welcomes the precautionary approach of using the higher of the SCANS-III and site specific density estimates for the assessment.	Noted.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	The Projects are within the Southern North Sea cSAC for which the harbour porpoise is the qualifying feature. The EIA should take into account the legal obligation that any assessment must include a detailed assessment of impacts against the Conservation Objectives of the site - that the site integrity must be maintained and that there is no adverse impact on the population of harbour porpoise within the site, either from the Projects alone or cumulatively. Site based protection cannot be met by assessing the whole North Sea population, but only by assessing the impacts for the number of individuals that are supported by the site (Rees et al. 2015).	Natural England considers impacts should be assessed against the North Sea MU reference population only. This is done in the Report to Inform the Habitats Regulations Assessment. Through ETG 3 on 9 th January 2019, it was agreed that assessment of potential impacts for the SNS SAC “population” would be provided to ETG members as a standalone document. However, this will not be included as part of the ES or DCO Application.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	Our primary concern surrounds the intense noise pollution resulting from pile driving for all cetacean species in the region. This is a particular concern for harbour porpoises as research has shown they are particularly sensitive to noise pollution from pile driving (James 2013). We would recommend that pile driven foundations are not used and are scoped out of the Projects, and that alternative foundations included in the Scoping Reports are used	At this stage, the option for piling foundations cannot be scoped out and has therefore been assessed as the worst-case scenario. Impacts of underwater noise have been fully considered in the ES. See section 11.6 of this chapter.

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		instead. The noise from pile driving has the potential to in particular, cause habitat displacement, changes in habitat use and prey availability. Studies analysing foraging rates in harbour porpoise found that they feed almost continuously to meet energy needs and are therefore highly sensitive to disturbance (Wisniewska et al. 2016).	However, as outlined in section 11.3.2 of this chapter, a range of foundation options is currently being considered including suction caisson and gravity base.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	A HRA will be required, and we are pleased to see this has been acknowledged in the Scoping Reports. The HRA must consider not only the project independently, but also cumulatively taking into account other plans and projects that will impact the harbour porpoise at both a site and population level.	An in-combination assessment is included in the Information to Support Appropriate Assessment Report (document reference 5.3).
Whale and Dolphin Conservation	19/12/2017 Scoping Response	WDC do not consider 'soft-start' to be an adequate mitigation measure to ensure there are no significant impacts. Whilst a common sense measure, soft start is not a proven mitigation technique and so cannot be relied upon to mitigate impacts, especially for developments in important and critical habitat areas.	Noted. The Applicant will review best practice mitigation at the time of construction. Possible mitigation measures, including embedded mitigation are outlined in section 11.3.3 of this chapter.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	We are aware of the JNCC protocol for using MMOs to ensure that no marine mammals are within 500m of a pile driving site before commencing pile-driving. We feel that 500m is not adequate considering the potential impact range on harbour porpoises from the development.	The mitigation zone for marine mammals will be determined based on the potential maximum impact range that there is a risk of any auditory injury in marine mammals. The Applicant will review best practice mitigation at the time of construction.
Whale and Dolphin Conservation	19/12/2017	The use of MMOs and passive acoustic monitoring (PAM) to detect animals is a monitoring measure, not a mitigation measure. If activities are halted to allow animals to move	Noted. As outlined above, the Applicant will review best practice mitigation at the time of construction.

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	Scoping Response	out of the area, the use of MMOs and PAM can be considered a mitigation strategy.	
Whale and Dolphin Conservation	19/12/2017 Scoping Response	We are concerned that acoustic deterrent devices (ADDs) such as pingers may be used to move marine mammals out of the area. Not only will this add another source of noise into the environment, the use of ADDs has not been proven as a mitigation for pile driving and cannot be relied upon for the range of species likely to be encountered in the windfarm region. Furthermore, the short and long-term impacts of ADD on marine mammals need to be thoroughly considered.	Noted. The Applicant will review best practice mitigation at the time of construction. The potential disturbance from the use of ADDs has been assessed in section 11.6.1.4.1 of this chapter.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	Consideration of real-time mitigation measures should include acoustic barrier methods and other techniques that have been proven in demonstration scale trial studies – e.g. Wilke (2012) and Diederichs et al. (2013).	Noted. As outlined above, the Applicant will review best practice mitigation at the time of construction.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	A recent study analysing the assessed the benefits of noise reduction to harbour porpoise during offshore wind construction found that if windfarms inside the Southern North Sea cSAC reduced their noise levels by the equivalent of around 8dB, the risk of a 1% annual decline in the North Sea porpoise population can be reduced by up to 66% (Verfuss et al. 2016). Such an approach is the only way to reduce the far reaching avoidance distances for cetaceans.	In addition to the MMMP, consideration will be given to the potential options to reduce the potential for the significant disturbance of harbour porpoise in the SNS SAC.
Whale and Dolphin Conservation	19/12/2017 Scoping Response	We would also like to draw your attention to this report identifying the potential for region wide impacts resulting	Noted. This report has been reviewed and considered in the cumulative impact assessment in section 11.7 of this chapter.

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		from noise pollution across the North Sea (Heinis and de Jong 2015).	
The Planning Inspectorate	20/12/2017 Scoping Response	The inspector does not agree that the impact of EMF during all phases can be scoped out at this time as insufficient information has been provided to support this proposal. The approach to the assessment of potential effects of EMFs on marine mammals should be agreed with Natural England.	Natural England, as outlined below, have agreed that the impact of Electromagnetic Field (EMF) can be scoped out of further assessment for marine mammals within the EIA process. Therefore, this impact has not been considered further.
The Planning Inspectorate	20/12/2017 Scoping Response	The inspector does not agree that the disturbance at seal haul-out sites during all phases can be scoped out at this time as insufficient information has been provided to support this proposal.	Through the EPP, Natural England have agreed, as outlined below, that disturbance at seal haul-out sites can be scoped out of the EIA. The potential interaction of seal foraging areas and the East Anglia TWO offshore development area has been assessed in sections 11.5.2 and 11.5.3 of this chapter and Appendix 11.2 .
The Planning Inspectorate	20/12/2017 Scoping Response	The date of the cut-off point after which no further projects will be included in the CIA should be clearly stated in the ES. The Applicant should be aware that the ExA may request additional information during the examination in relation to new development that comes forward after the cut-off date.	The date of cut-off for further information to be included within the EIA was the date that final comments were received on the PEIR. Any further relevant information will be included, if required, at the Examination phase. This is clearly stated in the ES.
Natural England	ETG 2 Meeting: 6th March 2018	Agree that disturbance at seal haul-out sites can be scoped out of the EIA for direct disturbance to haul out sites. Foraging areas may still need to be assessed, although the tagging work could evidence this. Further evidence to support that <i>any seals hauled-out along these routes and in the area of the ports would be habituated to the noise, movements and presence of vessels</i> should be included within the PEI.	Acknowledged. As agreed, disturbance at seal haul-out sites has been scoped out of the EIA (for direct disturbance to haul out sites only). The potential interaction of seal foraging areas and the East Anglia TWO offshore development area has been assessed in sections 11.5.2 and 11.5.3 of this chapter and Appendix 11.2 .

