

**SCOTTISHPOWER
RENEWABLES**

East Anglia ONE North and East Anglia TWO Offshore Windfarms

Applicants' Comments on Natural England's Deadline 4 Submissions

Applicant: East Anglia TWO and East Anglia ONE North Limited
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Author: Royal HaskoningDHV

Applicable to East Anglia ONE North and East Anglia TWO



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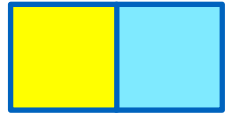


Table of Contents

1	Introduction	1
2	Applicants' Comments on NE Appendix A12 (REP4-087) - NE advice on Red-Throated Divers in the Outer Thames Estuary Special Protected Area related to Deadline 3 Submissions	2
3	Applicants' Comments on NE Appendix A13 (REP4-088) - NE's Interim Comments on Ornithology Compensation	35
4	Applicants' Comments on NE Appendix B3 (REP4-090) - Comments on the In Principle Southern North Sea SAC Site Integrity Plan [REP3-044] and Draft Marine Mammal Mitigation Protocol [REP3-042]	41
5	Applicants' Comments on NE Appendix G2 (REP4-094) - NE Comments to the Draft Development Consent Order (DCO) [REP3-011 & REP3-012] and Schedule of Changes to the Draft DCO [REP3-013]	46
6	Applicants' Comments on NE Appendix C6 (REP4-092) - Comments to Documents Submitted at Deadline 3 in Relation to Onshore Ecology [REP3-048, REP3-060, REP3-061, REP3-070]	53



Glossary of Acronyms

AEoI	Adverse Effect on Integrity
AONB	Area of Outstanding Natural Beauty
APP	Application Document
AS	Additional Submission
BLF	Beach Landing facility
CRM	Collision Risk Modelling
DCO	Development Consent Order
DML	Deemed Marine Licence
EIA	Environmental Impact Assessment
ES	Environmental Statement
FFC	Flamborough & Filey Coast
HRA	Habitats Regulation Assessment
IPMP	In-Principle Monitoring Plan
IPSIP	In-Principle Site Integrity Plan
LVIA	Landscape and Visual Impact Assessment
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
NE	Natural England
NPS	National Policy Statement
OTE	Outer Thames Estuary
OWF	Offshore Windfarm
PD	Procedural Decision
PEIR	Preliminary Environmental Information Report
PTS	Permanent Threshold Shift / Permanent Auditory Injury
PVA	Population Viability Analysis
RSPB	Royal Society for the Protection of Birds
RTD	Red-Throated Diver
SAC	Special Area of Conservation
SCHAONB	Suffolk Coasts and Heaths Area of Outstanding Natural Beauty
SIP	Site Integrity Plan
SNS	Southern North Sea
SPA	Special Protected Area
UXO	Unexploded Ordnance

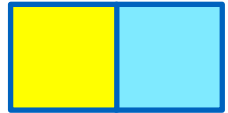


Glossary of Terminology

Applicant	East Anglia TWO Limited / East Anglia ONE North Limited
Construction operation and maintenance platform	A fixed offshore structure required for construction, operation, and maintenance personnel and activities.
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive, as defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017 and regulation 18 of the Conservation of Offshore Marine Habitats and Species Regulations 2017. These include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas.
Generation Deemed Marine Licence (DML)	The deemed marine licence in respect of the generation assets set out within Schedule 13 of the draft DCO.
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, these cables will include fibre optic cables.
Jointing bay	Underground structures constructed at intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
Link boxes	Underground chambers within the onshore cable route housing electrical earthing links.
Meteorological mast	An offshore structure which contains metrological instruments used for wind data acquisition.
Mitigation areas	Areas captured within the onshore development area specifically for mitigating expected or anticipated impacts.
Marking buoys	Buoys to delineate spatial features / restrictions within the offshore development area.



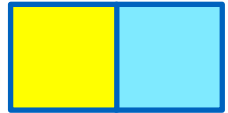
Monitoring buoys	Buoys to monitor <i>in situ</i> condition within the windfarm, for example wave and metocean conditions.
Natura 2000 site	A site forming part of the network of sites made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive.
Offshore cable corridor	This is the area which will contain the offshore export cables between offshore electrical platforms and landfall.
Offshore development area	The East Anglia TWO / East Anglia ONE North windfarm site and offshore cable corridor (up to Mean High Water Springs).
Offshore electrical infrastructure	The transmission assets required to export generated electricity to shore. This includes inter-array cables from the wind turbines to the offshore electrical platforms, offshore electrical platforms, platform link cables and export cables from the offshore electrical platforms to the landfall.
Offshore electrical platform	A fixed structure located within the windfarm area, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Offshore export cables	The cables which would bring electricity from the offshore electrical platforms to the landfall. These cables will include fibre optic cables.
Offshore infrastructure	All of the offshore infrastructure including wind turbines, platforms, and cables.
Offshore platform	A collective term for the construction, operation and maintenance platform and the offshore electrical platforms.
Platform link cable	Electrical cable which links one or more offshore platforms. These cables will include fibre optic cables.
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.
Transition bay	Underground structures at the landfall that house the joints between the offshore export cables and the onshore cables.
Transmission DML	The deemed marine licence in respect of the transmission assets set out within Schedule 14 of the draft DCO.



1 Introduction

1. This document presents the Applicants' comments on Natural England's (NE) Deadline 4 submissions as follows.
 - **Section 2** – Appendix A12 (REP4-087) - NE Advice on RTD in the OTE SPA
 - **Section 3** – Appendix A13 REP4-088 - NE Interim Comments on Ornithology Compensation (REP4-88)
 - **Section 4** – Appendix B3 (REP4-090) - NE Comments on the draft Marine Mammal Mitigation Protocol (MMMP) [REP3-042] and In-Principle Southern North Sea Site Integrity Plan (SIP) [REP3-044]
 - **Section 5** – Appendix G2 (REP4-094) - NE Comments to the Draft Development Consent Order (DCO) [REP3-011 & REP3-012] and Schedule of Changes to the Draft DCO [REP3-013]
 - **Section 6** – Appendix C6 (REP4-092) - NE Comments to Documents Submitted at Deadline 3 in Relation to Onshore Ecology [REP3-048, REP3-060, REP3-061, REP3-070]

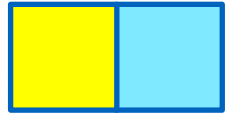
2. This document is applicable to both the East Anglia TWO and East Anglia ONE North DCO applications, and therefore is endorsed with the yellow and blue icon used to identify materially identical documentation in accordance with the Examining Authority's procedural decisions on document management of 23rd December 2019 (PD-004). Whilst this document has been submitted to both Examinations, if it is read for one project submission there is no need to read it for the other project submission. The exception to this is **section 2** and **section 3** in which some aspects relate specifically to measures being implemented at the East Anglia ONE North project to reduce the potential operational displacement impacts on the red-throated diver feature of the Outer Thames Estuary SPA.



2 Applicants' Comments on NE Appendix A12 (REP4-087) - NE advice on Red-Throated Divers in the Outer Thames Estuary Special Protected Area related to Deadline 3 Submissions

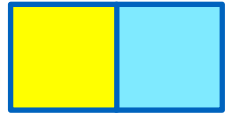
3. The following table provides detailed responses to Natural England's (NE) Deadline 4 (REP4-087) submission which reviewed the Applicants' Deadline 3 submission (REP3-049) Displacement of Red Throated Divers (RTD) in the Outer Thames Estuary SPA).
4. However, the Applicants first wish to set the context for the detail that follows. Following the submission of their Relevant Representations and workshops held between the Applicants, NE and the RSPB, it was agreed that the Applicants would undertake additional analysis to further understand the extent and magnitude of red-throated diver displacement effects due to windfarms in and around the Outer Thames Estuary SPA. The timeline for this process was:
 - i. Relevant Representations submitted – **20th February 2020**
 - ii. NE subsequently advised the Applicants that until further notice, due to resource issues during the first Covid-19 lockdown, they were unable to engage in non-statutory advice and were concentrating on examinations or post-examination work (i.e. Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas).
 - iii. The Applicants therefore undertook a literature review and an initial analysis of displacement using NE datasets.
 - iv. NE provided discretionary advice to the Applicants - **18th June 2020**
 - v. The Applicants provided an initial report (the outputs of point (iii)) to NE, RSPB and the MMO for a workshop, which also discussed NE's discretionary advice, on **27th July 2020**. As a result of this workshop NE requested more detailed analysis including use of data collected between 2002 and 2006 (on which the SPA designation was based) and reviewing displacement in 1km increments, looking at displacement to at least 12.5km and considering the gradient of effect. NE accepted that displacement would not be 100% for the entire range of effect.
 - vi. The Applicants engaged Professor Jason Matthiopoulos¹ to design and undertake the modelling from available datasets. East Anglia ONE North

¹ <https://www.gla.ac.uk/researchinstitutes/bahcm/staff/jasonmatthiopoulos/#additionalinformation>



- Limited worked internally to determine the scope for any possible reduction in the area of the East Anglia ONE North windfarm site
- vii. Initial results from the modelling were presented to NE and RSPB in a workshop - **22nd October 2020**.
 - viii. The modelling was provided to NE and RSPB (with confidence intervals added as per NE request) **16th November 2020**.
 - ix. Modelling workshop with NE/RSPB (and NE specialist modelling advisor) **7th December 2020**
 - x. Deadline 3 submission of REP3-049, accounting for NE comments from the workshop where possible, including consideration of the gradient of displacement effect ('effective habitat loss'), a reduced windfarm site area for East Anglia ONE North, and the literature review (**Appendix 2**, which was undertaken as part of (iii) above)) **15th December 2020**. This report was reviewed and approved by Professor Bob Furness².
5. This timeline demonstrates the steps that the Applicants have taken to address the issues raised with respect to red-throated diver since receipt of the Relevant Representations. Note that in addition to the above, the Applicants have amended REP3-049 to incorporate the comments raised by NE in REP4-087, this has not resulted in material changes to the report or conclusions.
 6. A key driver for undertaking this modelling was the observation made in studies conducted in the German Bight, that transferability of diver responses should not be assumed between regions, and hence a clear need for a region specific study was agreed.
 7. The analysis used data spanning nearly 20 years, the earliest of which predates all offshore windfarm development in the region, and incorporated NE's requests to consider displacement effects up to 12km in 1km increments, both for the proposed windfarms and also operational ones.
 8. The modelling and analysis, using statistical spatial models and accounting for other variables which influence diver distributions (e.g. depth, distance to coast, etc.), found that the average distance over which the birds were displaced by the operational windfarms in the SPA declined to zero in the 7-8km distance band, from a maximum displacement within the windfarms of around 35%.
 9. Following their review, NE has stated that the outputs from the London Array monitoring should be used for the assessment (despite this study being based on a much shorter period of data collection and covering a much smaller area).

² <https://www.gla.ac.uk/researchinstitutes/bahcm/staff/bobfurness/>



The London Array study reported a maximum distance effect of 11.5km and a maximum displacement within the windfarm of 55%, with a gradient of effect between the windfarm and 11.5km.

10. The individual comments on the analysis raised by NE are addressed in the following detailed responses. In conclusion, notwithstanding the comments made by NE in REP4-08 which are covered in detail in the table below, the Applicants consider the modelling presented is robust and hence the results are a reliable guide for assessment.



Reference	NE Comment	Applicants' Comments
Introduction		
001	<p>This document provides Natural England's statutory advice based on points raised in the following documents submitted by the Applicant at Deadline 3:</p> <ul style="list-style-type: none"> • REP3-40/41 Offshore In-principle Monitoring Plan • REP3-49 Displacement of Red Throated Divers (RTD) in the Outer Thames SPA • REP3-052 Project Update Note • REP3-070 Applicants' Comments on Natural England's Deadline 2 Submissions • REP3-073 Offshore commitments • REP3-074 Best Practice Protocol for minimising disturbance to RTD • REP3-084 Written Summary of Oral Case (ISH1) 	Noted
Summary		
002	<p>Natural England welcomes the undertaking of the additional analysis of red-throated diver displacement from the Outer Thames Estuary SPA. But as set out in Natural England's REP3-117 it is unfortunate given Natural England's fundamental concerns, that this assessment wasn't included as part of the original application and/or prior to examination commencing. It is Natural England's view that these issues are better dealt without outside of the constraints of examination.</p>	<p>The Applicants wish to highlight that whilst the displacement concern was raised prior to the Applications being submitted, that no advice was provided at that time by NE for how an assessment should be undertaken. Therefore, the Applicants included a standard approach to RTD displacement of a 4km range of impact with 100% displacement effect for East Anglia ONE North (included within the Information to Support Appropriate Assessment Report (APP-043)).</p> <p>It was only at the Relevant Representation (RR) stage that NE provided further information on their concerns and the range at</p>



Reference	NE Comment	Applicants' Comments
		<p>which they believed effects could be detected. The Applicants acknowledge that this has been an area of growing concern for NE, but that their most recent advice relates to publications from 2019 or 2020 (e.g. Vilela et al (2020), Dorsch et al (2020) and Mendel et al (2019), see Appendix 2 of REP3-049). It is therefore unreasonable to suggest, in the absence of information at the time of the assessment or clear guidance from NE, that the Applications could have included such information about displacement. Indeed, the current estimate of the non-breeding population of RTD in the SPA dates from September 2019 and is based on surveys published that year (Irwin et al, 2019).</p>
003	<p>Natural England raises fundamental issues regarding the Applicant's modelling approach. These relate to inclusion of aerial surveys without corrections for observer bias, application of shipping lane data and pseudo-replication for spatial and temporal parameters which is likely to result in displacement up to 7km being an underestimate.</p> <p>As the Applicant is basing their conclusions on their modelling approach, which we consider requires further consideration and validation, we believe the conclusions in Tables 5, 7 and 10 of REP3-049 to be unreliable. Until the modelling approach has been validated, and the issues around treatment of the visual aerial surveys have been addressed, Natural England cannot agree with any of the conclusions.</p> <p>The modelled predictions of displacement are completely inconsistent with all empirical studies of red-throated diver displacement recorded at windfarms within or near the Outer Thames Estuary SPA. Therefore, until such time that these predictions are validated, we consider it wholly inappropriate to assume that the reduction of relative density within the windfarm is 33%. As stated in MacArthur Green (2019)</p>	<p>The detailed points highlighted in Natural England's summary point here are covered in subsequent responses below.</p> <p>In summary, the Applicant's agree with NE that East Anglia ONE North is likely to have some effect on the distribution of divers within the area of the Outer Thames Estuary SPA closest to the windfarm, however the magnitude of the effect, and specifically the number of individuals affected is predicted to be very small (between 9 and 38 birds displaced and a maximum of 3 mortalities using the Applicants' modelling outputs, and up to 127 individual displaced and 13 mortalities using Natural England's advised approach (i.e. using 80-100% displacement out to 11.5km, which is presented in Table 5 of the Update to REP3-049, document reference ExA.AS-4.D5.V2)).</p> <p>The population consequences of these magnitudes of impact will be negligible (if in fact detectable at all) and NE have agreed that it is very likely there will be no population effect (see row 039).</p>



