East Anglia TWO Offshore Windfarm

Appendix 12.1

Offshore Ornithology Consultation Responses

Environmental Statement
Volume 3

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Table of Contents

Appendix 12.1 is supported by the tables listed below.

Table Number	Title
Table A12.1.1	Consultation Responses for scoping, Expert Topic Group (ETG) meetings and the PEIR
Table A12.1.2	Section 42 Consultation Responses for the EIA

Glossary of Acronyms

DCO	Development Consent Order
DDV	Drop Down Video
EA	East Anglia
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Direct Drilling
HRA	Habitats Regulations Assessment
IFCA	Inshore Fisheries Conservation Authority
MARESA	Marine Evidence Based Sensitivity Assessment
MESH	The Mapping European Seabed Habitat Project
MMO	Marine Management Organisation
MNNS	Marine Non-Native Species
NE	Natural England
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SPR	ScottishPower Renewables
ZEA	Zonal Environmental Appraisal

Glossary of Terminology

Applicant	East Anglia TWO Limited
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one offshore construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and the information required to support HRA and Appropriate Assessment.
Horizontal directional drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Inter-array cables	Offshore cables which link the wind turbines to each other and the offshore electrical platforms, this will include fibre optic cables.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land and connect to the onshore cables.
Meteorological mast	An offshore structure which contains metrological instruments used for wind data acquisition.
Marking buoys	Buoys to delineate spatial features / restrictions within the offshore development area.
Offshore cable corridor	This is the area which will contain the offshore export cables between offshore electrical platforms and transition bays located at landfall.
Offshore development area	The East Anglia TWO windfarm site and offshore cable corridor (up to Mean High Water Springs).
Offshore electrical platform	A fixed structure located within the windfarm area, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Offshore export cables	The cables which would bring electricity from the offshore electrical platforms to the landfall. These cables will include fibre optic cables.
Offshore construction, operation and maintenance platform	A fixed structure required for construction operation and maintenance personnel and activities.
Offshore platform	A collective term for the offshore construction operation and maintenance platform and the offshore electrical platforms.
Platform link cable	An electrical cable which links one or more offshore platforms, this will include fibre optic cables.
Safety zones	A marine area declared for the purposes of safety around a renewable energy installation or works / construction area under the Energy Act 2004.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water

12.1 Offshore Ornithology Consultation Responses

12.1.1 Introduction

1. This appendix covers those statutory consultation responses relating to offshore ornithology that have been received as a response to the Scoping Report (SPR 2017), the Preliminary Environmental Information Report (PEIR) (SPR 2019) submitted as part of Section 42 consultation and Expert Topic Group (ETG) Meetings. ***Table A12.1.1*** includes comments and responses relevant to Scoping and Pre-PEI ETG meetings and ***Table A12.1.2*** includes responses relevant to Section 42 comments and ETG meetings held after PEIR submission.

2. As Section 42 consultation for the proposed East Anglia TWO project was conducted in parallel with the proposed East Anglia ONE North project, where appropriate, stakeholder comments which were specific to East Anglia ONE North, but may be of relevance East Anglia TWO, have also been included in the consultation responses for East Anglia TWO.

12.1.2 Comments Relevant to Scoping and Pre-PEI ETG Meetings

Table A12.1.1 Consultation Responses Related to Scoping and ETG meetings prior to issue of Chapter 12 Offshore Ornithology, Preliminary Environmental Information