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Natural England	ETG 2 Meeting: 6th March 2018	Agree that effects of EMF to be scoped out of the EIA.	Acknowledged.
Natural England	ETG 2 Meeting: 6th March 2018	Approach to determining harbour porpoise and, if required, other cetacean species, density estimates to be used in the EIA, including seasonal correction factors is agreed, but what about JCP densities and information on turbidity and data quality.	Information on the Joint Cetacean Protocol (JCP) data, as well as information on turbidity and data quality have been included in Appendix 11.2 .
Natural England	ETG 2 Meeting: 6th March 2018	Natural England agree in principle that fishing activity will be considered as part of the baseline, however our advice on this may change as part of the Southern North Sea harbour porpoise cSAC review of consents process, and we reserve the right to amend our advice accordingly.	Acknowledged. Fishing activity is considered part of the existing baseline, as it has existed in the North Sea for a long time before any offshore windfarm construction, it is not a recent or an increasing activity (in most areas fishing is currently in decline). It is also considered more appropriate for fishing to be assessed as part of a more strategic assessment rather than project / developer led assessment.
The Wildlife Trust	ETG 2 Meeting: 6th March 2018	TWT request an assessment on an estimate of the cSAC population – 18% of the SCANS-III population estimate.	As outlined above, Natural England considers that the potential impacts should be assessed against the North Sea MU reference population only. Through ETG 3 on 9 th January 2019, it was agreed that assessment of potential impacts for the SNS SAC “population” would be provided to ETG members as a standalone document. However, this will not be included as part of the ES or DCO Application.

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Whale and Dolphin Conservation	ETG 2 Meeting: 6th March 2018	WDC states that white-beaked dolphins and minke whale must be included in the assessment. Although they are expected to be in low numbers in the East Anglia TWO area, they still use the area, and are a European Protected Species (EPS). Under the Habitats Directive it is an offence to kill, injure, capture or disturb European marine protected species	The presence and therefore the potential for impact of minke whale and white-beaked dolphin around the East Anglia TWO windfarm site has been assessed in Appendix 11.2 .
Natural England	ETG 2 Meeting: 6th March 2018	Agree that physical barrier effects to be scoped out of the EIA.	Acknowledged.
The following comments were made in response to the PEIR and were taken into account in the production of this ES.			
MMO	Section 42 comments on PEI	The MMO requests clarification regarding the piling that will take place. It is currently unclear if piling will take place simultaneously or not for the installation of WTGs or other offshore platforms. This should be clarified in the Environmental Statement. If simultaneous is proposed, then underwater noise modelling for impacts to fish should be based on this scenario.	The Applicant has committed that no concurrent piling will occur either for each project alone or if both projects are constructed at the same time, see Table 11.2 of this chapter.
MMO	Section 42 comments on PEI	Clarification is required regarding if more than one pile will be installed per 24hrs and assess Cumulative Sound Exposure Levels (SEL _{cum}) over the duration of the activity within a 24hr period as the NMFS intend in their 2018 guidance.	There is potential for more than one pile to be installed in a 24 hour period. The SEL _{cum} modelling of pin piles assumed one pin pile to be installed over 199 minutes (7,210 strikes), as stated in Table 4-3 of Appendix 11.4 .
MMO	Section 42 comments on PEI	It should be noted that the NOAA criteria recommend thresholds based on the Peak Sound Pressure Level (SPL _{peak}) and the SEL _{cum} , not the Single Strike Sound	SEL _{ss} is appropriate for the assessment of noise from UXO detonations as this is a 'single pulse' noise source; there is only one detonation to consider. In this case, the SEL _{cum} value would be the same as the SEL _{ss} . As stated within Appendix 11.4 , an assessment in respect of SEL is

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		Exposure Levels (SEL _{ss}) as presented in Appendix 11.4 tables 6.4 and 6.5.	considered preferential at long range as it takes into account the overall energy and the smoothing of the peak is less critical. However, it should be noted that assessments using the SPL _{peak} criteria has also been completed.
MMO	Section 42 comments on PEI	Clarification is required regarding Table 6.12 (Appendix 11.4). It summarises the estimated unweighted source levels for the different construction noise sources considered which appeared based on various data sets but none are referenced. This should be amended.	Subacoustech have used their own internal datasets to estimate the unweighted source levels within the underwater noise modelling (Appendix 11.4), but the data within this are not formally published, and so cannot be directly referenced. This data is included due to the lack of available published data and the limited nature of that which is available.
MMO	Section 42 comments on PEI	It is recommended by the MMO that the underwater noise assessment (Appendix 11.4) should also include a plot showing the predicted received sound levels with range, for a single strike sound exposure level. This will streamline the process of comparing predictions with any future construction noise monitoring data collected for compliance purposes.	The detailed modelling undertaken in Appendix 11.4 demonstrates that such a plot would be specific to the chosen source location, transect direction and hammer energy. It would therefore not provide the correct information for the purpose indicated, unless the future measurements followed precisely the path of the plot from the same location. However, plots to show the sound levels against range for monopiles and pin piles at East Anglia TWO have been included within Appendix 11.4 Figure 5-10 .
MMO	Section 42 comments on PEI	It is recommended that mitigation should take into account the predicted impact ranges (for both piling and UXO detonation).	A separate Marine Mammal Mitigation Plan (MMMP) for both piling and UXO clearance activities will be developed pre-construction in consultation with key stakeholders, including Natural England. This will take account of the comments made by Natural England.