Reference	NE Comment	Applicants' Comments
	<p>evidence suggests that displacement of red-throated divers tends to be around 80-100% from within offshore wind farms. Therefore, until there has been validation of model predictions, the 'effective area of displacement' within windfarms themselves should be considered as the upper end of the range for within windfarm displacement for assessment purposes i.e. 80-100%.</p> <p>Whilst East Anglia Two will have less of an impact on red-throated diver in the Outer Thames Estuary SPA than East Anglia One North; we disagree that there will be no displacement from East Anglia Two. We advise that the questions raised around the modelling approach are addressed before effects from East Anglia Two can be ruled out.</p> <p>There is clear evidence that the distributions of the red throated diver within the site have already changed as a result of windfarms that are already constructed within the Outer Thames Estuary SPA, and it is likely that if East Anglia One North is built just 2km away from the SPA boundary, there will be additional effects on the distribution of red-throated diver. The key issue here is the effect of the presence of additional windfarms inside or close to the boundary of the SPA has on the distribution of divers and how this may impact on the ability of the SPA to support the same number and distribution of birds as it otherwise would. Given the expected displacement of red-throated divers in the Outer Thames Estuary SPA due to existing (and planned) offshore wind development, further displacement should be avoided.</p> <p>If the proposed windfarm was to be moved 10km away from the Outer Thames Estuary SPA boundary this is likely to negate any significant effects of displacement.</p> <p>The approach taken by the Applicant to quantifying "effective habitat loss" ignores the issue that over the whole of the area of overlap</p>	<p>The Applicants consider that separating the area of effect from the magnitude of population effect, as NE has, is an inappropriate simplification and that there will not be an ecological consequence for the SPA (see section 2.3 of REP3-049 and of the updated report document reference ExA.AS-4.D5.V2).</p>



Reference	NE Comment	Applicants' Comments
	defined by whatever buffer is considered appropriate (>10km in our opinion), the density of divers and so the ability of those sea areas to support the qualifying feature will be reduced to some degree. Therefore, notwithstanding the disagreement on the modelling outputs Natural England advises that displacement 6-7% of the SPA population is a significant effect.	
004	Natural England has set out its legal submission in Deadline 4 Appendix A15 our views on fundamental flaws in the legal position set out by the Applicant in Section 4 and 5 of the Displacement of RTD in the OTE SPA document [REP-049] which should be read along-side the technical advice provided in this response.	The Applicants disagree with NE's legal submission and will be providing a response to this at Deadline 6.
Buffer – major concern		
005	Natural England project advice: The Applicant states their view of Natural England's current position, that a robust HRA which assumes that displacement extends up to 10km, is more conservative than our position pre-application. However, this is not the case. We raised the issue that the recent evidence suggests that red-throated diver displacement extends to beyond 10km before application submission as part of the Expert Topic Group meetings in June 2019.	<p>The Applicants note this comment.</p> <p>The RIAA (APP-043) assesses up to 4km on the basis of 10% mortality and on a worst case of 100% displacement. Although the Applicant accepted that, on the basis of emerging evidence, the displacement effect may have extended beyond 4km, given that 100% displacement to 4km and 10% mortality were unlikely (and in the absence of any other advice) it was considered that the approach used was sufficiently precautionary to account for the uncertainty over the spatial extent.</p> <p>In their section 42 consultation response NE stated (see Appendix 12.1 Offshore Ornithology Consultation Responses (APP-469), page 34:</p> <p><i>Based on the available evidence, Natural England considers that there is no clear justification to change our current advice of a 4 km</i></p>



Reference	NE Comment	Applicants' Comments
		<p><i>buffer and 100 % displacement across this (as advised in the joint SNCB displacement interim advice note, SNCBs 2017) at this stage for the purpose of impact assessment. It would seem that while 4 km may be an underestimate of the true extent of the displacement, assuming a magnitude of 100 % out to 4 km is likely to be an over-estimate</i></p> <p>And for the HRA (see Appendix 4 - Information to Support AA Report - Consultation Responses (APP-047)):</p> <p><i>We continue to advise that assessments of operational disturbance and displacement for RTD for offshore wind farm assessments are based on a constant displacement rate across the offshore wind farm site and a 4km buffer and suggest that a range of displacement rates up to 100 % and a mortality rate of up to 10 % are considered.</i></p> <p>The Applicants acknowledge that NE's advice has been refined since these comments were made.</p>
006	<p>In addition, whilst we acknowledge that there is research from the German Bight that indicates red-throated diver displacement is at least to 10km; this was not the only research which informed our position. The London Array final year post construction monitoring report (APEM, 2020), which reported displacement out to 11.5km within the Outer Thames Estuary SPA is of direct relevance and informed our position more than the similar evidence emerging from the German Bight.</p>	<p>The Applicants have included consideration of the Apem (2020) report within Applicants' Responses to Natural England's Deadline 1 Submissions (REP2-004). The Applicants would highlight the following key sections of the APEM (2020) report:</p> <p>Section 7.5.1 (emphasis added)</p> <p><i>The proportion of divers displaced from the LAW [London Array windfarm] footprint was estimated to be approximately 78% and 55% for during and post-construction respectively.</i></p> <p>Section 1.3 (fourth bullet, emphasis added)</p>



Reference	NE Comment	Applicants' Comments
		<p><i>The density profile of divers increased gradually throughout the buffer regions with a peak at 9 km pre-construction. This may be indicative that other factors, apart from the construction activities at the LAW, are compounding any displacement effects on divers in the region. Year-to-year fluctuations in diver numbers and distribution should be an important consideration when interpreting the results. The displacement distance estimated for divers was between 4.5 km and 11 km. However these results have not been subjected to any statistical analysis and therefore may not indicate significant changes. Overall, the displacement effects of divers appeared to be less than expected but occurred over a larger distance.</i></p>
007	<p>It is incorrect to state that Natural England's original recommendation was to employ a buffer of 4km. For EIA purposes we recommend that an assumption that there is 100% displacement out to 4km is used. However, since pre-application we have consistently advised that the HRA for the Outer Thames Estuary SPA needs to take account of the evidence that displacement of red-throated divers is in excess of 10km.</p>	<p>The Applicants acknowledge NE's clarification of this point, although notes it is unclear why different approaches would be applied between the EIA and HRA. However, as noted in row 005 NE's written advice to the Applicants at the section 42 stage on both EIA and HRA was to use 100% displacement to 4km.</p>
	<p>Adoption of 2km buffer: Natural England welcomes the Applicant's commitment to the provision of a 2km buffer between East Anglia One North and the SPA boundary. However, we note and agree with the Applicant's position that the 2km buffer reduces the impact, but the proposed buffer does not fully mitigate the impact of displacement to an acceptable level.</p>	<p>The Applicants agree that the potential for displacement by East Anglia ONE North is likely to extend beyond 2km and that as a result there will be some redistribution of birds within the nearest area of the SPA. However, when this is combined with consideration of the very low number of individuals this is likely to involve (and as acknowledged by NE elsewhere in this submission rows 029, 032, and 039) the effect will be of no material consequence to the population</p>



Reference	NE Comment	Applicants' Comments
		Notwithstanding the Applicant's view that there will not be AEoI, the Applicant recognises the concerns raised by NE and sought to identify the maximum commitment that could be made whilst maintaining target capacity as described in the Offshore Commitments (REP3-078).
008	<p>Locating OWFs away from RTD SPAs: We also acknowledge that there will not be complete avoidance within the buffer, instead there is a gradual decline in displacement with increased distance from the windfarm. However, whether the displacement is 7km, as proposed by the Applicant's modelling, or 11.5km as predicted by the London Array monitoring, the area affected is significant.</p> <p>The advice in: "Review of ornithology constraints for Offshore Wind Leasing in Areas 3 (Yorkshire Coast) and 4 (The Wash)" Report to The Crown Estate (March 2019) by MacArthur Green states:</p> <p>"Since offshore wind farms can displace red-throated divers up to distances that in some extreme cases appear to exceed 10 km from the turbines, it may be prudent to trim the inshore boundary of Regions 3 and 4 so that these are a minimum of 10 km from the outer edge of Greater Wash SPA."</p>	<p>The Applicants consider that treating this potential effect simply as the area of overlap between the windfarm buffer and the SPA omits the very relevant population scale, as noted in other responses here.</p> <p>With respect to the guidance provided to The Crown Estate, which NE refers to, the quoted statement has been taken out of context. It was provided as advice to The Crown Estate that, when identifying areas for future offshore windfarm leasing rounds (e.g. Round 4) it would be advisable to avoid areas where obtaining consent would be more challenging due to ornithological sensitivities and this thereby would minimise risks to developers of delays in the consenting process.</p>
009	Natural England agrees with this advice, and although this is in the context of the Greater Wash SPA, we advise that the same approach needs taken here to avoid an Adverse Effect on Integrity (AEoI) of the Outer Thames Estuary SPA.	This advice was given specifically to avoid the current issues, and reduce development risk, rather than due to an agreement with NE about the magnitude of effects.
Visual Aerial Surveys		
010	A key issue is that the 2002-2008 visual aerial data set appears to be treated the same as 2013 and 2018 survey data that was collected	The current model treats the survey data as a reliable source, but at the same time the modelling allows for fluctuations over time, so



Reference	NE Comment	Applicants' Comments
	using digital photographic aerial methods. The visual aerial survey represents an accurate distribution of red-throated diver at the time when all (apart from one) offshore wind farms had not been constructed. However, it cannot be considered to be an accurate reflection of the absolute numbers of red-throated diver in the SPA at the time, due to visual aerial methods under-estimating true numbers. APEM (2010) carried out comparisons between visual and digital survey methods and reported that digital stills reveal up to 6.5 times as many birds as the visual spotter method	<p>the spatial predictions do not suffer as a result of changes in methodology, although the absolute numbers (of individuals) generated by the model should be treated with caution.</p> <p>For this reason, the model predictions were normalised to ensure the comparisons of the model predictions with and without the windfarms were robust. By basing the outputs on this comparison of relative predictions the results are insulated against the effects of varying methodologies in data collection.</p>
011	Therefore, the Applicant has not accounted for the likelihood that, in comparison with post construction surveys (conducted by digital aerial photography), the abundance figures in and around the windfarm footprints during the pre-construction period are artificially low due to the use of visual aerial survey methods at that time, there is a risk that the predicted level of displacement will be significantly underestimated.	See response in row 010
012	Whilst we recognise that the APEM (2020) monitoring is of course a smaller area, and uses a number of environmental co-variates, the key issue is the baseline surveys in 2009 were undertaken using digital aerial surveys, and therefore comparable to post construction surveys which used the same survey platform. In contrast, the Applicant's approach combines data from different survey platforms, but without considering any correction factors to correct for the perception bias in the earlier visual surveys.	<p>As noted in response to the comment in row 010, the modelling predictions are not sensitive to methodology changes (in this case changing from visual to digital surveying), and therefore the distributions generated by the model are robust. It is true that the population abundance would be unreliable, however as stated above (and in REP3-047 and the updated document submitted at Deadline 5 document reference ExA.AS-4.D5.V2), the predictions were normalised to ensure a level playing field when using the model results to estimate displacement. Therefore there is no requirement to include correction factors as suggested here.</p> <p>The Applicants also note that there are also likely to have been differences in the quality of imagery obtained across a decade of digital aerial surveys (i.e. from 2009 to 2019) which would also</p>



Reference	NE Comment	Applicants' Comments
		have the potential affects that NE suggest here. However, in the same manner described above, it is expected that the modelling methods used by APEM (2020) will also have been robust to these potential methodological changes effects.
013	Recognising the change in survey platform as an issue Natural England recommended that an approach that considered change in relative densities inside the windfarm footprint and outside needed to be considered.	This is the approach which the Applicants took, with the relative change with and without the windfarm effects included (referred to in the analysis and assessment as counterfactual outputs (see sections 2.1 and 2.2 for a discussion and Appendix 1 for the outputs (document reference ExA.AS-4.D5.V2)).
Pseudo Replication		
014	It is unclear how the strengths of effects are being defined. This is particularly in lieu of the fact that there was uncertainty around the partial plot of distance to windfarm in regards to the confidence limits around the presented relationship. As it stands, the confidence limits around the partial relationship between abundance and distance to wind farm includes a straight line through 0 on the y-axis, which suggests that the actual relationship as presented may not exist, or may not be strong.	<p>The Applicants agree that there is inevitable uncertainty in the results of such modelling, but that this is unavoidable to some extent and does not detract from the results.</p> <p>The strength of effect (assuming this refers to the magnitude of displacement) is not derived from the partial plots, but the comparison of the density surface predictions generated with and without the windfarm effects.</p>
015	We note that the relative diver distributions in Appendix 1 figure 6a and 8a are very similar. The remarkably similar distributions between factualls and counterfactuals (Appendix 1 figures 7 and 8) are likely due to the fact that the covariates used are mostly static, and if distance to windfarm is not strongly influencing predictions, removing it or changing it as a parameter should not greatly impact predictive output. Counterfactuals were created here to act as a baseline for which to compare model predictions. This was done by simply changing the distance to windfarm parameter to represent the	The Applicants have interpreted the spatiotemporal term in the selected model to include missing covariates or intrinsically driven species aggregations, but no direct effects of windfarms. This carries the implicit assumption that there are no residual effects of distance to windfarms that are not captured by the distance-to-windfarm term itself. We base this on the fact that distance to windfarms is known with high accuracy and the time points at which different windfarms are introduced to the system are also precisely known. Most importantly, the distance to windfarm term is modelled