Consultee	Date / Document	Comment	Response / where addressed in the PEI
Natural England	08/12/2017 Scoping Response	NE maintains that a seasonal restriction is put in place from Nov – Feb for cable installation in order to mitigate against impacts to red- throated diver. This species has been particularly affected and displaced from large areas within the Outer Thames Estuary due to OWF construction. To reduce impacts further it would be a sensible option to cease works/activities that interact with the designated sites during this period.	A seasonal restriction has been considered further as part of the assessment, but is not considered to be necessary given the small predicted impact of disturbance on red-throated diver (see ***section 12.6.1.1.1*** of this chapter). A best practice protocol for minimising disturbance to red-throated divers will be adopted as for East Anglia THREE.
Natural England	08/12/2017 Scoping Response	It appears that the Birds of Conservation Concern (BoCC) listing from BoCC 3 (Eaton et al. 2009) has been used. This listing has since been updated by BoCC 4, we advise the Applicant to see Eaton et al. (2015), available online at: http://britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf	Updated to BoCC 4 for this assessment, see ***Table 12.9*** of this chapter.
Natural England	08/12/2017 Scoping Response	We note the comments on the need for mitigation will be to some extent dependent on the results of site specific survey and the impact assessment. However, Natural England's advice at the EA3 hearing was that adverse effect on site integrity cannot be excluded in-combination with other plans or projects in respect of predicted mortality from collision on kittiwake from Flamborough Head and Bempton Cliff SPA and Flamborough and Filey Coast pSPA. Therefore Natural England would welcome any mitigation measures, such as raising the minimum hub height to be considered at the earliest opportunity.	The Applicant will review impact magnitudes as they become apparent and consider options for mitigation as they arise. Further work has been undertaken to refine realistic cumulative turbine numbers. This includes adjustments to reflect new information on nocturnal activity levels, and reference to revised collision risk figures for developments that are operational and where the turbine array 'as built' has a lower collision risk than the worst case scenario in the Environmental Impact Assessment (see assessment of cumulative impacts of collision in ***section 12.7.4*** of this chapter).

Consultee	Date / Document	Comment	Response / where addressed in the PEI
Natural England	08/12/2017 Scoping Response	We agree with the use of Furness (2015) for use of definitions of biological seasons. However, further consideration will need to be given to lesser black-backed gull as the breeding season for individuals breeding at Alde Ore Estuary SPA will be wider than the May- July period stated as the breeding season only period, given that the project is within the foraging range of Alde-Ore Estuary SPA We suggest that this is discussed and agreed during Evidence Plan Process.	The breeding season collision risk estimate for lesser black-backed gull is based on the full breeding season (April to August; Furness, 2015) as opposed to the migration-free (core) breeding period. Although the project is within foraging range of lesser black-backed gulls breeding at the Alde Ore Estuary, tracking data from the SPA colony indicate that the proposed project is out with the core foraging areas for this species during the breeding season (***section 12.6.2.3*** of this chapter). It is therefore considered unlikely that breeding birds from the SPA make regular use of the project.
Natural England	08/12/2017 Scoping Response	We note that surveys are planned between May to August 2018 to ensure there are 24 months of site-specific data available for assessment. We welcome the commitment to collect 24 months of site specific data at the EA2 windfarm site. We also acknowledge that additional contextual information will come from surveys undertaken for the former East Anglia Zone and the former East Anglia TWO windfarm site.	Noted.
Natural England	08/12/2017 Scoping Response	In addition to the RSPB tagging studies from Flamborough, there is tracking data of lesser black-backed gulls from Alde-Ore Estuary SPA from the Department for Business Environment and Industrial Strategy (BEIS) funded BTO study, and there is further tracking planned as part of Galloper's post construction monitoring which may be available during the examination.	Reference has been made to tracking data from the Alde-Ore Estuary SPA in the assessment (see ***section 12.6.2.3.1.3*** of this chapter). Where available we will attempt to obtain any additional relevant data for the assessment.