Consultee	Date/ Document	Comment	Response / where addressed in the ES
			A draft MMMP for both piling and UXO has been submitted with the DCO application based upon the modelled impact ranges (document reference: 8.14).
MMO	Section 42 comments on PEI	It is recommended that mitigation should be secured using a Site Integrity Plan (SIP). When creating the SIP it is suggested that further noise reducing measures should be considered, e.g. Bubble curtains and acoustic barriers (IHC Noise Mitigation System) to further mitigate impacts on marine mammals in the area.	Developing the SIPs for both piling and UXO clearance in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts, including the review of the best available mitigation technique. An In principle SIP has been submitted with the DCO application (document reference: 8.17).
MMO	Section 42 comments on PEI	The MMO does not agree with the rationale in Chapter 11 Marine Mammals section 11.7.2.1 paragraph 521 that resulted in the conclusion that auditory injury through Permanent Threshold Shift (PTS) should not be considered as part of the cumulative assessment based on mitigation and other activities being considered “broadband noise in lower frequencies”. It is therefore the opinion of the MMO that PTS should still be considered within the Cumulative Impact Assessment.	The potential impact of PTS to act cumulatively with other project has not been assessed within the CIA as the potential for PTS to occur in marine mammals would be mitigated for each project screened into the CIA, resulting in no potential for cumulative impact.
MMO	Section 42 comments on PEI	Further to the above comment, the MMO does not agree with the statement made in Chapter 11 paragraph 390 that concludes that activities taking place at the same time as piling are not cumulative impacts. The reason given is “the maximum potential impact area for non-piling construction activities are less than those assessed for piling and will therefore be included in the predicted disturbance impact	The conclusion that non-piling construction activities underway at the same time as piling are not cumulative impacts is in relation to the impacts associated with the project itself, and as the sound source location would be the same but significantly smaller than that assessed for the piling works, this represents the worst-case

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		area assessed for piling". The MMO believes these activities should be assessed as part of the Cumulative Impact Assessment.	assessment and any cumulative assessment for these activities would therefore affect the same individuals. The CIA includes consideration of piling and other noise sources from other projects (see Table 11.60 of this chapter).
MMO	Section 42 comments on PEI	Clarification is required regarding Chapter 9 as it is not clear if the turbines and environmental conditions at East Anglia 2 are comparable to the previous windfarms that are being used to broadly inform the likely significance of noise. It is noted that in appendix 11.4 that "the considered turbine size for (operational noise) modelling at this wind farm is larger than those for which data is available. EA2 and EA1N are also in greater water depths, and as such, estimations of a scaling factor must be conservative to minimise the risk of underestimating the noise" which suggests that the previous wind farm may not be a suitable comparison. Clarification is required on this.	A linear fit was applied to data available for current operational wind turbine noise, as this was considered to be method of estimating operational turbine noise that would lead to the highest, and thus worst-case, estimation of source noise level from the larger 300m wind turbine. This resulted in an estimated source level of 164dB SPL _{RMS} , 18dB higher than the 6MW turbine, the largest for which noise data currently exists. The alternative method of using a logarithmic fit (with an increase of 3 dB per doubling of power output) to data would lead to a source level of 151dB SPL _{RMS} . A more extreme and unlikely 6dB increase per doubling of power output would lead to 156dB SPL _{RMS} . Taking into consideration the above, the method of using a linear fit estimate is considerably higher than alternatives and is a highly precautionary approach.
MMO	Section 42 comments on PEI	There is a minor error regarding table 11.2 of Chapter 11. It is noted as stating the worst case parameters for marine mammal receptors for UXOs should be (the type and size) up to 700g. This should be 700kg. Please amend this.	Noted and updated.
MMO	Section 42 comments on PEI	The MMO has concerns surrounding Paragraph 308 of chapter 11 which states "mitigation, outlined in section 11.3.3, would ensure no harbour porpoise, grey seal and harbour seal were in the potential impact range for PTS	Text in section 11.6.1.3.2.2 of this chapter has been updated and states, as suggested: " <i>Mitigation, as outlined</i>

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		from the first strike of the soft-start and therefore reduce the risk of PTS". It is the opinion of the MMO that any proposed mitigation may reduce the number of marine mammals in the area, there is no guarantee that the area will be free of marine mammals. It is recommended that this statement is amended to reflect this.	<i>in section 11.3.3, would reduce the risk of PTS from a single maximum hammer energy applied'</i> In addition, no offshore wind farm could commence piling without an agreed MMMP in place with the relevant regulator.
Natural England	Section 42 comments on PEI	As per Natural England's previous advice, a mechanism needs to be developed by the regulators to ensure continuing adherence to the SNCB thresholds over time. Multiple SIPs will be developed, piling can take place over several years, and new projects can come online during this time. Should potential exceedance of the thresholds occur, a process for dealing with this issue needs to be in place – the affected developers / industries will need to work together with the regulator and SNCBs to prevent adverse effect on the SCI.	Developing the SIPs for both piling and UXO clearance in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts, including the review of the best available mitigation techniques. An In principle SIP has been submitted with the DCO application (document reference: 8.17) secured under the requirements of the draft DCO.
Natural England	Section 42 comments on PEI	Until the mechanism by which the SIPs will be managed, monitored and reviewed is developed, Natural England are unable to advise that this approach is sufficient to address the in-combination impacts and therefore the risk of Adverse Effect on Integrity on the Southern North Sea SCI cannot be fully ruled out. Natural England considers that the requirement for a Site Integrity Plan (SIP) should be secured in the DCO for each project.	The MMO have responsibility for the SIP which provides the management framework and potential methodologies for management, it is therefore the responsibility of the MMO to determine how these work in practice. The SIP is secured via the draft DCO. An In principle SIP has been submitted with the DCO application (document reference: 8.17) and is secured under the requirements of the draft DCO.