Reference	NE Comment	Applicants' Comments
	<p>environment between 2002 and 2006. However, a year covariate and a spatial smoothing covariate were also included in the model. The concern is that there is a signal in the spatial and year parameters that confounds the distance to windfarm parameter because distance to windfarm is a covariate that is made up by the year and spatial elements, thus potentially incorporating an element of pseudo-replication in the model. Therefore, the impact of the windfarms, which is captured by inclusion of the year and spatial parameters, is being passed to the counterfactual. It is therefore unlikely that they actually represent a true baseline to compare against. It is recommended that this potential source of pseudo-replication be investigated and removed if possible.</p>	<p>with as much flexibility as the spatial term (i.e. they are both composites of basis functions) and hence the model tailors the distance to windfarm covariate to match the observed effects.</p> <p>To evaluate this assumption, the Applicants inspected the partial plots of the time specific spatial layers (Fig. 5 in Appendix 2 of REP3-049) which show no similarity between the fitted spatial effects in each year of data and the location of windfarms. Nevertheless, it is possible that if there are indirect effects of the windfarms on red-throated diver distributions which do not radiate symmetrically from the windfarms, these would not be captured by the structure of the distance-to-wind-farm layer and may instead be incorporated into the spatial term. Such effects could include changes in prey distributions due to hydrodynamic or prey-behaviour changes brought about by the placement of turbines, however identifying and obtaining appropriate covariates which would need to be closely matched in time to the original surveys, and there is no guarantee that suitable data were collected.</p>
Displacement Effect		
016	<p>The predicted abundance of RTD displayed in Tables 1 and 2 of REP3-049 is surprising. The comparison of the empirical data in the Applicant's review (in Table 1.1 Appendix 2) stated the level of displacement within the actual windfarm footprint ranged typically between 78% and 95% displacement (Table A below includes all the studies from within or near the Outer Thames Estuary SPA).</p>	<p>The Applicant's note that the modelling results using site specific data and a longer time series than previous work have shown different results than NE appear to have expected, but, this does not mean that the reported result is incorrect. NE also appear to make a distinction between 'empirical' studies and 'modelling' ones, but this distinction overlooks the fact that all the studies have performed data analysis and in most (possibly all) cases this will have involved fitting a model to the data. Furthermore, the current analysis is entirely based on the analysis of survey (i.e. empirical) data.</p>



Reference	NE Comment	Applicants' Comments
		<p>It should also be noted that among the comparable (to the current analysis), large scale studies in the review, the reported distances over which red-throated divers may be displaced by windfarms, show considerable variation; in the German Bight distances of 3.3km to 23km (Vilela et al. 2019) and separately high levels of displacement up to 5km, and a detectable effect up to 10-15km (Dorsch et al. 2020); post-construction monitoring for LID/Lincs reported an effect detectable up to 5-9km (the range attributed to inter-annual variations), and at Horns Rev the estimated displacement distance was 5-6km.</p> <p>Thus, there is quite a wide variation in effect, and the current estimate of 7-8km lies in the middle of this range. In their discretionary advice, NE accepted that</p> <p><i>“Vilela et al does caution that the available results can only be transferred to other areas outside the study area to a very limited extent, and therefore need to be tested on a case by case basis.”</i></p> <p>Indeed, the full statement in Vilela et al. 2020 from which this was taken (emphasis added) is:</p> <p><i>“The theoretical habitat loss for the spring season was estimated at 5km radius for the total study area and also for the northern sub-area. For the southern area a lower value was estimated at 2km. Diver densities in the southern area were considerably lower compared to the northern area and showed more variable aggregations between years as compared to the North. The estimated displacement effect for the southern area was weaker and more difficult to estimate due to the flat model curve. However, we do not yet fully understand the causes of these differences in disturbance radius and habitat loss. Possible explanations could be</i></p>



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		<p><i>factors such as local food availability, seasonal usage by divers (cf. Dorsch et al. 2019) and diver density, as well as abiotic factors like the distance to the shoreline, currents, water depth, sediment and many more. Since these biological and environmental factors will differ strongly between different areas, the transferability of these values to other (sub-) areas, such as different regions of the North Sea outside the German Bight or the Baltic Sea is therefore limited.</i></p> <p>This, therefore, was the rationale for undertaking new modelling using site specific data and not simply importing worst case assumption from other geographies (see row 018)</p>
017	Therefore, we advise that Tables 1 and 2 of REP3-049 which indicate that the within windfarm reduction is only ~33% is not consistent with the empirical studies carried out in or near the Outer Thames Estuary SPA (Table A above).	<p>It is agreed that the maximum displacement effect is lower than that reported elsewhere. However, the Applicants dispute the implication in this (and the following paragraph) that the current study is 'theoretical' while the others are 'empirical' and that this therefore confers greater weight to the latter. All of the estimates have been derived through analysis and modelling, and therefore this is a false distinction. While based on assumptions, like all analysis, the current study is methodologically robust and of no less inherent value than any other.</p> <p>The other studies conducted in or near the SPA have been smaller in scope, both spatially and temporally, and it is entirely possible that this accounts for the differences in the results, for example if these studies represent shorter duration effects or ones that were not well captured across the (comparatively) small survey areas. It is also relevant that all but one of the previous studies cited by NE were conducted using boat-based survey methods and there is a high likelihood this will have influenced the results obtained, since</p>



Reference	NE Comment	Applicants' Comments
		<p>this species is known to avoid vessels by up to 2km. Thus, the fact that these studies reported different effects is perhaps not surprising.</p>
018	<p>The Applicant's modelling has not found a similar diver response (reported elsewhere) when considering within the windfarm area. Other studies in the Outer Thames Estuary, the Greater Wash and the German Bight have all reported much greater levels of displacement within the windfarms themselves. Whilst we agree that results in one region are not automatically transferable to another region; this is not the situation here. Empirical data from windfarms impacting upon the same SPA namely the Outer Thames Estuary SPA are demonstrating significant differences in diver responses when compared to this (theoretical) modelling.</p>	<p>The Applicants agree that the current analysis has not found the same results as reported previously, and NE appear to consider this is grounds for rejection. The Applicants are of the opinion that the purpose of the current study was to investigate if the findings from studies conducted elsewhere were appropriate for use in the current assessment.</p> <p>While scrutiny of scientific methods is entirely appropriate, as noted in previous responses, the current modelling is considered robust and the concerns raised by NE have been responded to in the current document, and there is no need for further modelling.</p> <p>It should also be noted that the 'empirical' studies referred to here were all conducted at a much smaller scale (e.g. of individual windfarms) and most covered much shorter time scales (c. 5 year span) than the current analysis and this may have influenced the observed differences.</p> <p>As previously noted, the apparent distinction between 'empirical' studies and the current 'theoretical' one is flawed, since it is not possible to derive an estimate of effect without some analysis and modelling, and therefore there is no distinction. The models reported here were fitted to the empirical data, which is standard practice for spatial analysis such as this.</p>
019	<p>Contrary to the Applicant's opinion, the observations do not appear to be similar to the London Array post construction monitoring (APEM, 2020). Firstly, the London Array data; although lower than many of the</p>	<p>The Applicants note NE's response to this however it is appropriate to consider the range of results found for displacement,</p>



Reference	NE Comment	Applicants' Comments
	<p>studies in Table A, a 55% reduction within the windfarm is still considerably higher than the 33% found by the Applicant's modelling approach. This disparity, together with the fact that no cross-validation efforts were made to determine the predictive performance of the model, leads Natural England to question whether the model is underestimating the displacement effects</p>	<ul style="list-style-type: none"> • The current study: 33% reduction in the windfarms, declining to 0% at 7-8km; • German studies: 90-100% reduction in the windfarms, declining in some case to zero at distances >10km but in others <5km; and • London Array (APEM 2020) study: 55% reduction in the windfarm, declining to 0% at 11.5km. <p>From this it is apparent that red-throated diver responses are variable, and thus it is appropriate to undertake studies such as the current one in order to further our understanding.</p>
Validation of Model Predictions		
020	<p>The issue of the un-validated model prediction, that the percentage reduction within the windfarm is approximately 33%, does not relate to East Anglia One North because the proposed array is located outside of the SPA. However, it does mean the total displacement that the SPA is already subjected to is massively under-estimated.</p>	See row 021
021	<p>As stated above, there are questions over the modelling approach. In particular, the modelling approach does not include any attempt to validate the model predictions, for example by: i) comparison of modelled densities of divers in certain places of particular interest e.g. in and around windfarms with the actual densities recorded or, ii) formal cross validation by exclusion of some of the survey data from the dataset used to construct the models and comparison of the densities generated by those models with the withheld density data. We consider that model validation tests of this kind are necessary to establish the robustness of the model's predictions and so the degree</p>	<p>As noted above, the modelling results are considered robust for predicted distributions, but given the inherent variability in seabird distributions, it is not clear what would be gained from a comparison of the current model predictions with smaller scale windfarm surveys which lack the wider spatial context. These might provide a close correspondence, or not, but either way the results could equally be considered as chance.</p> <p>The current analysis has instead presented counterfactual outputs which avoid these issues, and are able to provide a clear presentation of the differences in distributions due to each</p>



Reference	NE Comment	Applicants' Comments
	<p>of confidence can be placed in the findings. Once confidence has been established in the modelling approach, then an assessment of the extent of area affected and numbers of birds predicted to be displaced can be undertaken.</p>	<p>individual term in the model. In this aspect, the outputs are directly comparable to those from population models, where the relative impacts with and without windfarms have become the accepted metrics for assessing consequences.</p> <p>NE has suggested that cross-validation be undertaken for this analysis, however from the context to this point it appears the request is in fact to undertake independent validation. For clarity, cross-validation is a resampling method used for model fitting and model selection. It is the gold standard for those two procedures, because it gets directly at the comparison between explanatory and predictive power. However, for the current models and size of dataset the time-scale to undertake this analysis could be in the order of years. As a consequence the statistical community (who author the statistical software used in this analysis) has replaced these impractical methods with considerably more expedient ones such as maximum likelihood (in the case of model fitting) and penalised likelihood criteria such as Akaike's Information Criterion (AIC; for model selection). Both of the latter approaches have been used in the current analysis.</p> <p>Assuming NE is suggesting we undertake independent validation of the results (as opposed to cross-validation), this could be conducted with a subset of the data withheld (e.g. removal of the spatially innermost 20% of the data), and the results compared with those obtained using the full dataset. However, crucially there is no objective means to judge the quality of fit between the two surfaces this would generate, hence this would not assist in reaching a judgement on model performance. Furthermore, since the candidate suite of models analysed is considered to be appropriate for model investigation, by using industry standard methods for</p>



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		<p>model selection (maximum likelihood methods for model fitting and penalised likelihood criteria (e.g. AIC) for model selection) means the Applicants have a high degree of confidence in the process and the selected best-fit model.</p> <p>While not specifically providing a measure of the model's predictive performance, the bootstrap resampling procedure used to estimate confidence intervals around the mean predicted results (as included in the revised report submitted at Deadline 5 (see updates to Tables 1 – 4, document reference ExA.AS-4.D5.V2) does provide a robust quantification of uncertainty around the point estimates. In practice the Applicants consider the latter (i.e. robust estimates of uncertainty) to be a more useful measure of model performance than a "yes/no" answer to the question of "<i>does one predicted density surface closely match another one?</i>", especially when (as noted above) there is no objective yardstick to answer this question, meaning that the answer will instead rely on subjective appraisal.</p>
022	In addition, we note that the modelling undertaken in the German Bight (Vilela 2020) uses a more sophisticated Bayesian approach, which may also be appropriate for these projects and help address concerns	The Applicants acknowledge that other statistical methods are available, however the current study is considered robust.
023	<p>Given the questions around the validity of the modelling approach we suggest that a range of displacement figures are presented, based on:</p> <ul style="list-style-type: none"> > varying spatial extents of effect (including 7km from the Applicant's modelling, but also up to 12km, to reflect the evidence from the London Array monitoring). > varying magnitudes of displacement and associated gradients with increasing distance (including the Applicant's modelled displacement 	<p>The Applicants have provided responses to Natural England's validity questions above and are of the opinion that the methods and results are robust.</p> <p>Nonetheless, the range of outputs suggested is presented in Tables 1 – 4 of the revised version of the Displacement of red-throated divers in the Outer Thames Estuary SPA submitted at Deadline 5 (document reference ExA.AS-4.D5.V2). A preliminary review of these indicates that the mortality prediction for East</p>



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	of 33% within the windfarm footprint, associated gradient out to 7km and up to 100% within the windfarm area and associated gradient out to 11.5km to reflect the empirical studies that have reported much higher levels, typically 80-100% within windfarm footprints).	Anglia ONE North, using NE's figures of 100% displacement in the windfarm declining to 0% at 11.5km, would increase from the current upper mortality prediction of 3 individuals (which is 10% of the 34 predicted to be at risk of displacement using the modelling results) to 13 (10% of 127 individuals at risk of displacement). This would not materially change the assessment conclusion that there would be no population impact due to displacement from the windfarm.
Conservation Objective to maintain diver abundance		
024	As stated in REP1-172, the mortality rate as a result of displacement is not the main the area of concern to Natural England in relation to the Habitats Regulations Assessment. Even if no birds died as result of displacement, the fact remains that the distribution of the divers within the SPA has been changed and will most likely be further changed by the current developments, probably (given the absence of evidence of habituation) on a continuing/lasting basis, and the area of SPA that can support divers will have been reduced.	Given this statement it is unclear why the Applicants were requested to undertake the current modelling as NE's position on AEol is derived from the presence of the windfarm within 11.5km of the SPA, and all other considerations would appear to be secondary.
025	In addition, it is impossible to make direct comparisons between the abundance estimates due to the different survey platforms. When the Outer Thames Estuary SPA was classified in 2010, the best population estimate of the overwintering red- throated diver population was 6,446 individuals (1989 to 2006/07, peak mean estimate). Technology and survey techniques have vastly improved since, and digital aerial imagery has become the new survey standard (HiDef Aerial Surveying Limited 2018). This has allowed more accurate counts of red-throated diver, and suggests that previous counts may have been underestimates (Goodship et al 2015). There is no way of knowing what the abundance of red throated divers in the SPA would have	As noted in response to row 007 above, the current analysis is not sensitive to these survey method changes, and normalising the model outputs has prevented the changes from influencing the results. Furthermore, the existing results do compare relative abundances (counterfactuals) as suggested. The Applicant has not focused solely on the predicted mortality arising from displacement, but rather has considered that in conjunction with the area over which this could occur. In this manner the Applicant has taken account of both aspects.