Consultee	Date / Document	Comment	Response / where addressed in the PEI
Natural England	08/12/2017 Scoping Response	We would like to clarify if it is planned to use MRSea on all the survey data, or whether reliable model based estimates require a minimum number of observations, and therefore may only be used for the more numerous species.	MRSea has not be used as there are limited data for many species. Design based outputs are however provided for all species.
Natural England	08/12/2017 Scoping Response	We agree that the species assessed will depend on the results of the surveys but will include: fulmar, gannet, kittiwake, lesser black-backed gull, great black-backed gull, herring gull, red-throated diver, guillemot, razorbill and puffin. We assume that other species assessed may include those that may pass through on migration but are only recorded in small numbers by snap shot aerial surveys, for example little gull. It is not clear in the Scoping Report (SPR 2017) if non-seabird migrants are also being considered.	An evidence plan supporting document on non-seabird migrants has been agreed based on nearby windfarm assessments, to justify scoping out non-seabird migrants, as these will have extremely low predicted impacts.
Natural England	08/12/2017 Scoping Response	We agree with the likely key issues listed in the Scoping Report (SPR 2017), although we would include lesser black-backed gull collision risk during the breeding season, in addition to the non-breeding season.	Noted and agreed, collision risk during the breeding season has been assessed for the project alone (***section 12.6.2.3*** of this chapter) and cumulatively (***section 12.7.4.2*** of this chapter).
Natural England	08/12/2017 Scoping Response	We agree with the list of expected features of the HRA however we recommend that impacts on other qualifying features of Flamborough and Filey Coast pSPA and other qualifying features from the Outer Thames Estuary pSPA are also likely be included in the HRA.	We will screen for other impacts in the Information to Support Appropriate Assessment Report (document reference 5.3) as suggested. See the HRA Screening Report
Natural England	08/12/2017 Scoping Response	We are content with the proposals for measuring flight height, and would expect there to be enough samples within the site specific surveys to get an adequate sample particularly if the historic digital aerial survey data can be used. We would expect flight heights to be provided with confidence intervals to enable them to be used with a	BTO generic flight height data have been used for the assessment of collision risk (***section 12.6.2.3*** of this chapter) the aerial survey contractors advised ScottishPower Renewables that the flight height estimates from specific baseline survey data were not reliable. Thus, these data have not been used in the assessment.

Consultee	Date / Document	Comment	Response / where addressed in the PEI
		stochastic collision risk model should that be available by the time the application is submitted.	
RSPB	20/12/2017 Scoping Response	Given the recent concerns around potential collision risk to breeding kittiwake and gannet from other windfarms in the former East Anglia Zone, we strongly recommend that the potential for impacts on these species during the breeding season from the proposed East Anglia TWO project is recognised in the table and the subsequent assessment.	Collision risk during the breeding season has been assessed for the project alone (***section 12.6.2.3***) and cumulatively (***section 12.7.4.2*** of this chapter).
RSPB	20/12/2017 Scoping Response	If figures for the migration-free breeding season were to be used in the PEI as in the Scoping Report, we consider that it would be necessary to attribute birds in the crossover months to breeding and dispersal in order to ensure collision risk to breeding birds is not underestimated.	With the exception of lesser black-backed gull, the turbine array of the proposed project is considered to be outwith the foraging range of the seabird species considered in the assessment of collision risk. Tracking data from the Alde Ore SPA colony of lesser black-backed gulls also indicate that the proposed project is outwith the core foraging areas for this species during the breeding season (***section 12.6.2.3*** of this chapter).
RSPB	20/12/2017 Scoping Response	We recommend the following paper as a recent critique of the methods used to assess impacts of offshore windfarms on seabird populations: Green, R. E., Langston, R. H., McCluskie, A., Sutherland, R., and Wilson, J. D. (2016). Lack of sound science in assessing windfarm impacts on seabirds. *Journal of Applied Ecology.*	Full use of available literature and evidence has been made in assessing the project's potential impacts for the ES
The Planning Inspectorate	02/12/2017 Scoping Response	The Inspectorate does not agree that the impact of disturbance due to lighting during operation and decommissioning can be scoped out as no information to support this approach and no evidence demonstrating clear agreement with relevant statutory bodies has been provided. The PEI should include an assessment of this matter.	A review of the effects of operational lighting has been prepared (Furness, 2018). At the request of NE, construction and operational lighting is considered in the assessment (***sections 12.6.1.1*** and ***12.6.2.1*** of this chapter).