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Natural England	Section 42 comments on PEI	Para 397 states there is expected to be 74 additional vessels on site during construction with an average of 136 trips per month, whereas paragraph 427 states 115 trips per month. Please could clarity be provided as to which is the correct figure.	This has been amended within this ES to 74 vessels in total, with up to 124 movements per month and 4.1 movements per day, as per Table 11.2 of this chapter.
Natural England	Section 42 comments on PEI	The tiers that projects are placed in will need to be revisited and updated prior to submission and any changes followed through in to the cumulative impact assessment both for the EIA and HRA.	These have been updated within the ES chapter, section 11.7.4.1 of this chapter.
Natural England	Section 42 comments on PEI	Natural England understands why only one of Thanet Extension, Norfolk Vanguard and Norfolk Boreas have been included in the CIA for EA2, but queries why Norfolk Vanguard was chosen to be included over Thanet Extension? Similarly, why was Norfolk Boreas included instead of Norfolk Vanguard? Rationale for these choices should be provided in the text.	Projects were selected based on the most likely overlap in piling at the same time. Norfolk Vanguard was included rather than Thanet Extension or Norfolk Boreas as piling is more likely to overlap with the East Anglia TWO project, based on the assumption that Thanet Extension could be developed first, followed by Norfolk Vanguard and then Norfolk Boreas. Text has been clarified in the footnote to Table 11.56 of this chapter. Additional information has been provided on the inclusion of Norfolk Boreas in the assessment in section 11.7.4.1 of this chapter.
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	Although we appreciate that developers are unlikely to construct more than one project at a time, it is possible that there may be some overlap between some project commencement and completion e.g. the construction and completion of Norfolk Vanguard and commencement of construction for Norfolk Boreas may overlap with East Anglia One North. This should be taken account within both the Environmental Statement and HRA assessment. When	Further information has been added to section 11.7.4 of this chapter. To clarify, it is considered that all construction impacts <i>apart from</i> piling could overlap for a single developer. This acknowledges that construction activities may be concurrent (although this is unlikely) for a single

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		producing the final Environmental Statement and HRA, it will be important to consider any further information which may be available for Hornsea 4 and any potential offshore wind farm extensions.	developer, without including unrealistic scenarios for piling.
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	Although we appreciate that underwater noise changes over distance, we are concerned that PTS impacts for pin piles using the SEL _{cum} ranges is up to 21km. We would welcome a conversation with the project team regarding this, including the need for further assessment and on the adequacy of mitigation.	The MMMP for both piling will be developed pre-construction in consultation with the relevant SNCBs, this will take into account the final project design, along with the latest guidance and latest information, including any updated noise modelling, to determine the predicted PTS ranges and mitigation required to reduce the risk of PTS in marine mammals. The assessments presented in the ES and draft MMMP (Document reference: 8.14) are based on the current worst-case scenarios.
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	We are pleased that an indicative figure for UXO clearances has been included and an assessment undertaken of impacts on the Southern North Sea SAC. However, we expect all offshore wind farm developers to undertake more pre-consent surveys to gain a realistic figure of required UXO clearances. This will ensure that a robust assessment of environmental impacts will be undertaken. With this information in place, a realistic dML could also be included within an application.	Further investigations into the number, location and size of UXOs within the East Anglia TWO offshore development area will be undertaken in the pre-construction period.
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	TWT is concerned that current mitigation used during UXO clearance is not fit for purpose. It is essential that work is undertaken over the coming years to gain realistic figures on noise impacts from UXO clearance and harbour porpoise response in relation to this. An assessment on the effectiveness of current mitigation measures, such as	Developing the MMMP for UXO clearance in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence.

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		bubble curtains is also required. If the evidence suggests that current mitigation methods are not effective, then investment in research and deployment of new mitigation methods is required.	
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	Please note that TWT does not agree with the SNCB advice on underwater noise management for disturbance impacts. The proposed thresholds are not based on strong science and are therefore, not precautionary enough. TWT advocate the management approach used in Germany. However, we do support the use of the standard 26km deterrence radius.	Acknowledged.
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	We have some concerns regarding the use of seasonal areas for underwater noise disturbance assessments. This approach will result in only half of the site being protected during half of the year. The current seasonal distribution of harbour porpoise may change over time due to natural factors or due to displacement from offshore wind farm development and therefore, it is essential that mitigation is deployed to ensure the protection of the whole site to safeguard site integrity. With the acknowledged gaps in understanding of harbour porpoise use of the Southern North Sea SCI, it would be consistent with the Precautionary Approach to deliver whole site mitigation.	All mitigation included in order to negate effect of PTS within the MMMP for piling and UXO will be undertaken at all times of the year. The assessment on seasonal areas follows the most recent advice from the SNCBs. The development of the SIP will reduce any significant disturbance relative to the time of year and area of SNS SAC that disturbance could occur within. Draft MMMP and In principle SIP for UXO and piling has been included with the DCO Application (document references: 8.14 and 8.17).
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	We look forward to engaging with East Anglia TWO on the development of marine mammal monitoring. This is especially important for the Southern North Sea SAC. Although SCANS surveys may not suggest any change in harbour porpoise density since the mid-1990s, analysis	Details of potential monitoring will be developed pre-construction. These will be developed in consultation with stakeholders and be appropriate to the final project design and construction methodology.

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		suggests that there is low power to detect changes in populations from SCANS data and populations of marine mammals may reach critical levels before a decline is detected. TWT also suggests that a strategic approach to monitoring should be implemented within the SAC which would yield better results and be a better use of individual developer resources. We are aware that a mechanism to allow strategic monitoring does not exist and we would welcome a conversation with SPR on how this can be achieved.	High-level proposals for monitoring are included in the In principle Monitoring Plan (document reference: 8.13), provision is also included (if required) within the In principle SIP (document reference: 8.17).
The Wildlife Trusts / Suffolk Wildlife Trust	Section 42 comments on PEI	TWT would like to highlight that a range of guidance is out of date as it was not developed with the scale of round 3 offshore wind farms in mind. This includes guidance for both piling and UXO activities. We believe JNCC were considering updating their advice in these areas.	Reference to the JNCC guidance (JNCC 2010) has been provided for context only. Developing the MMMP for piling and UXO clearance in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods available at that time, including the latest scientific evidence and guidance.
Eastern IFCA	Section 42 comments on PEI	The East Anglia ONE North project offshore development area is located wholly within the Southern North Sea cSAC, a European Marine Site (EMS) designated for the protection of Harbour porpoise under the Habitats Directive as transposed by the Conservation of Habitats and Species Regulations 2010 and the Offshore Marine Conservation Regulations 2007. EIFCA acknowledges that studies analysing foraging rates in harbour porpoise have found that they feed almost continuously and are therefore highly sensitive to disturbance. EIFCA supports the use of mitigation measures to aim to remove marine mammals	Acknowledged.