Reference	NE Comment	Applicants' Comments
	<p>been prior to the construction of any of the windfarms if those surveys had been carried out using digital photographic means. Therefore, there is insufficient robust data to state confidently what impact the OWF's have had on RTD displacement and mortality and any impacts are inconsequential due to the 'apparent' changes in population. Natural England's advice is to consider the changes in relative abundance inside and outside of the windfarm areas. This will require an alternative approach to treating the visual and digital aerial data in the same way. Furthermore, by focussing on the mortality arising from displacement and the impact of that on population abundance, the assessment misses the key issue which is the need to reduce the frequency, duration and / or intensity of disturbance</p>	<p>The difference in interpretation of the potential effects between the Applicants and NE is whether or not the assessment should consider each conservation objective in isolation. Natural England consider that it is appropriate to assess in this manner, while the Applicants consider that this approach fails to take account of the fact that there is no predicted population effect (which NE has acknowledged is likely) and that this is the ultimate determinant of whether an SPA's purpose (to safeguard a designated species) is being achieved. In this case, all the evidence around ecological consequence (see section 2.3 of document reference ExA.AS-4.D5.V2) indicates that the SPA will continue to provide protection for this species, irrespective of any small changes in distribution.</p> <p>Note that the Applicants intend to respond to NE's legal submission at Deadline 6.</p>
<p>Conservation Objective to Maintain Diver Distribution</p>		
026	<p>We note the Applicant's point that the number of divers that would be displaced from within and around East Anglia One North/East Anglia Two may be relatively small compared to the total number of divers recorded across the entire SPA. However, maintaining the abundance of divers is not the only Conservation Objective; there is also the objectives to maintain the distribution of divers, and to maintain the area of supporting habitat. The percentage of the SPA affected is significant. For East Anglia One North/East Anglia Two alone out to 8km is 9,019.56 hectares (2.3%), 10km is 12,867.84 hectares (3.28%). In combination with other plans and projects already built, the area of the SPA affected by some degree of displacement at, 8km is 158,033 hectares (40.2%) and 10km is 195,691 hectares (49.86%). We acknowledge that there is not complete displacement, but a gradual</p>	<p>The Applicants welcome NE's acknowledgement of the predicted small population effect.</p> <p>As stated elsewhere, the Applicants also consider that separating the distribution effect from the population effect is inappropriate, since the fundamental purpose of the SPA is to safeguard the designated feature and the assessment has demonstrated that, irrespective of any on-paper impact discussed, the effective ecological one will be negligible (see section 2.3 of document reference ExA.AS-4.D5.V2).</p>



Reference	NE Comment	Applicants' Comments
	decline in the displacement levels the further divers get from a windfarm. These calculations do not account for the 2km buffer at EA1N, but there is still a significant area of the SPA subject to a change in the distribution of divers and a further reduction in available habitat when accounting for the buffer.	
027	The Applicant suggests that a similar amount of divers are predicted to be displaced compared to their modelling approach when the alternative approach of 100% displacement of birds out to 4km is considered. With regard to this, firstly there are questions over whether the Applicant's modelling approach underestimates the levels of displacement due to not accounting for the change in survey platform. Therefore, the level of displacement is likely to be underestimated due to the issue of not correcting for the different survey platforms. Secondly, the SPA Conservation Objectives are not simply about maintaining abundance targets. There are also objectives to maintain the distribution of the interest feature throughout the SPA, and to maintain the extent of supporting habitat. Finally, the post construction monitoring from London Array reports that the number of divers displaced in a gradient out to 11.5km was greater than the assumption that 100% of birds were displaced up to 4km.	See responses to rows 007, 022 and 023.
028	As previously stated, even if no birds die as a result of the displacement, a separate but equally important issue, dictated by the full suite of conservation objectives for the SPA is the continuing (and apparently permanent) change in distribution of the interest feature. This compromises the ability of the supporting habitat within the SPA to continue to support the same numbers and distribution of birds as before.	See responses to points 022 and 023.



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Ecological Consequences of Displacement		
029	We acknowledge that the likely consequences (lethal or otherwise) of displacement that results from the concentration of more birds into a smaller area of sea distant from all windfarms is not known and may indeed be small. However, while many of the statements made in this section of the report in support of the conclusion that the effects will be minimal and of no significance are justified, some are not and so the case is overstated. For example, it is incorrect to state that “in the absence of highly aggregated regions for this species, it appears unlikely that existing or planned windfarms occupy sites of particular importance for this species..... hence the first mechanism above (exclusion from preferred foraging areas) is not considered to be applicable”.	The Applicants welcome NE’s acknowledgement of this point.
030	By definition the SPAs include the areas of highest average density, usually assessed over a period of several years, and within those there are often certain areas that persistently hold the highest densities. One might infer from this that the SPA boundary includes the most suitable habitat for the species and that within those there are areas of particularly high suitability. Certain windfarms have already been constructed within the most heavily used areas and have excluded birds from those preferred areas.	By this argument, the English coast from Flamborough Head to the Kent coast (c. 400km), which is all designated as SPAs for red-throated divers (i.e. the Greater Wash SPA and the Outer Thames Estuary SPA), would appear to be considered by NE as areas of highest average density. But this over-simplifies the actual situation which is that there is considerable variation in density and abundance throughout this stretch of coastline. The SPAs make no distinction within their boundaries for the variation in density actually recorded, but this is of critical importance when considering the locality of any potential impacts.
031	The Applicant has stated that red throated divers appear to be capable of a high degree of mobility in winter, and therefore they will be able to find alternative foraging areas, albeit in some cases distant from the original area of displacement. This may be true, but this fails to	The Applicants consider that given the large extent of the SPAs (as discussed in response to row 027), displacement by East Anglia ONE North does not automatically mean that birds would be displaced to areas outside the SPA and indeed, it would seem



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	acknowledge the critical point that in the context of this Habitats Regulations Assessment, displacement of birds from inside to outside an SPA that would otherwise support them means that the integrity of the site has been compromised. The site would no longer be making the contribution that it otherwise would to the favourable conservation status of the species or the coherence of the Natura 2000 network for that species.	<p>much more likely that displaced birds would remain in the SPA, since it extends over such a large area.</p> <p>Certainly, the alternative interpretation, that the SPA is already at capacity and therefore density dependence would lead to birds relocating outside the SPA, seems less supported by the observations and variations in density within the SPA.</p>
032	<p>Furthermore, in the context of this Habitats Regulations Assessment, all the Conservation Objectives of the SPA must be considered. In this case the Conservation Objectives include an objective to maintain or restore the distribution of qualifying features within the site.</p> <p>Furthermore, the Supplementary Advice on Conservation Objectives for the red-throated diver feature of this SPA specify a target to: <i>“Reduce the frequency, duration and / or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed”</i>. It may be that no birds at all die as a result of the displacement, but it is in the light of these Conservation Objectives it is still possible that an AEoI on the SPA will result from one or more of the other conservation objectives not being fulfilled.</p>	<p>As discussed in previous responses (row 022 and 023), the Applicants consider that conservation objectives for the SPA should not be assessed in isolation, but should be considered with more awareness of the other objectives and how these combine to ensure the site continues to provide the protections for which it has been designated. This would result in an overall conclusion that fully considered demonstrable ecological consequences rather than ‘on paper’ effects.</p> <p>Note that the Applicants intend to respond to NE’s legal submission at Deadline 6.</p>
Legal Protections Afforded to the Outer Thames Estuary SPA		
033	<p>Baseline: The reference to a ‘baseline’ for assessment of the effects of a proposed plan or project is not found in the Habitats Directive or either of the two domestic statutory instruments and leads to incorrect conclusions. We note that the inclusion of the wind farms within the OTE SPA that received consent prior to the existence of the SPA as part of the in-combination assessment of EA1N and EA2 is included. However, Natural England advise that these existing windfarms (and</p>	<p>The Applicants intend to respond to NE’s responses on the legal arguments at Deadline 6.</p>



Reference	NE Comment	Applicants' Comments
	those that became operational before the current RTD population figures were established) should be included as a matter of law and not 'for illustrative purposes' only.	
034	Significance of impact: The use of the term 'significance of disturbance' (paragraph 69), and the suggestion that it should be considered by reference to the 'objectives for the whole region or an EU Member State' is incorrect.	The Applicants intend to respond to NE's responses on the legal arguments at Deadline 6.
035	We agree that it is necessary to consider the significance of the disturbance resulting from the projects, but in the context of the effect of disturbance on the integrity of the SPA itself, and not in a regional or other spatial context. Natural England's view is that there is strong evidence to confirm that the presence of wind turbines does constitute significant disturbance to red-throated divers. This appears to be long term based on the lack of any evidence showing diver habituation to the presence of offshore windfarms.	The Applicants intend to respond to NE's responses on the legal arguments at Deadline 6.
036	As per our Deadline 1 Appendix A4 [REP1-172] submission we advise that the Examining Authority base their assessment on an in-combination assessment that includes all projects that were not constructed at the time of the surveys to inform the SPA notification i.e. those projects constructed after 2002-2008. It was the spatial variation in the birds' density at that time which informed the analysis that determined the size and shape of the SPA.	The Applicants intend to respond to NE's responses on the legal arguments at Deadline 6.
037	Within the 'disturbance caused by human activity' attribute for red-throated diver, the supporting notes state: <i>"Disturbance should be judged as significant if an action (alone or in combination with other effects) impacts on (water)birds in such a way</i>	The preceding section of this attribute states (emphasis added): <i>"The nature, scale, timing and duration of some human activities can result in bird disturbance (defined as any human-induced activity sufficient to disrupt normal behaviours and / or distribution of birds in the absence of the activity) at a level that may</i>



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	<p><i>as to be likely to cause impacts on populations of a species through either:</i></p> <p><i>changed local distribution on a continuing basis; and/or</i></p> <p><i>changed local abundance on a sustained basis; and/or</i></p> <p><i>the reduction of ability of any significant group of birds to survive, breed, or rear their young."</i></p>	<p><i>substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts."</i></p> <p>It appears from review of the complete attribute that the underlying aspect which this attribute seeks to avoid is an effect on "<i>the long-term viability of the population</i>". As acknowledged by NE, it is very likely that there will be no population effect, and as the Applicants have sought to stress in the assessment, since this is the ultimate objective of an SPA, the conclusion for the current assessment is one of no AEol.</p>
038	<p>It is due to a changed local distribution on a continuing basis that we consider there is significant disturbance. The key point is that the phrase "likely to cause impacts on populations of a species..." does NOT say "population abundance or size". This means that significant disturbance can be disturbance that impacts the population through changing its local distribution on a continuing basis – regardless of what that means for the population's size and abundance</p>	<p>The definition of the term 'local' would appear to be highly relevant to this argument and the Applicants note that the supporting documentation for this attribute does not provide a definition of 'local'. However, in a subsequent section of the SPA description (at the link provided by NE) the following statement is made (in relation to the objective to maintain the population's abundance), which may provide some guidance:</p> <p><i>"This will sustain the site's population and contribute to a viable local, national and bio-geographic population"</i>.</p> <p>This appears to imply that 'local' applies at a scale below national, but notably the absence of 'regional' in this statement suggests the two terms (local and regional) may be interchangeable. Thus, in</p>



Reference	NE Comment	Applicants' Comments
		<p>this case 'local' would seem to be applicable to the SPA as a whole, rather than some smaller area within the SPA. And on this basis, it can be argued that there will not be a local, ongoing redistribution, since the balance of probability is that the birds will remain within the SPA.</p> <p>The Applicants intend to respond in full to NE's responses on the legal arguments at Deadline 6.</p>
039	<p>Natural England acknowledges that the abundance objective is likely to be maintained. However, our concerns are whether the distribution of the divers are changed on a continuing basis, and whether the SPA is able to support divers throughout the whole of the SPA. The key point is that the disturbance attribute has a target to "restore" and so that is not favourable and that relates to the headline objective to maintain or restore the distribution of qualifying features within the site – which is a separate high level Conservation Objective to the population one.</p>	<p>The Applicants welcome the acknowledgement from NE that the abundance objective is likely to be maintained. The Applicants do not disagree that there will be some redistribution effect but consider that the materiality of that effect is relevant, and pertinently that in this case the effects are predicted to be very small.</p>
In-combination		
040	<p>As stated in our advice submitted at Deadline 1 (REP1 -172) the data regarding RTD that effectively determined the current size, shape and boundary of the SPA was derived from surveys undertaken before all but one of the relevant offshore windfarms were constructed (the earliest survey data even preceded the operation of Kentish Flats). Therefore, we advise that an in-combination assessment of the level of displacement should include all the projects that have become operational since that baseline understanding of the distribution of RTD was established, namely:</p>	<p>The Applicants have acknowledged NE's position on this matter and provided the assessment as requested, excluding those projects outwith the SPA or outwith the likely range of displacement effect (see REP3-039, Section 5.3 and Table 9). As stated in paragraphs 85 and 86 (emphasis added)</p> <p><i>With respect to the remaining projects [London Array, Kentish Flats, Kentish Flats Extension and Gunfleet I, II and III], the Applicants therefore consider that several, if not all, of these projects should actually be considered as part of the baseline irrespective of any</i></p>