Consultee	Date / Document	Comment	Response / where addressed in the PEI
The Planning Inspectorate	02/12/2017 Scoping Response	The Inspectorate does not agree that the impact of transboundary impacts can be scoped out as no information to support this approach and no evidence demonstrating clear agreement with relevant statutory bodies has been provided.	Evidence is provided that Transboundary impacts can be screened out of the assessment (see ***section 12.8*** of this chapter and the HRA screening report).
The Planning Inspectorate	02/12/2017 Scoping Response	It is noted that in the Scoping Report no ornithology surveys are proposed to be undertaken along the (cable corridor) AoS, based on conclusions drawn from existing survey information which was used to assess the potential impacts of East Anglia ONE and East Anglia THREE on red- throated diver, and that impacts are expected to be temporary and localised. No other bird species are referenced. The source of the data relied upon to support the conclusions in relation to the proposed East Anglia TWO project should be identified in the PEI and its relevance to bird species other than red- throated diver should be explained. The evidence demonstrating clear agreement with relevant statutory bodies that no surveys are required must be provided.	The methods and evidence (including source of data) for assessing potential impacts along the cable corridor during construction are set out in ***section 12.6.1.1*** of this chapter. As for East Anglia ONE and East Anglia THREE the assessment for the export cable corridor considers red-throated diver based on survey data collected for the Outer Thames Estuary SPA.
The Planning Inspectorate	02/12/2017 Scoping Response	Only 2 of 4 European sites are identified in the Method Statement in relation to HRA and are referenced under designated sites in the Scoping Report; Flamborough and Filey Coast pSPA and Alde-Ore Estuary SPA are omitted. In addition, although the little gull is identified in MS paragraph 46 as a feature of the Greater Wash pSPA, it is not included in the list of receptors likely to be affected by the Proposed Development provided in paragraph 44 of the MS. While the information in the ES should not duplicate that in the HRA Report, the Inspectorate expects it to be consistent between the two documents.	The HRA screening and assessment provides a comprehensive review of potential connectivity of designated sites. This is reflected in the ES (***section 12.5.2*** of this chapter). Little gulls were recorded within the East Anglia TWO windfarm site although in small numbers (***Table 12.11***) and were not screened in for assessment for any potential impacts.

Consultee	Date / Document	Comment	Response / where addressed in the PEI
The Planning Inspectorate	02/12/2017 Scoping Response	It should be clearly explained in the PEI how the value of a feature will be taken into account in judging its sensitivity and the overall assessment of significance.	This is explained in the impact assessment methodology (***section 12.4.3*** of this chapter)
Natural England	18/05/2018 Comments on Expert Topic Group (ETG) meeting agreement points	Agree that BTO flight height data and presentation of Option1 and Option 2 outputs is acceptable given the uncertainty around site specific flight height data.	BTO flight height data and Option 1 and 2 outputs used in the assessment of collision risk. Option 1 outputs are provided in the Technical Appendix. See ***section 12.6.2.3*** of this chapter and ***Appendix 12.2 Technical Report***.
Natural England	18/05/2018 Comments on ETG meeting agreement points	NE have advised SPR that the consequences of lighting for birds during all phases of the project (including construction) should be considered, so any potential impacts and mitigation can be explicitly stated.	A review of the effects of operational lighting has been prepared (Furness 2018). At the request of NE, construction and operational lighting is considered in the assessment (***sections 12.6.1.1*** and ***12.6.2.1*** of this chapter).
Natural England	18/05/2018 Comments on ETG meeting agreement points and evidence plan supporting document on non-seabird migrants	Impacts on migrating non-seabirds can be scoped out.	Migrating non-seabird species scoped out and not considered further.
Natural England	18/05/2018 Comments on ETG meeting agreement points	Agree that transboundary impacts on non-UK ornithology receptors can be scoped out subject to consultation with Scottish Natural Heritage (SNH))	Transboundary effects on non-UK receptors have been scoped out following contact with SNH.