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		from the mitigation zone prior to the start of piling to reduce the risk of any physical or auditory injury.	
Eastern IFCA	Section 42 comments on PEI	Eastern IFCA consider that despite the potential for disturbance to prey species of Harbour/Grey seal through operational works associated with the project, evidence provided in the PEIR stating that 'any effects on prey species are likely to be intermittent, temporary and highly localised, with potential for recovery following cessation of the disturbance activity. Any permanent loss or changes of prey habitat will typically represent a small percentage of the potential habitat in the surrounding area' supports that the project is unlikely to result in significant impacts on either species of seal. Therefore, eastern IFCA support the outcome of the assessment that there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC in relation to the conservation objectives for Harbour and Grey seal arising from changes in prey resources.	Acknowledged.
Eastern IFCA	Section 42 comments on PEI	Coastal habitats provide important spawning and nursery grounds for many marine species, therefore any disturbance to these habitats has the potential to negatively impact populations. Tope shark and Thornback ray utilise the Outer Thames Estuary as nursery grounds whilst herring use the area as a spawning site. The inshore area of the offshore cable corridor crosses the Outer Thames Estuary SPA, therefore these species will be particularly susceptible to any disturbance. The North Sea is understood to support nursery grounds for additional species including herring, cod, whiting, mackerel, plaice and sole and spawning grounds for sole and sandeels (Ellis	Cumulative impacts upon benthic habitats and fish are assessed in Chapter 9 Benthic Ecology and Chapter 10 Fish and Shellfish Ecology . Where there are interrelationships between receptor groups (i.e. impacts upon spawning habitat of prey species for marine mammals) these assessments have been assessed for project alone (see section 11.6 of this chapter) and cumulatively (see section 11.7 of this chapter) and signposted in section 11.9 of this chapter.

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		et al. 2012) – an important prey species of the Harbour porpoise, which is protected within the Southern North Sea cSAC. Although the best available information (Coull et al. 1998; Ellis et al. 2012) shows extensive spawning grounds for many species, Eastern IFCA is concerned about the scale of offshore activities in the Southern North Sea because of the cumulative effects these could have on seabed habitats and subsequently on dependent species. Whilst we appreciate the complexity of studying potential wide-scale impacts, we consider the issue does need further consideration.	
WDC	Section 42 comments on PEI	Due to the impacts of climate change on cetaceans, WDC supports the development of well-considered marine renewable energy. However, we have serious concerns about the potential impacts these developments, both individually and cumulatively, have on cetaceans. These concerns are detailed in our report "Marine Renewable Energy: A Global Review of the Extent of Marine Renewable Energy Developments, the Developing Technologies and Possible Conservation Implications for Cetaceans".	Acknowledged.
WDC	Section 42 comments on PEI	The case law supports an approach which looks at both the site-level population and the favourable conservation status within the species natural range (see e.g. Commission v Spain C 404/09). Commission Guidance (Managing Natura 2000 sites: The provisions of Article 6 of the Habitats Directive 92/43/EEC", European Commission, 2000, ISBN 92-828-9048-1) states at 2.3.2 that while favourable conservation status for species is defined by reference to its	Assessments were conducted based on the current SNCB advice and the Conservation Objectives for the site. As outlined in the Conservation Objectives of the site (JNCC and Natural England 2019), it is currently not advised to use the SNS SAC site population estimate in any assessments of effects of plans or projects, as these need to take into consideration population estimates at the MU level.

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		“natural range”, the assessment of favourable conservation status at site level “will always be necessary”. For the purposes of appropriate assessment, the focus is on the impact of the plan or project on the integrity of the site (for example, where article 6(4) is engaged, the damage to the site must be precisely identified (see Commission v Greece C43/10 at 114)).	As stated above, an additional assessment was completed and provided to the ETG attendees, based on the estimate that the SNS SAC could support 29,384 harbour porpoise. However, this will not be submitted with the DCO Application.
WDC	Section 42 comments on PEI	We recognise that the assessment has been undertaken with no mitigation measures applied and agree that this is the best approach and will give the most reliable results. We welcome the commitment to using mitigation methods to reduce the risk of piling activities on harbour porpoise and the SNS SCI. We also acknowledge that the full details of mitigation to be used are yet to be finalised in the Marine Mammal Mitigation Protocols (MMMP) for both UXO clearance and piling, alongside the Site Integrity Plan (SIP), and will set out the approach to deliver any project mitigation or management measures in relation to the SNS SCI. However, we have concerns over the embedded mitigation measures proposed and would like to see a commitment to using proven mitigation methods (see section below on Mitigation Methods). Until the details of the MMMPs and SIP are finalised, it is impossible to conclude that there will be no Adverse Effect on Integrity (AEoI) on the SNS SCI.	Developing the MMMP and SIP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts, including embedded mitigation. A draft MMMP (document reference: 8.14) and In principle SIP (document reference: 8.17) are submitted as part of this DCO application.
WDC	Section 42 comments on PEI	WDC is pleased to see that two years of site surveys have been undertaken, using a robust methodology, to understand the use of the area by marine mammals, and provide a baseline upon which to assess the impacts of the	Acknowledged.

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		development. WDC believe that two years is the absolute minimum survey required to provide a reliable baseline data.	
WDC	Section 42 comments on PEI	WDC agrees that high definition aerial surveys are suitable for surveying for marine mammals, and are pleased to see that the methodology used is suitable for collecting marine mammal data. However, only a buffer of 4 km around EA2 and EA1N was used when undertaking the surveys, we feel this is inadequate to assess the numbers of marine mammals that could be impacted by the development, given the distances at which construction noises can disturb porpoises, these distances are highlighted below.	The baseline survey methodology with 4km buffer was agreed with Natural England prior to the surveys commencing. This follows a standard procedure for most offshore wind farms. The area allowed the transects covering the East Anglia TWO site (and 4m buffer zone) to be conducted in one day which is important in reducing the potential for double-counting animals that have moved from one part of the survey area to another during long survey periods. In addition to the survey data, data from other nearby offshore wind farm surveys, SCANS and other surveys were also reviewed to provide additional information on the wider area (see section 11.4.2 of this chapter).
WDC	Section 42 comments on PEI	We agree with the approach that all images were analysed to species level to provide the best baseline data possible, and followed a robust quality control. Additionally that unidentified small cetaceans were assumed to be harbour porpoises for the purpose of the impact assessment as the worst case scenario.	Acknowledged
WDC	Section 42 comments on PEI	Additional data sources WDC are pleased to see the inclusion of other data sources, including recent aerial surveys of EA2 and EA1N sites and the use of the recent SCANS III data to assist with assessing marine mammal populations, and potential impacts on marine mammals. However, the SCANS	Acknowledged. The assessments for harbour porpoise have used the East Anglia TWO site specific density estimate, as derived from the site specific surveys (see Appendix 11.2 for more information on how the site specific density was derived), to assess impacts, as well