Reference	NE Comment	Applicants' Comments
	<ul style="list-style-type: none"> • London Array • Gunfleet Sands I, II and III • Kentish Flats and Kentish Flats Extension • Greater Gabbard • Thanet. 	<p><i>displacement effect they may be causing. This is due to the fact that they were either operational prior to the designation of the SPA in 2010, or they became operational in the period during which the revised baseline population figure was determined by NE (Natural England, 2019).</i></p> <p><i>Notwithstanding this last point, the Applicants have undertaken the following in-combination assessment on the basis that effects from Gunfleet Sands (I, II and III), Kentish Flats, Kentish Flats Extension and London Array are included</i></p>
041	<p>With regards to East Anglia Two, the monitoring results from London Array post construction monitoring suggest that displacement distances are up to 11.5km. Until the Applicant's modelling addresses our concerns raised in the above sections, we continue to advise that East Anglia Two and the above projects are included in the in-combination assessment.</p>	<p>The Applicant has provided responses to the modelling concerns listed by NE and therefore considers that the prediction that displacement extends to 7-8km is appropriate and consequently East Anglia TWO, at 8.3km from the SPA at its nearest point is beyond the range at which displacement would occur in the SPA. Furthermore, even if the distance is slightly greater as suggested by NE, the actual amount of overlap is very small, and only the low level of effect occurring at the furthest edge of the range would occur. Thus, inclusion of East Anglia TWO in the in-combination assessment is neither supported by the modelling results, nor is it likely to amount to more than an extremely small effect.</p> <p>Assuming a straight line decline in displacement from 100% in the windfarm to 0% at 11.5 km (as suggested by NE), the East Anglia TWO 1km wide buffers which overlap the SPA (8-9 km, 10-11 km and 11-12 km) would result in less than a 15% displacement effect from the overlapping area of 20 km². Even if the density within these overlapping areas is 2 birds per km² (the upper range of densities from Irwin et al. 2019 for these areas of the SPA), this would only result in 6 birds at risk of displacement.</p>



Reference	NE Comment	Applicants' Comments
Shipping Data		
042	For shipping we note that there was a choice to convert shipping traffic into a rasterized map. This decision needs more consideration as there does not seem to be much precedent for this in the literature. The concern with the use of shipping data like this is that there are areas where shipping traffic is simply 0, and those pixels could fall directly next to a shipping lane, which means that a gradient effect could be missed. Convention is to use distance to shipping lanes.	The method used is considered better able to capture variations in shipping level, by using a data layer which reflects the number of shipping movements, rather than simply treating all shipping lanes as equal and using the distance to them.
043	In addition to concerns detailed above regarding treating all shipping as a static variable and not as distance to shipping lane; we are unclear whether it is appropriate to assume the same level of shipping in 2012 compared to 2002 – 2008.	The Applicants acknowledge that shipping traffic is more temporally variable than implied by this method, however large changes in shipping lanes and traffic levels are considered unlikely across this period. In addition, unless much finer resolution (spatial and temporal) historical shipping data are available (of which the Applicants are not aware) then the current approach is considered appropriate. It should also be noted that the shipping data layer has a comparatively weak influence on the results, so this is not considered to have overly affected the results.
Assumed Increases in Red Throated Diver Numbers		
044	We acknowledge that estimated abundance of the RTD population within the SPA has increased significantly over the period within which several windfarms have been constructed within it. However, it is important not to infer from this that it is a fact that the actual population abundance has significantly increased. This is because of the fundamental shift in the survey method used over that period. That the two digital surveys in 2018 yielded an average population abundance greater than the average in 2013 also cannot be used to infer with any confidence that the population has increased over that time period.	The Applicants acknowledge that seabird counts by aerial surveys can only ever yield snapshots, however this limitation has not prevented NE from being able to increase the designated size of the red-throated diver population using the apparent chance high estimate noted here. If NE consider this count to be sufficiently reliable to inform a change in the designated population size then it should be treated as such (rather than described as chance) and



Reference	NE Comment	Applicants' Comments
	<p>The first of the two surveys conducted in 2018 yielded a population abundance estimate that was lower than on either of the two surveys in 2013. Only the last survey in 2018 yielded a number in excess of 20,000. The fact that this was recorded was a matter of chance, and similar short-lived peaks in abundance are highly likely to have been missed in previous years as surveys are only a snap-shot in time. Therefore, we advise that the Applicant appears to be confusing abundance and distribution targets.</p>	<p>no more, or less, weight should be given to it than to other counts, in this case lower ones.</p>
Model Evaluation		
045	<p>We note that nine models were evaluated, using three different error structures (Poisson, Tweedie, negative binomial). This is convention with General Algebraic Modelling System (GAMs) and the authors have treated this appropriately. However, one point here is that the Poisson distribution as used in the code (i.e., the Poisson() family) may not necessarily be the most appropriate for zero-inflated data in all cases. Best practice for zero-inflated Poisson data would be to use the ziP() family (i.e., zero-inflated Poisson). Whilst it is unlikely that this would drastically change the outputs of the modelling, it should be explored in case it does help to explain a little more of the variance in the data.</p>	<p>The Applicants would like to clarify for the avoidance of doubt that the modelling undertaken used Generalised Additive Models, not General Algebraic Models as suggested here.</p> <p>With respect to the comment about the error structure, it should be noted that the Poisson models had the poorest fit, by a large margin, and therefore these models have not been used to inform the assessment. The adjustment proposed by NE would be very unlikely to significantly change the fit of these models and hence we are in broad agreement that this is a minor consideration and will not have any effect on the results obtained.</p> <p>It is also important to note that the best-fit model was better by a very considerable margin, such that model selection by way of information theoretic methods (e.g. AIC) as is standard practice, lent almost complete support to the best-fit model (over 99.5%) and therefore modifications to the other models will have no bearing on the model results (see Appendix 1, sections 2 and 3 of document reference ExA.AS-4.D5.V2).</p>



Reference	NE Comment	Applicants' Comments
Effects of Bathymetry		
046	It seems that bathymetry has a strong influence on predictions across the whole site (i.e. the predicted output closely matches the patterns in bathymetry). Thus, interpretation of these partial dependence plots needs to be done with care because they are not a representation of the exact relationship in space, just a partial relationship when taking into account the other parameters. Therefore, in areas where distance to coast is <15km, if another parameter has a stronger positive effect than the negative effect of distance to coast in that range, the model could still predict higher densities.	The Applicants agree that the modelled red-throated diver distribution reflects multiple factors, some of which operate in opposite directions (such as distance to coast and bathymetry), however the flexibility inherent in the modelling process means that the predictions are able to combine all of these effects and therefore it is only the interpretation of individual covariates in isolation which may be unreliable. Such isolated consideration is of academic interest, but is not relevant to the counterfactual results obtained.
Interim comments on Offshore In-principle Monitoring Plan		
047	Natural England agrees that ornithological monitoring should be targeted to address residual impacts, evidence gaps or uncertainty of most relevance to the proposed East Anglia ONE North project and the specific species. We agree that should focus on monitoring the extent of displacement on red-throated diver and undertaken as part of a pre- and post construction monitoring programme. This will be particularly important if a design is consented where the buffer is less than 10km or less than the to be agreed modelled extent of displacement. Natural England will provide at Deadline 5 further advice on specific hypothesis/positions to be tested/validated by the post construction monitoring	The Applicants acknowledge this statement and agree that a focus on this topic for subsequent monitoring is appropriate.
048	Natural England's advice is that EA2 should be included as part of an in-combination assessment for the Outer Thames Estuary SPA. Therefore, comments made by Natural England in relation to the East Anglia ONE North IPMP, also apply to EA2.	The Applicants acknowledge this statement and as confirmed at Issue Specific Hearing 3 intend to update the East Anglia TWO IPMP to include monitoring of red-throated diver.



Reference	NE Comment	Applicants' Comments
Comments on Offshore commitments [REP3-073]		
049	<p>Natural England notes that the Applicant's view is that the 2km does not mitigate the displacement effects, only reduces them by 8%. Although there is uncertainty on the exact number of red throated diver that may be displaced, it is clear that the extent of supporting habitat extends well beyond 2km. So, whether the extent of displacement is 7km as the Applicant's suggest from their recent modelling or 11.5km that was concluded from the London Array's monitoring within the Outer Thames Estuary, the buffer needs to be significantly increased from 2km. Without an increase in the distance between the proposed array and the SPA boundary an adverse effect on integrity from the EA1N project alone cannot be ruled out as a result of displacement reducing the ability of the supporting habitat and a change in the distribution of red throated divers on an ongoing basis.</p>	<p>See responses to previous comments above which address these aspects.</p>
Detailed comments on Best Practise Protocol for minimising disturbance to RTD [REP3-074]		
050	<p>Natural England welcomes the submission of the broad principles for a best practice protocol for minimising disturbance to red throated diver. We note that the intention is that the protocol will be adopted and provided as part of the project environmental management plan (PEMP) and to be approved by MMO. Although we note that detail will be included at a later stage, it would be beneficial to provide some additional detail in this document of the expectations and detail that will be required to sign of this mitigation measure prior to commencement of construction for example: -</p> <p>How will it be demonstrated that planned works during construction and operation phases are avoiding the sensitive periods between November and March?</p>	<p>The Applicants will address these points in an update to the Protocol at Deadline 6</p>



Reference	NE Comment	Applicants' Comments
	<p>Were it is not possible to avoid works during the sensitive period how will vessel movements be managed to minimise disturbance to SPA features?</p> <p>Provided details of particular works when vessels will be required to leave existing navigational routes through the SPA.</p>	
051	<p>Low flying helicopter flights over the SPA are also likely to cause disturbance. If the use of helicopters is likely then we advise that is also covered under a protocol for minimising disturbance.</p>	



3 Applicants' Comments on NE Appendix A13 (REP4-088) - NE's Interim Comments on Ornithology Compensation

Reference NE Comment		Applicants' Comments
001	Natural England advises that before more in-depth discussions on compensation can happen, options for avoidance, reduction and mitigation of impacts should be fully explored so that the Worst Case Scenario (WCS) impacts are known/fixed and there are no ambiguities in relation to the need for, and the scale of compensation measures required.	The Applicants agree with this sentiment, but note that due to the limited time available during the examination and the time taken to receive stakeholder responses it is necessary and appropriate to begin the process of identifying suitable compensation options before the assessment is finalised.
002	<p>Whilst further advice on each compensatory option is provided in the detailed comments set out below, NE advises that the options that should still be actively considered are as follows:-</p> <p>Flamborough and Filey Coast SPA – Kittiwake</p> <ul style="list-style-type: none"> • Prey enhancement measures • Productivity Improvement - Construction of artificial nest sites (provided there is clarity over what each project will deliver) • Predator control (in specific circumstances) <p>Flamborough and Filey Coast SPA – Gannet</p> <ul style="list-style-type: none"> • Prey enhancement measures 	<p>The Applicants broadly agree that the list proposed by NE is appropriate for further consideration as compensation options.</p> <p>However, as discussed at Issue Specific Hearing 3, the Applicants consider that work undertaken in 2020^{3 4} demonstrates that prey enhancement measures would depend upon fisheries management measures and these require strategic government intervention and are not practical project-based measures. The Applicants will provide commentary on these reports as part of the wider update on compensatory measures at Deadline 6.</p>

³ Habitats Regulations Derogations Workshop Report, DTA Ecology, June 2020

https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/oclg/1094_dta_derogations_worksho.pdf

⁴ Response to the Secretary of State's Minded to Approve Letter Appendix 3: Supporting Evidence for Kittiwake Prey Resource, Orsted, September 2020

[https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003239-HOW03_30Sep_Appendix%203%20Supporting%20Evidence%20for%20Kittiwake%20Prey%20Resource%20\(06543668_A\).pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003239-HOW03_30Sep_Appendix%203%20Supporting%20Evidence%20for%20Kittiwake%20Prey%20Resource%20(06543668_A).pdf)



Reference NE Comment		Applicants' Comments
	<ul style="list-style-type: none"> Productivity Improvement - Construction of artificial nest sites (subject to ecological feasibility) Reduce or end harvesting of gannet chicks <p>Alde Ore Estuary SPA – Lesser Black Backed Gull</p> <ul style="list-style-type: none"> Predator control Prey enhancement (only if predation is addressed) <p>Outer Thames Estuary SPA – Red throated diver</p> <ul style="list-style-type: none"> Removal of anthropogenic pressures within the SPA 	
003	<p>In addition, before finalising our comments in relation to any proposals from the Applicant there will need to be agreement on:</p> <ul style="list-style-type: none"> The projects alone impacts The in-combination impacts; and The implications of the Hornsea Project 3 decision and agreed final figures for all species and not just Kittiwake for the in-combination assessment <p>Otherwise, the scale and validity of any required compensation measures are unable to be determined.</p>	<p>The Applicants agree with this sentiment, but note that due to the limited time available during the examination and the time taken to receive stakeholder responses it is necessary and appropriate to begin the process of identifying suitable compensation options before the assessment is finalised.</p>
Derogations Hierarchy		
004	<p>In addition to the ongoing technical issues with the ornithological assessments in determining the project alone impacts (please see Appendix A1- A14 of our examination written submissions) the competent authority must be certain that every effort has been made to minimise the project impacts as much as possible.</p>	<p>The Applicants consider that all efforts have been made to reduce impacts as set out in the document Offshore Commitments (REP3-073).</p>
005	<p>Natural England wishes to re-iterate the advice we provided in our Relevant Representations/Written Representations [RR – 059] and in discussions with the</p>	



Reference NE Comment		Applicants' Comments
	Applicant that before considering compensatory measures in more detail, every effort should be made to avoid, reduce and mitigate the impacts from the two projects. Then once this is complete [with considerations and decision pathways clearly documented], appropriately informed discussion/s can happen in relation to the revised/finalised impacts which may or may not need to be compensated for.	
006	For example, we have previously advised that consideration (but not exclusively) could be given to potential removal of turbines within 10km of the Outer Thames Estuary SPA boundary to avoid an Adverse Effect on Integrity from the displacement of Red Throated Diver as well as further raising of the turbine draught height to reduce the potential collision risk for kittiwake, gannet and lesser black-backed gull.	
007	Whilst documents have been submitted highlighting the 'Offshore Commitments' [REP3-073] to reduce the project impacts; Natural England's advice remains unchanged i.e. the commitments do not remove/avoid, reduce and mitigate the impacts to an acceptable level to change our advice that there are project alone and in-combination adverse effects on integrity for ornithological matters. Natural England queries if there is anything more that could be done to minimise the project alone impacts	The Applicants remain committed to minimising impacts wherever feasible and, within the constraints of the time remaining within the Examination, will continue to do so. However, it should also be noted that the Applicants do not agree with all of NE's positions with respect to predicted impacts and that this has a bearing on the degree of mitigation considered appropriate.
In-combination		
008	Please see Natural England's Appendices A1 – A14 of our examination submissions where we highlight our in-combination concerns. Please be advised that we note in that the Applicants Deadline 3 submissions they maintain their position that the effects of the Projects are minimal and below those considered de minimis by the Secretary of State in recent decisions (namely Norfolk Vanguard). However, Natural England wish to highlight that we had concluded that an AEol could not be ruled out since the Hornsea Project 2 examination for the in-combination total of collision mortality across consented plans/projects for kittiwake	Noted.