12.1.3 Comments Relevant to Section 42 Consultation on PEI and ETG Meetings

Table A12.1.2 Consultation Responses Related to the Offshore Ornithology PEI (Section 42 comments) and ETG Meetings

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Rijkswaterstaat	March 2019 Section 42 Comments	We do however have a comment to make, especially on the transboundary impacts in chapter 12.8 on offshore ornithology. In the commentary column it is stated that at the time of writing no specific information was found in relation to turbine numbers and specifications or ornithology assessments. However, we recently upgraded the Ecology and Cumulation Framework. The original methodology is described (also in English) at this site: https://www.noordzeeloket.nl/en/functions-and-use/offshore-wind-energy/ecology/ The upgrade of this Framework to version 3.0, which makes an assessment of the accumulation for all the plans to 2030 is available (and all underlying documents), but only in Dutch, at the following link: https://www.noordzeeloket.nl/functies-gebruik/windenergie-zee/ecologie/wind-zee-ecologisch/documenten-wozep-0/kader-ecologie/ These documents are under translation and will become available by the end of April. In these calculations, scenario's for size and number of turbines are used for the different plans up to 2030. We would appreciate if in the EIA this information is used in assessing the accumulation of transboundary impacts.	The Applicant believes the report provided is too high level to allow a meaningful assessment to be conducted.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
RSPB	25/03/2019 Section 42 Comments	Thank you for inviting the RSPB to comment on the Preliminary Environmental Information Report (the PEIR) for East Anglia TWO and East Anglia ONE North Offshore Wind Farms. As you are aware, where the environmental impacts of a proposed scheme are likely to be unacceptable, we will object, but our preference is to work with renewable energy developers to address and mitigate any impacts.	Noted
RSPB	25/03/2019 Section 42 comments	We are grateful for the constructive pre-application discussions with Scottish Power Renewables, and will continue discussions with a view to resolving our concerns, and ensuring that robust evidence is submitted so that the potential environmental impacts can be properly understood and evaluated.	Noted
RSPB	25/03/2019 Section 42 Comments	Overall, we consider that the PEIR appears comprehensive, with the information presented logically and clearly. Our comments in relation to specific detail in the PEIR are set out in the attached appendix. These relate to the assessment of potential impacts on the wildlife interests and protected sites. Comments are based on the EA2 documents, but should also be taken to apply to the EA1N documents.	Noted
RSPB	25/03/2019 Section 42 comments	Key areas of concern which we expect to be addressed within the Environmental Statement are: • Impact significance. The RSPB is unable to agree at this stage that no impacts greater than minor adverse significance will occur to ornithological interests as a result of offshore elements of the project. Our concerns relate principally to collision risk to gannet and kittiwake, particularly in relation to the Flamborough and Filey Coast	RSPB key species and sites of concern are noted. The assessment has been revised and updated taking into account S42 comments, the full 24 month ornithology data set and additional relevant information that has become available (including peer reviewed papers, 'grey' literature reports and information made available as part of the DCO

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		SPA, lesser black-backed gull of the Alde-Ore Estuary SPA and great black-backed gull, and to displacement of red-throated diver (including those of the Greater Wash SPA), razorbill and guillemot.	examinations for other UK offshore windfarms in 2019).
RSPB	25/03/2019 Section 42 comments	Key areas of concern which we expect to be addressed within the Environmental Statement are: • Methodological issues. The RSPB considers that some methodological procedures used in the assessment are inadequate to ensure a robust assessment and therefore a proper understanding of the likely impacts of the scheme. We have particular concerns regarding the stochastic model used in the assessment of collision risk, the use of median values for bird density within the collision risk modelling, and the use of revised nocturnal activity factors.	The ES assessment of collision risk is based on the deterministic collision risk model (Band 2012), mean bird densities, and presents a range of nocturnal activity factors taking account of current SNCB guidance on nocturnal activity for individual species, and published evidence where available for gannet.
RSPB	25/03/2019 Section 42 comments	The RSPB notes that the design parameters for the projects were changed following completion of the collision risk modelling (paragraph 21, p.10). For East Anglia TWO this has increased the number of turbines "…from 67 to 75 for the 12MW scenario, and from 53 to 60 for the 15MW scenario." This represents a 10% increase in turbines at 12MW and 11% at 15MW. Given this change any conclusions presented in the PEIR are not based on the worst-case scenario and should be considered under-precautionary until such time as revised assessments have been undertaken.	The offshore ornithology assessments have been revised based on the finalised turbine scenarios as agreed for the ES (see ***Table 12.1*** of this chapter).
RSPB	25/03/2019 Section 42 comments	Paragraph 62 (p.25 EA2; 61 EA1N) highlights that no site-specific surveys have been carried out for the offshore cable corridor. Assessments are being based on historic data collected from 2013. The RSPB considers such data should have been updated to ensure that a robust	In contrast to RSPB, NE welcomed the use of the 2013 (APEM) data. The assessment of potential construction disturbance impacts to red-throated diver within the export cable corridor makes use of a NE