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		<p>surveys are only one seasonal snapshot in time, with a 10 year gap between datasets. It is not therefore appropriate to be used for estimates of density and finer-scale information is required where such data are not available (Green et al. 2012).</p> <p>We are concerned that the other datasets used to provide a baseline for assessment are not recent, are ad-hoc data or are not dedicated marine mammals surveys, and some only cover small parts of the of EA2 and EA1N area. Whilst useful information they cannot be relied upon to provide a reliable baseline for assessment.</p>	<p>as the density estimate as reported by the SCANS-III survey (Hammond et al. 2017).</p> <p>Potential impacts have been based on the highest site specific survey density estimates and the SCANS-III survey density estimate throughout the assessment, as a precautionary approach to assessing impacts. All currently publicly available data has been referred to including surveys have been undertaken / currently underway at other offshore wind farm sites, for example, Norfolk Vanguard and Norfolk Boreas.</p>
WDC	Section 42 comments on PEI	<p>WDC note that the foundation type has yet to be finalised, and are pleased to see that various foundation types are being considered for EA2 and EA1N. We are concerned to see that foundations requiring piling are being considered. Pile driving, even with the use of pin piles, has the potential to cause physical harm, as well as displacement. We recommend that foundations requiring piling are taken out of consideration, particularly as the offshore wind farms are within the SNS SCI; or alternatively there is a commitment to using proven mitigation measures during construction.</p>	<p>Piling has been assessed as worst-case, but other foundation options are being considered. The requirement for pile driving will be based on the several factors, such as underlying ground conditions and the safest way to successfully install and operate the turbines. The most suitable foundation options for the site would be determined during final design, post consent, and would be informed by further site investigations.</p>
WDC	Section 42 comments on PEI	<p>Our primary concern surrounds the intense noise pollution resulting from pile driving for all cetacean species and the harbour porpoise population supported by the SNS SCI. Reactions of harbour porpoises to the pile driving process have been recorded at distances many kilometres from the piling location (Brandt et al. 2018, 2011; Carstensen et al. 2006; Dähne et al. 2013; Thomsen et al. 2006). In some</p>	<p>Acknowledged. An assessment of the potential for disturbance from pile driving is included in section 11.6.1.4.1 of this chapter.</p> <p>The assessments for the potential disturbance and possible behavioural response in harbour porpoise was based on the currently advised thresholds and criteria for underwater noise modelling, as well as the SNCB</p>

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		cases pile driving is audible by harbour porpoises beyond 80 km from the source and could mask communication at 30 – 40 km (Thomsen et al. 2006). Bottlenose dolphins (<i>Tursiops truncatus</i>) could exhibit behavioural responses at distances of up to 40 km from pile driving locations (Bailey et al. 2010).	recommended 26km Effective Deterrence Radius (EDR). In addition, a review of all relevant publications were conducted to put the assessment into context. There is no evidence that bottlenose dolphin would be present in the East Anglia TWO windfarm site, however, the MMMP and SIP (document reference: 8.14 and 8.17) although aimed primarily at harbour porpoise would provide mitigation for other cetaceans / EPS.
WDC	Section 42 comments on PEI	Research has shown that pile driving causes behavioural changes in harbour porpoises which leave the area during construction and in some instances did not later return to their usual numbers (Brandt et al. 2011; Carstensen et al. 2006; Teilmann and Carstensen 2012). Some studies have shown harbour porpoise start to return in one area, yet years later have not returned to other areas (Snyder and Kaiser 2009). The longest running study into the effects of windfarms on harbour porpoises shows that ten years later, the population has only recovered to 29% of the baseline level (Teilmann and Carstensen 2012). Even where areas have been recolonised, it is not clear if these are the same animals returning or new animals moving into the area, or if the animals are using the area in the same way.	Acknowledged. An assessment of the potential for disturbance and behavioural response for harbour porpoise from pile driving is included in section 11.6.1.4 of this chapter.
WDC	Section 42 comments on PEI	A paper analysing foraging rates in harbour porpoise found that they feed almost continuously to meet energy needs and are therefore highly sensitive to disturbance (Wisniewska et al. 2016). Loud noises, such as pile driving, can cause harbour porpoise to be displaced (Dähne et al. 2013) from potential important feeding grounds. Additionally, harbour porpoise can lose 4% of their body	The displacement of harbour porpoise as a result of any changes in availability of prey species is assessed in sections 11.6.1.9 and 11.7.7 of this chapter.

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		weight in just 24 hours from starvation (Kastelein 2018). Given the importance of the EA2 and East Anglia ONE North area and the SNS SCI for harbour porpoise, most likely as prime foraging areas, displacement from the area could be very significant.	
WDC	Section 42 comments on PEI	We are pleased that currently there are no plans for concurrent piling at EA2 and EA1N offshore wind farms. However if the construction window of both offshore wind farms will overlap the cumulative potential impact of pile-driving for these wind farm on the harbour porpoise population is high, covering the lifespan of a porpoise and with a high potential to affect breeding and feeding activity.	The construction windows for the East Anglia ONE North and TWO projects may overlap, however, under that construction scenario, there would be no concurrent piling. The assessment of disturbance to harbour porpoise as a result of pile driving, taking into account the total time that pile driving may be undertaken, is included in section 11.6.1.4 of this chapter.
WDC	Section 42 comments on PEI	Although it is likely that pile driving activity will not be constant, the installation of monopile foundations has been found to have a profound negative effect on harbour porpoise acoustic activity up to 72 hours after pile driving activity (Brandt et al. 2011). It is unlikely that harbour porpoises will return to an area during these gaps, resulting in them most likely being excluded from the area for the entire duration of construction.	A number of studies have been used to inform the assessment of piling noise on harbour porpoise, including the results of the DEPONS model which has shown that local harbour porpoise density levels recovered to their baseline levels within two to six hours of the piling activity ceasing (Nabe-Nielsen et al. 2018).
WDC	Section 42 comments on PEI	We are pleased that it is recognised that the impacts from piling include both physiological and behavioural impacts on marine mammals. We note that INSPIRE modelling has been used to predict underwater noise levels from the construction of EA2 and EA1N. Whilst we feel this is model will be helpful in the assessment, the model has been found to under predict noise levels (Spiga 2015) which can	The Applicant is confident that the modelling used is appropriate for the purposes of this assessment. A precautionary approach has been used for the underwater noise modelling with the worst-case parameters used within the model, including piling hammer energies, soft-start and ramp-up scenarios, strike rate, duration of piling, receptor swim speeds and water depths. In addition, this