Reference NE Comment		Applicants' Comments
	at the Flamborough and Filey Coast SPA. Therefore, any additional mortality arising from these proposals would be considered adverse. We note that further predicted collisions of this feature of the SPA will have been added to the in-combination total presented at the Hornsea Project 2 examination with a further five projects located in English waters (Hornsea Project 3, Norfolk Vanguard, Norfolk Boreas, East Anglia One North and East Anglia Two). However, whilst we are still digesting the recent Secretary of State latest decision for Hornsea Project Three we do note that a different consenting approach for in-combination was taken to that for Norfolk Vanguard i.e. an AEoI has been identified in-combination and the total impact of the project had to be compensated for.	
Final figures for Hornsea Project 3		
009	Whilst there is a clearer understanding of the contribution of impacts from Hornsea Project 3 for Kittiwake populations we are still asking for final figures for the project alone impacts for other SPA features. Until we have these, we advise the Applicant to continue to follow the approach taken for Norfolk Boreas.	Noted
High Level advice on the proposed Compensatory Measures		
6.1 Potential compensatory measures Flamborough and Filey Coast (FFC) SPA		
010	Natural England does not consider it appropriate to restrict the potential compensation for FFC SPA kittiwakes to just the option of provision of artificial nest sites at this this time and consider that a range of compensatory measures should be considered, including prey availability, which may well prove to be a limiting factor in the medium-long term. This would allow the Secretary of State (SoS) to consider the appropriateness of a range of potential compensatory measures.	The Applicants note NE's position on this matter, and will continue to consider a range of feasible options. See row 002 for comments on prey enhancement.



Reference NE Comment		Applicants' Comments
011	With regard to construction of artificial nest sites for FFC SPA kittiwakes, we note that further work needs to be undertaken prior to any commitments to requirements regarding structure size, height etc. and number of nests that could be provided. Selection of locations for artificial nest sites for both FFC SPA kittiwakes and gannets should consider proximity to existing, consented and proposed wind farms.	The Applicants note this advice which will be used to inform the compensation proposed.
012	In addition, we note that the provision of nest sites is being proposed by all OWF projects currently in the planning system as their preferred compensatory measure for this SPA population. However, the availability of appropriate locations will mean that not all of these projects will be able to deliver this as compensation and alternative options should also be progressed.	The Applicants acknowledge this point, but also highlight that the scale of compensation required by individual projects varies widely, with the Projects at the very lower end of that range. This is relevant since this determines the scale of compensation required which has a large bearing on identifying possible locations.
6.2 Potential compensatory measures Alde Ore Estuary SPA		
013	Natural England broadly agrees that a potential compensatory measure is addressing predation issues through the provision of predator proof fencing at strategic locations. Although this is feasible in principle there needs to be clarity where other projects have identified this option as a potential measure and whether this is also a valid option for this project.	Noted. To the Applicants' knowledge, the only project for which this has been proposed and is not yet determined is Norfolk Boreas, and therefore it is unlikely that all scope for further efforts in this regard have been exhausted.
6.3 Potential compensatory measures Outer Thames Estuary SPA		
014	We reiterate Natural England's advice is that further mitigation measures beyond the 2km buffer between East Anglia One North and the SPA boundary are required.	The Applicants note NE's position on this matter and refer to the detailed comments provided by the Applicants in response to NE's review of this topic (see section 2).
015	The fact that the impact of displacement results in a change in distribution, rather than a decline in birds means that any potential compensatory measures need to be focussed on the removal of anthropogenic influences within the SPA such as OWF turbines. Management of vessel traffic was provided as an example of	The Applicants note NE's position on this matter and refer to the detailed comments provided by the Applicants in response to NE's review of this topic (section 2).



Reference NE Comment		Applicants' Comments
	reducing anthropogenic influences and impacts from disturbance. However, this measure would be dependent on being able to deliver navigational management of established shipping lanes for the purposes of compensation. It is therefore better not to increase the levels of displacement by avoiding constructing any more turbines in or near the SPA in the first place (i.e. to avoid the effect via mitigation).	
Next steps		
016	Natural England will provide a more detailed response at Deadline 5.	Noted.



4 Applicants' Comments on NE Appendix B3 (REP4-090) - Comments on the In Principle Southern North Sea SAC Site Integrity Plan [REP3-044] and Draft Marine Mammal Mitigation Protocol [REP3-042]

Reference NE Comment		Applicants' Comment
Summary		
001	<p>Several significant changes have been made to the Marine Mammal Mitigation Protocol (MMMP) and Site Integrity Plan (SIP) in version 2 of both documents, particularly in relation to wording of the commitments, clustering of UXOs and the swimming speed of marine mammals used in the assessment. No explanation for these changes has been provided within in the document and the Applicant has not contacted us to discuss the changes or the rationale behind them. Furthermore, Natural England has noticed 'track-changed' documents being submitted without all of the changes being tracked. This is very frustrating and results in a very disjointed working relationship with the Applicant. Natural England would welcome the Applicant providing the opportunity to discuss the below points to hopefully expedite the process of resolving them.</p>	<p>The Applicants apologise for this error in the tracked change version of the East Anglia TWO IPSIP and East Anglia TWO MMMP. This was in no way intended to mislead NE and the Applicants understand the frustration that this has caused. The Applicants would highlight that the same issue did not occur within the East Anglia ONE North tracked change version however will endeavour that future quality assurance on these documents is carried out with greater diligence.</p> <p>The Applicants discussed these points at a meeting with NE on 11th January 2021.</p> <p>Specific responses to the issues noted by NE are provided within this table.</p>
Wording of the Commitments		
002	<p>The Applicant appears to have changed the wording of the commitments in section 4 for a second time, with no explanation. Since the words 'without mitigation' were added in the Addendum submitted by the Applicant at deadline 1, which Natural England provided comment on at deadline 3 [REP3-118], the Applicant has now changed it to 'without at source mitigation'. No rationale has been provided in either the MMMP or SIP as to why the changes are required and what the repercussions of</p>	<p>As noted in row 001 the Applicants discussed these points at a meeting with NE on 11th January 2021.</p> <p>It was explained that the words 'at-source' were added to differentiate between the standard mitigation that will be applied as part of the MMMP and that which may be applied through the SIP e.g. bubble curtains or low-order deflagration.</p>



Reference	NE Comment	Applicants' Comment
	<p>the changes may be. This makes it incredibly difficult for Natural England to understand the reasoning for the change and therefore provide advice on the change. We would welcome further explanation and clarification from the Applicant as to why these changes are required.</p>	<p>As described in section 4 of the Applicants' Comments on Natural England's Deadline 3 Submissions (REP4-016), it is the Applicants' view that the commitments already made allow for robust control of this issue by the MMO (see response to Row 004 of REP4-016) and that no further conditions are necessary. However, in recognition of NE's position on this matter and following the discussion with NE on the 11th January 2021, the Applicants are exploring the potential for a DML condition to be included in the DCO. The Applicants will continue to engage with NE and MMO on this matter and will provide a further update through submissions to the examination at Deadline 6.</p> <p>Once there is agreement with NE and the MMO on the above matter, the IPSIP and the draft MMMP will be updated and resubmitted.</p>
003	<p>It remains Natural England's position that the commitments should be conditioned on the face of the DML in their own right, without the inclusion of the wording 'without at source mitigation'. Further detail can be found in our submission for deadline 3 [REP3-118].</p>	<p>See the Applicants' response at row 002.</p>
<p>Clustering of UXO Detonations</p>		
004	<p>Natural England welcomes clustering of UXO being included as a potential mitigation measure for UXO detonations that may be taken forward however, there has been no discussion of this option with the Applicant since Natural England suggested it in a meeting in August 2020. The text provided in the MMMP and SIP is vague at best and much more detail is required before we can be supportive of this approach. No rationale is provided for why 5km has been chosen as the appropriate distance to cluster UXO, no detail is provided as to how many UXO may be clustered or any limitations in relation to the size of those UXO or the sizes of the charges that may be used. Underwater noise modelling will</p>	<p>The text was added as an example to cover this option within the documents as the clustering of UXO devices within a 5km radius had been proposed by NE (see REP1-166) as a potential mitigation option. The text was not intended to be definitive. The MMMP and IPSIP documents submitted are draft and in-principle respectively and therefore the fact that very specific details on this possible measure are not provided at this stage is entirely appropriate and justified.</p> <p>The text in the IPSIP will be simplified to reflect the wording within the draft MMMP</p>



Reference NE Comment		Applicants' Comment
	be required to demonstrate that the clustering method would be effective for EA2. Had there been engagement on this point from the Applicant since August 2020, this could already have been resolved. However, Natural England is willing to engage with the applicant to resolve this issue.	<p><i>Clustering of UXO devices, where possible and safe to do, will also be considered, in order to reduce the number of separate detonations, for example, where two (or more) UXO are located in close proximity to one another, one (or more) of the UXO could, if it were safe, be relocated nearer to the other UXO, allowing a single detonation to take place rather than two (or more) separate detonations.</i></p> <p>The Applicants would welcome engagement with NE on this matter, however until specific details on the location and extent of UXOs are known post-consent there will be limited information with which to provide more detail.</p>
Marine Mammal Swimming Speed		
005	Section 5.2.2 and Appendix 1 of the MMMP both detail a marine mammal swimming speed of 1.8m/s when discussing the distances to which marine mammals may be moved by the use of soft-start ramp ups and ADD use. This is a change from the 1.5m/s used in the marine mammal assessment in the EIA and no explanation is provided of where the 1.8m/s speed has originated. Kastelein et al (2018) reported a swimming speed of 1.97m/s but this is only one paper and does not warrant a change from the currently widely accepted speed of 1.5m/s. It certainly does not indicate that a seemingly random number between 1.5 and 1.97 can be used.	<p>As outlined in the ES, a swimming speed of 1.5m/s is highly conservative and based on an average swimming speed for harbour porpoise mother calf pairs (Otani et al. 2000). However, harbour porpoise have been recorded swimming at speeds of up to 4.3m/s (Otani et al. 2000) and during playbacks of pile driving sounds harbour porpoise swimming speed was 1.97m/s (Kastelein et al. 2018).</p> <p>The Applicants will revert the swimming speed to 1.5m/s in future versions of the draft MMMP</p>
006	It is unclear whether the information in Appendix 1 is intended to be a repeat of information in chapter 11 of the environmental statement or act as a reassessment based on a swimming speed of 1.8m/s. Natural England would expect mitigation to be designed around the outcome of an assessment using a swimming speed of 1.5m/s, not an element of an assessment being changed without sufficient justification and agreement	



Reference	NE Comment	Applicants' Comment
	<p>around the new parameters. Natural England fundamentally disagree with the use of a swimming speed of 1.8m/s and therefore with the assessment of the efficacy of possibly mitigation measures presented in Appendix 1.</p>	
Untracked Changes		
007	<p>Natural England understand the submission of new versions of documents into Examination both in clean format and with track-changes is intended to aid the speedy review of new information and any changes that have been made to existing information contained in those documents within the confines of a fixed and fast-paced Examination timetable.</p> <p>Paragraph 5 of version 1 of the SIP reads '<i>...in relation to the potential in-combination effects of pile driving noise, in order to ensure there will be no adverse effect on the SNS SAC.</i>' The same paragraph in version 2 (now paragraph 6) reads '<i>...in relation to the potential project alone and in-combination effects of pile driving noise and UXO clearance noise, in order to ensure there will be no adverse effect on the SNS SAC.</i>'</p> <p>Finding instances such as this where text has been changed without it being openly acknowledged is incredibly frustrating and detracts from the positive relationship we have enjoyed with the Applicant to date.</p> <p>Furthermore, on this point specifically, Natural England has responded at Deadline 3 with extensive comments strongly refuting the suitability of the SIP to include project alone effects. It was never the intended purpose of SIPs to include project alone impacts, indeed if a project is having a significant impact alone then the project design should be changed to avoid this. Full details regarding Natural England's position on this can be found in our submission for Deadline 3 [REP3-118] and in Natural</p>	<p>The Applicants apologise for this error in the tracked change version of the East Anglia TWO IPSIP (see row 001).</p> <p>Regarding the use of SIPs for project-alone impacts, the Applicants have responded in detail to NE's comments within Points 002 and 004 in section 4 of the <i>Applicants' Comments on Natural England's Deadline 3 Submissions</i> (REP4-016). Also see row 002 of this table.</p>



Reference	NE Comment	Applicants' Comment
	England's position paper submitted into the Boreas examination on the use of a SIP to manage project alone impacts on Boreas Appendix B4.	