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		potentially lead to underestimate the impact of piling on cetaceans. We are pleased that the National Marine Fisheries Service (NMFS) modelling (National Marine Fisheries Service (NMFS) 2018) is also used as agreed in the Expert Topic Group.	model has been validated against over 50 datasets of piling noise, at differing hammer energies and distances, as well as against modelling data from third parties. More information on the underwater noise modelling and INSPIRE model can be found in Appendix 11.4 . During the development of the final MMMP for piling, the underwater noise modelling will be reviewed, and updated, if required.
WDC	Section 42 comments on PEI	<p>WDC is concerned about the impacts of increased vessel activity particularly during construction. Increased vessel noise can interrupt harbour porpoise foraging behaviour and echolocation, which can lead to significantly fewer prey capture attempts (Wisniewska et al. 2018). Harbour porpoises have a high metabolism and need to feed constantly and therefore are highly sensitive to disturbance (Wisniewska et al. 2016) and can lose 4% of their body weight in just 24h from starvation². There is an increased risk of collision and disturbance to cetaceans from increased vessel activity (Dyndo et al. 2015; James 2013). This is of particular importance as there are expected to be a large increase in the number of vessels in the of EA2 and EA1N area during construction.</p> <p>WDC do not agree with the assumption in 11.6.1.8.1 Chapter 11 Marine Mammals that “Marine mammals in the ... offshore development area would be habituated to the presence of vessels (given the existing levels of marine traffic) and would be able to detect and avoid vessels. Therefore, harbour porpoise... are considered to have a low sensitivity to the risk of a vessel strike” as there is no</p>	<p>An assessment of the increase of collision risk to harbour porpoise has been included in section 11.6.1.8 of this chapter, and an assessment of the potential disturbance due to increased vessel presence is included in section 11.6.1.6 of this chapter.</p> <p>Assessments on the potential impacts of vessels have been based on the worst-case scenarios. All vessel operators will use good practice to reduce any risk of collisions with marine mammals.</p>

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		evidence to base these assumptions upon. This conclusion is particularly concerning due to the location of EA2 and EA1N in the SNS SCI, especially if the area is important for feeding and breeding.	
WDC	Section 42 comments on PEI	<p>We are pleased to see that at the moment there are no plans to use explosives during the decommissioning of the wind farm, and that instead decommissioning will most likely will involve cutting of piles and grinding or drilling techniques. We hope that this will continue to be the case when the detailed plan is drawn up because the use of explosives in decommissioning has the potential to cause physical harm or be lethal to cetaceans (Prior and McMath 2008).</p> <p>We do have concerns regarding the noise levels that may be generated by decommissioning, and recognise that this will be dependent on the methods used to remove the turbine foundations and mitigation methods used. Until methods of removal have been decided, it will be inaccurate to conclude that the impacts from decommissioning on marine mammals will be negligible.</p>	<p>Acknowledged.</p> <p>The assessment for the proposed activities during construction are based on the worst-case scenario and it is anticipated that the potential impacts during decommissioning will be the same or less than those assessed for construction.</p>
WDC	Section 42 comments on PEI	Section 11.3.3 of Chapter 11 Marine Mammals details the embedded mitigation measures that have already been incorporated into the project design. As discussed at EWG meetings, WDC are pleased to see a commitment to mitigation measures however, we strongly disagree that these measures are appropriate mitigation methods.	Developing the MMMP and SIP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts, including embedded mitigation. A draft MMMP (document reference: 8.14) and In principle SIP (document reference: 8.17) are submitted as part of this DCO application.

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WDC	Section 42 comments on PEI	We understand that the JNCC guidance for minimising the risk of injury to marine mammals from piling noise (JNCC 2010) has been followed, with a more precautionary approach. We recognise that currently these are the only guidelines available to developers to use to minimise the impacts of piling activity on marine mammals, however it is widely known that these guidelines are outdated, and do not use the latest scientific evidence.	Reference to the JNCC guidance (JNCC 2010) has been provided for context only. Developing the MMMP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, including the latest scientific evidence and guidance.
WDC	Section 42 comments on PEI	The in-situ methods in the JNCC guidelines have been widely criticised as arbitrary and with a lack of supportive evidence (Wright and Cosentino 2015). Additionally the guidelines have not been updated for a number of years and therefore do not include the latest and increasing body scientific data of the impacts of noise on marine mammals (Wright and Cosentino 2015).	The MMMP will be developed in the pre-construction period and based upon best available information, methodologies and guidance.
WDC	Section 42 comments on PEI	WDC have concerns over the guidance that soft-starts should be used and the use of Marine Mammal Observers (MMOs). WDC do not consider 'soft-start' to be an adequate mitigation measure as they are only a reduction in sound source at the initiation of a piling event. It cannot be assumed that cetaceans will leave an area during a soft-start as they may remain the area due to prey availability or breeding despite the harmful noise levels (Faulkner et al., 2018). Whilst a common sense measure, soft-starts are not a proven mitigation technique and so cannot be relied upon to mitigate impacts, especially for developments within the SNS SCI.	Developing the MMMP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, including the latest scientific evidence and guidance for 'soft-starts'.

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WDC	Section 42 comments on PEI	We are concerned that acoustic deterrent devices (ADDs) such as pingers may be used to move marine mammals out of the area. Not only will this add another source of noise into the environment (Faulkner et al. 2018), the use of ADDs has not been proven as a mitigation for pile driving and cannot be relied upon for the range of species likely to be encountered in the wind farm region. The range of displacement from ADDs has the potential to exceed the range of displacement from pile driving itself when using bubble curtains (Dähne et al. 2017).	The potential disturbance from the proposed use of ADDs has been assessed in section 11.6.1.4.1.2 of this chapter. If the use of ADDs is proposed as a mitigation method the potential disturbance will be assessed against the risk of any physical or permanent auditory injury (PTS) to marine mammals. Examples of ADD use were included, but as outlined above all effective and appropriate mitigation methods will be reviewed during the development of the MMMP. The use of ADDs has been used as mitigation during piling at several European and UK offshore wind farms.
WDC	Section 42 comments on PEI	We agree that mitigation methods will be reviewed closer to construction and that best practice mitigation, and that exact methods will be agreed at that time. However at this time we would like to see a commitment to using only proven mitigation methods.	Developing the MMMP in the pre-construction period will allow for a detailed review and assessment of the most effective, and appropriate mitigation methods at that time, including considerations into those mitigation measures that have previously been proven to be effective.
WDC	Section 42 comments on PEI	Due to the location of EA2 and EA1N in the winter area, and year round area of the SNS SCI, it is particularly important that only proven mitigation measures are used as this is the only way to ensure no AEoI on the harbour porpoise population of the site. WDC would like to see a commitment to using mitigation methods that have been proven in both test scale (Diederichs et al. 2013; Wilke et al. 2012) and full-scale sites, in particular bubble curtains (Brandt et al. 2018; Dähne et al. 2017; Nehls et al. 2016).	Developing the MMMP for both piling and UXO clearance in the pre-construction period will allow for a detailed review and assessment of the most effective, and appropriate mitigation methods at that time, including considerations into those mitigation measures that have previously been proven to be effective.
WDC	Section 42 comments on PEI	A study analysing the benefits of noise reduction to harbour porpoise during offshore wind construction found that if wind farms inside the SNS SCI reduced their noise levels	As outlined above all effective and appropriate mitigation methods will be reviewed during the development of the MMMP.

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		by the equivalent of around 8dB, the risk of a 1% annual decline in the North Sea porpoise population can be reduced by up to 66% (WWF 2016). Such an approach is the only way to reduce the far reaching avoidance distances for cetaceans.	
WDC	Section 42 comments on PEI	<p>WDC are pleased to see a commitment to a MMMP to reduce noise from construction. We recognise that the MMMP will be designed closer to construction, once all details and plans are known, and that mitigation methods to be used will be decided at that time. We believe this to be appropriate as this enables the latest proven mitigation methods to be included in the MMMP.</p> <p>However, until the details of the MMMP are decided it is impossible to conclude that the MMMP will ensure that impacts from piling, and other construction, activity will be sufficiently mitigated. We are concerned that the MMMP currently only includes mitigation methods from the JNCC guidelines and would like to see a commitment to ensure that only proven mitigation methods are included in the MMMP.</p> <p>WDC request to be involved in the consultation of the MMMP.</p>	<p>Acknowledged.</p> <p>Developing the MMMP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, including the latest scientific evidence.</p> <p>WDC will be consulted on in the development of the MMMP in the pre-construction period.</p>
WDC	Section 42 comments on PEI	<p>As with the MMMP, WDC appreciate the commitment that is being made to the implementation of mitigation. We also appreciate that there is a lack of guidance from SNCB's on what should be included in the SIP. As a result the SIP is little more than a commitment to use mitigation methods. Currently there is no commit to any specific mitigation</p>	<p>Acknowledged.</p> <p>Developing the SIP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts, including embedded mitigation.</p>

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		<p>measures, or an assessment of how effective the mitigation will be; as a result currently the SIP cannot remove all reasonable scientific doubt as to the effects of the projects on the SNS SCI. WDC request to be involved in the consultation of the SIP.</p> <p>WDC is a consultee of the Review of Consents being undertaken by Business Energy and Industrial Strategy (BEIS) and has commented on the recent Proposed Marine Licence Condition of a SIP. We have serious concerns over the lack of guidance in the draft SIP condition, and the threshold approach used in particular. We are concerned that SIPs will fail to achieve the noise reductions necessary to ensure no Adverse Effect on Integrity (AEoI) of the SNS SCI.</p>	An In principle SIP (document reference: 8.17) has been submitted as part of this DCO application. WDC will be consulted during the development of the final SIP.
WDC	Section 42 comments on PEI	WDC are pleased to see that that Cumulative Impact Assessment (CIA) includes a full range of projects that may overlap with impacts from other offshore activities. We agree with the listed projects and plans in Appendix 11.3 Marine Mammal Cumulative Impact Assessment (CIA) Screening, and believe these to be appropriate. We appreciate that the CIA has been based on the best available information, and that plans for any project may change at any time; we agree that the approach taken provides the best information to base the most reliable CIA assessment.	Acknowledged.
WDC	Section 42 comments on PEI	We are pleased that other developments, including cross boundary developments are being taken into account when undertaking the assessment. Cumulative effects from across marine boundaries need to be considered to	Acknowledged.

Consultee	Date/ Document	Comment	Response / where addressed in the ES
		consider all potential transient impacts across such boundaries, especially considering the mobile nature of cetaceans.	
WDC	Section 42 comments on PEI	Due to the concerns over the embedded mitigation methods, and until the mitigation methods that are to be used are known, it is inaccurate to conclude that the mitigation measures will ensure that impacts from piling on harbour porpoise and the harbour porpoise population supported by SNS SCI will be reduced. WDC strongly disagrees with the conclusions in the PEIR that either stand-alone or in-combination, that impacts on the harbour porpoise will be negligible with or without embedded mitigation.	The MMMP and SIP will set out the approach to deliver any project mitigation or management measures in relation to harbour porpoise and the SNS SAC. Developing the MMMP and SIP in the pre-construction period will allow for a detailed review and assessment of the most effective and appropriate mitigation methods at that time, based on the latest scientific evidence to reduce underwater noise impacts. It is acknowledged that WDC disagree with the conclusions of the assessment. However, the Applicant stands by the findings of the assessment and as previously outlined, the Applicant is committed to using effective, proven and appropriate mitigation methods based on the latest scientific evidence.

11.2 References

Scottish Power Renewables (2017). East Anglia TWO Offshore Windfarm Scoping Report. November 2017.

ScottishPower Renewables (2018) East Anglia TWO Offshore Windfarm Habitats Regulation Assessment Screening Report. document reference: EA2-DEVWF-ENV-REP-IBR-000734.

Nabe-Nielsen, J., van Beest, F.M., Grimm, V., Sibly, R.M., Teilmann, J. and Thompson, P.M. (2018). Predicting the impacts of anthropogenic disturbances on marine populations. *Conserv Lett.* 2018;e12563. <https://doi.org/10.1111/conl.12563>.

ScottishPower Renewables (2019) East Anglia TWO Offshore Windfarm Preliminary Environmental Information. Volume 1.

ScottishPower Renewables (2019a) East Anglia TWO Habitats Regulations Assessment. document reference: EA2-DEVWF-ENV-REP-IBR-000738.

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