5 Applicants' Comments on NE Appendix G2 (REP4-094) - NE Comments to the Draft Development Consent Order (DCO) [REP3-011 & REP3-012] and Schedule of Changes to the Draft DCO [REP3-013]

Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
3.1.1 EA1N and EA2 Schedule of Changes to the Draft Development Consent Order [REP3-013]				
001	NE 1	Article 2 (1)	<p>The definition of Outline <i>Sabellaria</i> Reef Management Plan has an error in the referencing.</p> <p>Natural England welcomes the inclusion of Best Practice Protocol for red throated diver submitted by the Applicant at Deadline 3 [REP3-074] and have no further comment.</p>	<p>The Applicants note that the reference to the definition of the "outline Sabellaria reef management plan" in the <i>Schedule of Changes to the draft Development Consent Order</i> (REP3-013) submitted at Deadline 3 includes the text "Error! Reference source not found". This reference has been updated in the next version of the Schedule of Changes submitted at Deadline 5.</p> <p>The Applicants note and welcome NE's position on the inclusion of the Best Practice Protocol for Red-Throated Diver.</p>
002	NE 2	Article 2 (1)	<p>The updated definition of offshore pre-construction works addresses some of our comments. However, we note that the inclusion of UXO works has been retained and refer to our concerns raised in our relevant and written reps [RR-059 Appendix G].</p>	<p>The Applicants have addressed the issues raised by NE with regard to the inclusion of UXO works in Schedule 1 within their relevant and written representations, namely:</p> <ul style="list-style-type: none"> • Risks to <i>Sabellaria</i> reef – addressed through the <i>Sabellaria</i> Reef Management Plan (REP4-041)); • Maximum size and charge weight (addressed through the updated SIP (REP3-041) and MMMP (REP3-043). Although, note that the Applicants are



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
				<p>exploring the potential for a DML condition to be included in the DCO to secure the commitments described within the SIP and MMMP. The Applicants will continue to engage with NE and MMO on this matter and will provide a further update through submissions to the examination at Deadline 6; and</p> <ul style="list-style-type: none"> Timing of the submission of pre-commencement documentation: It is proposed that the SIP, MMMP, and most parts of the UXO method statement can be submitted to the MMO for approval six months prior to any UXO activities taking place. However, the final detailed plan of the UXO locations and the exclusion zones/environmental micro-siting requirements are unlikely to be able to be finalised six months prior to the activity and therefore the Applicants have proposed providing these in a draft form as early as possible but have suggested a commitment within the DML condition to submit these documents at least three months prior to UXO clearance activities. The MMO indicated they were content with this approach. The Applicants have updated the condition in the draft DCO submitted at Deadline 5 to reflect the amended timescales for submission of these documents. <p>The Applicants reiterate their view that UXO clearance activities have been robustly assessed and that the commitments already made allow for robust control of this issue by the MMO (see response to Row 004 of REP4-016) and that no further conditions are necessary.</p>



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
003	NE 3	Article 37	Natural England notes the amendment to the arbitration article to make it clear that decisions undertaken by the MMO or the secretary of State post consent will not be subject to arbitration. This addresses our concern with this article.	Noted.
004	NE 7	Schedule 1 Part 3 requirement 30	Natural England notes that, at our request, we have been named as consultees on the decommissioning plans. We consider this issue resolved.	Noted.
005	NE 8	Schedule 13 Part 1 Paragraph (1)	As per comment 1 re Sabellaria reef management plan and RTD Best Practice Protocol. Also as per comment 2 on definition of offshore preparation works.	As per the Applicants' response to NE 01 (row 001 above) and NE 2 (row 002 above).
006	NE 9	Schedule 13 Part 2 Condition 16	We note the amendment to include a need to identify any environmental micro siting requirements. This addresses our concerns with regard to the UXO impact on benthic habitats of conversation importance. However, we defer to the MMO regarding the appropriateness of inclusion of UXO within this licence.	The Applicants note the NE response with regard to environmental micrositing. The Applicants are continuing engagement with the MMO with regard to the inclusion of UXO clearance in the draft DCO although it is anticipated that agreement to include this will be reached during the course of the Examination.



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
007	NE 10	Schedule 13 Part 2 Condition 16 (3)	Natural England notes the changes and, given the changes above, requests that the report identifying any micro-siting requirements also be included within this condition to ensure it is provided in a timely fashion.	Condition 16 has been updated in the draft DCO submitted at Deadline 5 to include a specific timescale for the submission of the details of any exclusion zones/environmental micrositing requirements.
008	NE 12	Schedule 13 Part 2 condition 17 (1) (j)	Natural England notes the condition to require production of a Sabellaria management plan six months prior to undertaking any pre-construction geophysical survey. We consider the wording appropriate. Please see our comments to the Outline Sabellaria Management Plan [REP2-056]	Noted
009	NE 13	Schedule 13 Part 2 condition 20 (2) (d) and 22 (2) (e)	Natural England notes the inclusion of the ornithological monitoring condition. However, we without the right to make comment on this condition along with the feedback on the updated In Principle monitoring plan. Our rationale for requirement for both EA1N and EA2 to be covered by specific measures to monitor displacement effects on RTD from Outer Thames Estuary are set out in more detail in Appendix A12.	The Applicants are updating the East Anglia TWO IPMP to include provision for monitoring of red-throated diver. This will be submitted at Deadline 6.
010	NE 14	Schedule 13 Part 2 condition 21 (3)	Natural England notes the updated wording and considers that this addresses our concerns with during construction noise monitoring. However, we are aware that the MMO is currently reviewing this condition to ensure it is appropriate. Natural England will provide feedback on any proposed changes.	Noted



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
011	NE 15	Schedule 13 Part 2 condition 24	Natural England notes the proposed additional condition. However, Natural England considers that this wording does not address our concerns regarding the deployment of cable protection over the lifetime of the development. We refer to the comments in our relevant and written reps [RR-059 Appendix F1 and Appendix F2] and to our draft guidance document on cable protection Appendix F7.	The Applicants are considering NE Appendix F7 (REP4-093) and note that the MMO are providing further advice on this matter at Deadline 5. The Applicants will therefore consider both sets of advice and respond at Deadline 6.
012	NE 16	Schedule 14	All comments on Schedule 13 apply to Schedule 14 where similar provisions and changes have been made.	Noted
EA1N and EA2 Written Submission of Oral Representations at ISH 1 [REP3-084]				
013	NE 18	Section 3.5	Natural England advise that the IPMP for EA2 is also revised to reflect that monitoring of effects upon red throated diver will be required are undertaken as part of a pre- and post-construction monitoring programme. Natural England have made specific comments in Appendix A12.	The Applicants are updating the East Anglia TWO IPMP to include provision for monitoring of red-throated diver. This will be submitted at Deadline 6.
014	NE 19	Section 5.1	Natural England response at Deadline 3 has highlighted our concerns regarding the approach to include project alone impacts within the SIP. Natural England maintains its position as detailed within our written and relevant reps [RR-059	As described in section 4 of the Applicants' Comments on Natural England's Deadline 3 Submissions (REP4-016), it is the Applicants' view that the commitments already made allow for robust control of this issue by the MMO (see response to Row 004 of REP4-016) and that no further conditions are necessary. However, in recognition of NE's position on



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
			Appendix G] regarding the need for condition to prevent concurrent piling and UXO detonation.	this matter and following the discussion with NE on the 11 th January 2021, the Applicants are exploring the potential for a DML condition to be included in the DCO. The Applicants will continue to engage with NE and MMO on this matter and will provide a further update through submissions to the examination at Deadline 6.
EA1N and EA2 Applicant's Comments on Natural England's Deadline 2 Submissions [REP3-070]				
015	NE 20	ExA question 1.2.91	Natural England notes that the applicant intends to consult with us on the method statement. However, unless this is secured within the DCO requirements there is no certainty on any consultation occurring.	The Applicants will update the outline landfall construction method statement at Deadline 6, stating that the relevant statutory nature conservation body will be consulted in the preparation of the landfall construction method statement. As the landfall construction method statement must be in accordance with the outline landfall construction method statement, this consultation process is therefore secured and it is not considered necessary to include such consultation within the wording of Requirement 13 in the draft DCO.
6.3 EA1N and EA2 Environmental Statement Appendix 6.3 Relationship of Onshore and Offshore Plans Secured by DCO [REP3-019]				
016	NE 21		The updated DCO has included requirement for UXO to consider micro siting requirements prior to any UXO detonation. The flowcharts should be updated to reflect this need.	The Applicants have updated Environmental Statement Appendix 6.3 Relationship of Onshore and Offshore Plans Secured by DCO to reflect this update to the DCO.
Outline Operations and Maintenance Plan				



Reference	NE reference	DCO Reference	NE Comment	Applicants' Comments
017	NE 22		As stated in our comments above regarding the changes to cable protection conditions. Natural England does not agree with the deployment of cable protection in new areas over the full lifetime of the project. We refer to the comments in our relevant and written reps [RR-059 Appendix F1 and appendix F2] and to our draft guidance document on cable protection Appendix F7.	The Applicants are considering NE Appendix F7 (REP4-093) and note that the MMO are providing further advice on this matter at Deadline 5. The Applicants will therefore consider both sets of advice and respond at Deadline 6.
018			Natural England has noted that the document allows for up to 5 cable repairs across the project per year. However, questions how this allocation of 5 will be managed, especially once an OFTO has taken ownership of the cable. An instance could occur where both DML holders wish to use all 5 or where the total repairs across the projects will exceed 5. Please could the applicant provide clarity on how the DCO or DML manage this potential risk?	<p>Up to 5 cable repairs per year was included in the Outline Operations and Maintenance Plan (REP3-039) as a worst-case scenario for all cables; inter array, platform link and export cables across both the Generation DML and the Transmission DML. It will therefore be incumbent on the Applicants to manage this worst-case allocation across the offshore development area. From a regulatory perspective, this will be done through the approval and consultation process in respect of the Operations and Maintenance Plan.</p> <p>The scenario where greater than 5 cable repairs are required in a single year is considered unlikely. However, should this occur the Applicants would engage with the MMO to discuss any further licensing requirements.</p>



6 Applicants' Comments on NE Appendix C6 (REP4-092) - Comments to Documents Submitted at Deadline 3 in Relation to Onshore Ecology [REP3-048, REP3-060, REP3-061, REP3-070]

Reference	NE Comment	Applicants' Comment
Outline Water Course Crossing Statement (OWCCS) [REP3-048]		
001	<p>Natural England welcomes the confirmation that the ducting will be carried out in parallel, to ensure effects to the environment are kept to a minimum. However, Natural England has concerns that although the document focuses on fish and ecology in the immediate vicinity of the crossing, potential impacts further downstream are not considered. Although Data Forms for the SPA and citation for the SSSI are included, there is no discussion on potential environmental impacts to site features. We advise that this is addressed in any OWCCS. The Applicant has just noted this will be included in the ecological management plan (EMP) post consent. Moving forward, unless this document is submitted into examination, Natural England is unable to comment or agree there will be no significant impacts to designated sites and protected species.</p>	<p>The Outline Watercourse Crossing Method Statement (REP3-048) submitted at Deadline 3 acknowledges that although the river itself is not designated, its lower reaches flow through the Sandlings Special Protection Area (SPA) and Leiston – Aldeburgh Site of Special Scientific Interest (SSSI) downstream of the crossing point. The Applicants have developed a number of mitigation measures in order to protect the SPA and SSSI and these are set out in the above-mentioned method statement.</p> <p>During a Statement of Common Ground (SoCG) meeting (11th January 2021) the Applicants agreed to update the Outline Watercourse Crossing Method Statement (REP3-048) to include a Habitat Regulations Assessment (HRA) screening exercise which will consider the potential for impacts downstream within the SPA / SSSI. The updated document will be submitted at Deadline 6.</p>
Deadline 3 Onshore Ecology Clarification Note [REP3-060] and Air Quality Deadline 3 Clarification Note [REP3-061]		
002	<p>Semi-Natural Broadleaved Woodland [REP3-060]</p> <p>We note that, in response to the comments by the Suffolk Wildlife Trust, the loss of semi-natural broadleaved woodland is now recorded as a priority habitat and that the effect on this habitat has been changed, as</p>	Noted.



Reference	NE Comment	Applicants' Comment
	<p>noted in paragraph 10 [REP3-060], to moderate adverse and significant. We agree that this is an appropriate assessment of both the importance of the habitat nationally and of any potential loss to this habitat.</p>	
003	<p>NRMM Impacts on Ecological Receptors [REP3-060]</p> <p>Whilst Natural England welcomes the air quality [REP3-061] and additional onshore ecology [REP3-060] clarification notes, our concerns remain outstanding as limited detail has been provided on the interest features of each site which are likely to be affected by this proposal.</p> <p>We note that paragraphs 32 and 33 [REP3-060] contain a very brief summary of the total habitats that may be affected on each designated site together with a description of the habitats at the landfall site. A comprehensive qualitative assessment is needed to explain the findings of the quantitative assessment i.e. it should refer back to the data set out within the Air Quality Clarification Note [REP3-061] and explain the effect on each habitat.</p> <p>The main habitats likely to be affected, according to the data, are at locations E1, E2, E4, E5, E6 and E7, as listed within Table 2.6 Receptor Locations, Habitats and Associated Nutrient Nitrogen 3 and Acid Critical Loads of the Air Quality Clarification Note [REP3-061]. These habitats comprise acid grassland and broadleaf woodland which are both sensitive to NoX pollutants. The proposed development was recorded as likely to increase nitrogen deposition to well above the critical load of the two habitats at each location listed above. Furthermore, at other locations, it is shown to contribute a further c.50% of the critical load, yet this Additional Onshore Clarification note does not explain in sufficient detail why those effects are likely to be insignificant, despite the conclusions from the air quality modelling work.</p>	<p>The Applicants are considering NE's comments and will respond at Deadline 6.</p>



Reference	NE Comment	Applicants' Comment
	<p>Paragraphs 32 and 33 of the onshore ecology clarification note [REP3-060] states that the designated sites are likely to be affected for 8 months (Leiston-Aldeburgh SSSI) or 5.5 months (the Sandlings SPA) each year during construction. It is questionable whether this should be stated to be insignificant, given the number of years, the current pressure on the sites due to current background levels of nitrogen and the fact that the full details of construction are not yet confirmed. We need further detail, as set out below, to carry out a full assessment on the likelihood of significant effects from the proposal upon the designated sites:</p> <ul style="list-style-type: none"> a) The full effect of the change in air quality on the designated sites, taking into account information such as: <ul style="list-style-type: none"> i. the sensitivity of the notified or interest features. ii. the current state of the habitats in question ie. what condition are they in? Is there evidence of the effects of NoX pollution on these habitats already? iii. the most appropriate environmental benchmarks for each feature on each designated site (e.g. site relevant critical levels and critical loads). We recommend using the Air Pollution Information System (www.apis.ac.uk) to obtain information about site/habitat sensitivity (e.g. critical loads and levels for ecosystem protection). iv. the location of the interest features and their proximity to the works. b) Prevailing environmental conditions, e.g. the total pollution burden predicted at the sites. In the first instance we recommend using the information on the Air Pollution Information System 	



Reference	NE Comment	Applicants' Comment
	<p>(www.apis.ac.uk) for estimates of current ('background') pollution concentrations and deposition.</p> <p>c) The predicted pollution in combination with other relevant plans and projects.</p> <p>d) Description of the modelling approach and the key assumptions and areas of uncertainty within it.</p> <p>Natural England would like to note that the above list is not necessarily exhaustive, and it is the responsibility of the Applicant to provide all necessary information to fully assess the implications of the proposed development on designated sites.</p>	
004	<p>Furthermore, Natural England would also want to check whether air quality effects during decommissioning have been considered.</p>	<p>It is anticipated that underground infrastructure (i.e. landfall works, onshore cables and jointing bays) would be decommissioned (de-energised) and either left in-situ or removed depending on the requirements of the Onshore Decommissioning Plan (Requirement 30 of the DCO). It is envisaged that the methods and equipment used for decommissioning would be similar to those outlined for construction, but that works are likely to be smaller in scale, particularly if underground infrastructure remains in-situ. The decommissioning impacts of the Projects will therefore be no greater than those identified for their construction.</p>
	<p>Please be advised that the habitat survey at the river crossing will need to be updated prior to construction to ensure that the baseline data is accurate.</p>	<p>A pre-construction survey of the Hundred River crossing will be carried out and any changes in the site conditions since the surveys undertaken to date will be noted (see section 5.6.3.2 the Outline Landscape and Ecological Management Strategy (OLEMS) (REP3-031)). Should any site conditions be noted as having changed, appropriate mitigation measures (if required) will be determined and implemented.</p>



Reference	NE Comment	Applicants' Comment
EA1N & EA2 Applicant's Comments on NE's Deadline 2 Submission [REP3-070] – Onshore Ecology		
005	<p>Outline SPA Crossing Method Statement (NE Appendix C2b REP2-053)</p> <p>Natural England acknowledges that the area at the landfall site within Sandlings SPA is not supporting habitat. Nevertheless the position of the cable route through the designated site has potential to cause disturbance, as it is effectively separating two areas of the SPA. This disruption may lead to stress to ornithological features, which in turn effects breeding potential.</p> <p>Natural England consider that the Environmental Statement does not contain the level of detail that would be required to assess whether works actually happening within a European site would be significant. It is usual to provide this detail so that planning applications can be full assessed.</p>	<p>The Applicants maintain that a comprehensive assessment of potential impacts upon the qualifying features and integrity of the Sandlings SPA arising from an open trench SPA crossing is presented within Habitat Regulations Assessment - Information to Support Appropriate Assessment Report (APP-043).</p> <p>In addition, the Applicants would highlight the parallel ducting commitment described within the Project Update Note (REP2-007) which states that should both the East Anglia ONE North project and the East Anglia TWO project be consented and then built sequentially, when the first project goes into construction, the ducting for the second project will be installed along the whole of the onshore cable route in parallel with the installation of the onshore cables for the first project. By making this commitment, there will no longer be a scenario whereby both projects are constructed completely independently of each other along the onshore cable route.</p> <p>The Applicants will continue to liaise with NE throughout and beyond the Examination as required, to ensure that the final SPA Crossing Method Statement contains sufficient information regarding the impacts and mitigation measures adopted with an open trench SPA crossing solution.</p>
006	<p>Natural England welcomes the proposed enhancement measures and proposal to carry out 5 years of monitoring and management. However, in terms of achieving long term environmental benefits, it is questionable whether five years will be sufficient to provide long term habitat for ground nesting birds. For example, nightjar require clearfell areas, i.e. areas of specific growth levels (about 6/7 years growth). If this area is not</p>	<p>The Applicants maintain that the 5-year management period for Work No. 12A specified within the Outline SPA Crossing Method Statement (REP1-043) is sufficient to establish a functional habitat for nightjar, providing ample opportunity for ecological enhancements to be realised given the initial activity of thinning of scrub and bracken removal on rotation.</p>



Reference	NE Comment	Applicants' Comment
	<p>managed following this time, the habitat is not likely to be suitable for breeding purposes for this species.</p>	
007	<p>Ecological Enhancement Clarification Note (NE Appendix C4 REP2-054)</p> <p>Natural England is concerned that, while the aim is to provide enhancement, there is insufficient detail submitted in all the documents so far to assess whether the proposals are appropriate. In our view a development of this size should be providing a generous level of enhancement i.e. more than the 10% requested of standard planning applications. The Enhancement detailed within the ecology reports, including the Enhancement Clarification Note, OLEMS and Environmental Statement, appear to be not considered strategically across the application site, but are provided within areas that are no longer likely to be affected by the cable route, with no plan how it is actually intended to enhance the habitats.</p>	<p>Regarding the 10% enhancement requested of standard planning applications, the Applicants assume NE is in fact referring to Biodiversity Net Gain. As set out in section 1.1.1 of the Ecological Enhancement Clarification Note (REP1-035) submitted at Deadline 1, based on UK Government guidance, the Applicants' position regarding Biodiversity Net Gain is that it is not required for nationally significant infrastructure projects (NSIPs). NE confirmed in its Deadline 2 submission (REP2-054) that Net Gain is not formally required for the Projects. .</p> <p>As noted in the Ecological Enhancement Clarification Note (REP1-035), the Applicants are proposing to achieve no overall loss of biodiversity along the cable route with habitats being replaced 'like-for-like' where possible to ensure habitat connectivity is not permanently affected. Improvements to hedgerows and any additional planting or enhancements made (e.g. 'gapping up' hedgerows, enhancing grassland species mixes and creating wooded areas of better habitat condition than that which will be lost) will contribute towards potential biodiversity enhancement. These measures will be established as planting schedules are refined during the detailed design stage.</p> <p>The habitat creation / enhancement currently identified will be undertaken primarily around the onshore substations and National Grid infrastructure locations. These form part of the Outline Landscape Mitigation Plan presented within the OLEMS (REP3-030) submitted at Deadline 3, which contains the outline EMP and LMP. The Applicants have given careful consideration to the scope of enhancement proposals to ensure the appropriate solutions are adopted in the right locations. This has also</p>



Reference	NE Comment	Applicants' Comment
		<p>been balanced with the requirement for land acquisition or rights to be justifiable.</p> <p>The final detail of mitigation and enhancement measures will be provided through the EMP and LMP, pursuant to the relevant requirements of the DCO. The Applicants intend to submit a further revision of the OLEMS at Deadline 6. The Applicants also refer NE to the most recent Outline Landscape Mitigation Plan (REP4-015) submitted as a standalone document at Deadline 4.</p>
008	<p>Natural England understands that the proposed reduction in footprint will be beneficial to the enhancement programme, but details remain limited on how it is intended to improve the ecological value of the land in question.</p>	<p>The Applicants refer NE to the Onshore Substations Update Clarification Note (REP3-057) submitted at Deadline 3 and to the most recent Outline Landscape Mitigation Plan (REP4-015) submitted at Deadline 4.</p> <p>Reducing the footprints of the onshore substations allows the western boundary of the westernmost substation to be relocated 40m to the north-east. This allow for retention of an established woodland (approximately 0.27ha) which includes habitats that provide suitable opportunities for nesting birds; the amount of existing habitat that would be lost to the Projects has therefore been reduced.</p> <p>The remainder of the 190m x 40m strip of land that would no longer be occupied by the onshore substations is currently in arable use. Arable land is typically considered to be of low ecological value due to the homogeneity of the habitat, as well as farming practises and the presence of insecticides and herbicides within crops. Post-construction woodland planting is now proposed for this area. From an ecological perspective, it is considered that such woodland is preferable to the arable land, augmenting the habitats provided by the retained semi-natural broadleaved woodland.</p>



Reference	NE Comment	Applicants' Comment
009	Natural England notes the opportunity for enhanced connectivity between Laurel Court and Grove wood and the proposed infill of gaps in hedgerows. This is likely to improve connectivity as suggested in the response. Natural England ideally requires a comprehensive mitigation and enhancement strategy document, so we can understand exactly what the enhancement areas are and how they will be created, managed and monitored.	The Applicants refer NE to the OLEMS (REP3-030) submitted at Deadline 3 which contains the outline EMP and LMP. The final detail of mitigation and enhancement measures will be provided through the EMP and LMP, pursuant to the relevant requirements of the DCO. The Applicants intend to submit a further revision of the OLEMS at Deadline 6.
010	Onshore Ecology Clarification Note (NE Appendix C5 REP2-055) Summary – we welcome the acknowledgement that the Applicant will work with Natural England to ensure that concerns are addressed prior to consent.	Noted.
011	Hairy Dragonfly. We note the explanation provided regarding the suitability of the habitat at the landfall site to the larval stage of this species. We agree that an area with arable habitat and little suitable bankside vegetation and lacking in good water quality is not likely to support the larval stage. However, as time has passed since the habitat survey was carried out, we consider it important to provide an updated habitat survey in this location prior to works, to ensure there has been no change in the habitat. Since the site of the crossing is currently unsuitable for hairy dragonfly, there would appear to be a good opportunity as part of the reinstatement works to include bankside flora that will support this species.	An updated survey will be undertaken as part of the pre-construction survey effort as described in the OLEMS (REP3-031). Should any site conditions be noted as having changed, appropriate mitigation measures (if required) will be implemented. Regarding the reinstatement works, as noted in Ecological Enhancement Clarification Note (REP1-035), the Applicants will seek to deliver and develop opportunities for ecological enhancement through the final EMP and LMP.
012	Air Quality - Natural England welcomes the submission of the Air Quality Clarification Note [REP3-061], which, in our view, has provided a sufficiently comprehensive review, in terms of the quantitative analysis, of how the works, and traffic associated with it, are likely to affect the air quality of the Sandlings SPA and Leiston Aldeburgh SSSI. Whilst we	The Applicants consider that should the additional assessment work requested by NE within row 003 change the conclusions drawn in the Deadline 3 Onshore Ecology Clarification Note (REP3-060) and



Reference	NE Comment	Applicants' Comment
	<p>acknowledge that the works are temporary, nevertheless the habitats within these sites are already under pressure from NoX pollutants (as evident from APIS) and therefore care should be taken not to add a significant level of further pollution to these sites.</p> <p>Natural England advises that, where a significant effect cannot be ruled out, consideration is given to how pollution can be reduced during construction, operation and decommissioning. If this is not possible, then we would expect mitigation to be provided for the habitats that are likely to be significantly affected.</p>	<p>predict significant impacts, then additional pollution reduction or mitigation measures would be considered.</p>
013	<p>Natural England advises that the Onshore Ecology Clarification note [REP3-060], still has limited detail regarding whether the habitats are likely to be damaged due to changes in air quality, and how this effect can be avoided, reduced, or mitigated. This should be either available within the Air Quality Clarification Note [REP3-061] or Onshore Ecology Clarification note [REP3-060], but does not appear to be included in either document (see the bulleted list above regarding the detail that we require to assess this).</p>	<p>See the Applicants' comment at row 003</p>
014	<p>Applicants' Responses to NE Comments on other Interested Parties' ExA Written Question Answers (NE Appendix K1b REP2-058) – Onshore Ecology</p> <p>1.2.54 - 1.2.56 – Natural England refers the ExA and Applicant to our previous comments regarding the Ecological Management Plans. We reiterate that, as an overarching document, the OLEMS provides a broad brush approach when describing the EMP and LMP. In order to fully understand how mitigation and enhancement will fit it to the plans, we need to understand how the sites will be created, managed and monitored.</p>	<p>The OLEMS contains a full outline EMP based upon ecological surveys to date; it provides the framework for preparation of the final EMP. The final EMP will be developed post-consent so that mitigation measures can be informed by the most up-to-date survey information.</p> <p>The Applicants submitted a revised OLEMS (REP3-030) at Deadline 3 and understand that NE will provide comments on this at Deadline 5. The Applicants intend to submit a further revision of the OLEMS at Deadline 6.</p>



Reference	NE Comment	Applicants' Comment
015	1.2.55 – Natural England is content to join discussions regarding the results of the preconstruction surveys.	Noted.
016	1.2.61, 64, 67 – Natural England refers to our previous advice on the ecological enhancement clarification note [REP2-054].	Noted.
017	1.2.70 – Natural England welcomes the acknowledgement that linear routes for bats will be maintained, using temporary infill measures where necessary within the relevant hedgerows.	Noted.
018	1.2.73 – Natural England notes the update regarding woodland and hedgerows and have no further comments at this stage.	Noted.
019	1.2.80 – Natural England notes that given the uncertainty regarding whether the Marlesford Bridge will be used, we consider it appropriate to assume use and provide ecological data for this site.	Until detailed assessments / surveys of the bridge are undertaken, it is not possible to establish the precise nature of works (if any) required at Work No. 37 (Marlesford Bridge). Should detailed assessments / surveys of the bridge identify the need for works (e.g. ground raising, re-profiling or the installation of new structures) the Applicants will undertake ecological surveys at this location and consult NE on the results prior to construction.
020	1.2.91 – Natural England expects to be included in discussions regarding the landfall construction method statement, as there is potential for methods to impact on ecological receptors.	Noted.
021	1.2.93 – Natural England notes the further update provided by the Applicant, which has provided some further detail on the nightingale and turtle dove proposed mitigation. However we consider that, where mitigation for species associated with designated sites is required, we should have access to a mitigation strategy early on in proceedings so that we can decide whether the mitigation adequately offsets the effect.	Noted. The Applicants will engage with NE on this matter during preparation of the final EMP.