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		understanding of the cable corridor and potential impacts is available. This is particularly important when understanding potential displacement impacts for red-throated diver which could be potentially significant. It is not clear how this deficiency will be addressed.	commissioned survey report on 2018 surveys of divers within the Outer Thames Estuary SPA (Irwin et al 2019). It is therefore based on very recent data. The RSPB agreed at ETG 4 meeting on 20/06/2019 that the Irwin et al 2019 report provided sufficient data coverage of the offshore cable corridor (see below).
RSPB	25/03/2019 Section 42 comments	Paragraph 80 (p.33) provides a suitable summary of the pressures facing seabird colonies and the "…the conclusion must be that with the probable exception of gannet, numbers of almost all other seabird species in the UK North Sea region will most likely be on a downward trend over the next few decades, due to population declines, redistributions or a combination of both." Paragraph 78 (p.32) indicates the uncertainty regarding trends in gannet populations with the most recent study suggesting a potential slowdown in population growth. This provides a suitable context for assessing the impacts that the two windfarm projects, alone and in-combination, could have on seabird populations during their lifetime. Any projects or activities that would impact on the conservation objectives for sites where the focal species occur, either directly or by limiting the ability of a population to recover from identified declines, should not be consented in accordance with the Habitats Regulations. Whilst acknowledged in paragraph 81 (p.33), the overriding principle seems to be to manage climate change and this will resolve issues for seabirds. There are multiple ways by which climate change could be addressed and this does not present sound justification for consenting projects that may be inappropriately sited and which could exacerbate	The comment is noted. The text at the end of ***section 12.5.3*** of this chapter is not intended to suggest that addressing climate change justifies the consent of projects that may have significant adverse effects on ornithological receptors. As stated, the ecological impact assessment is carried out against a background of declining baseline populations of a number of receptor species. Where a receptor species is declining, the assessment takes into account whether a given impact is likely to exacerbate a decline in the relevant reference population and prevent a receptor species from recovery should environmental conditions become more favourable. No change has been made to the text.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		declines beyond a point which seabird populations can recover.	
RSPB	25/03/2019 Section 42 comments	12.6.1.1 Direct Disturbance and Displacement (p.34) 12.6.2.1 Direct Disturbance and Displacement: (p.48) Our concerns are principally around the assessment of impacts on red-throated diver (including those of the Greater Wash SPA during construction) and relate to both the methods used in the assessment and the significance of potential impacts. We do not agree that displacement of this species can be considered to result in impacts of minor adverse significance. These impacts should be regarded as of moderate adverse significance.	The assessment has been reviewed. In relation to red-throated diver in the export cable corridor, data from 2018 surveys of the Outer Thames Estuary SPA, commissioned by Natural England has been used (Irwin et al. 2019). The conclusion of minor adverse significance for both assessments (displacement from the project alone during construction and operation) is considered to be robust and is maintained
RSPB	25/03/2019 Section 42 comments	12.6.2.1.1 Red-throated Diver (p.56) 12.7.3.1 Red-throated Diver (p.118) Red-throated diver displacement The RSPB notes that the SNCB recommended displacement and mortality rates for the red-throated diver displacement assessment have not been used. The analysis must present a worst-case assessment based on the best available evidence otherwise predicted impacts will be overly precautionary and not appropriate. As there are few robust studies of displacement, results differ, and we do not know the consequences for mortality or population trajectories, it is appropriate to consider a range of putative displacement and mortality rates. The current SNCB advice is that 90-100% displacement is assumed for red throated diver, as the evidence for displacement is high and widely acknowledged; for	The project alone and cumulative assessments of displacement for red-throated diver have been based on 90-100% displacement from the offshore windfarm site and a 4km buffer and 1-10% mortality as recommended by SNCBs. For the project alone assessment, the most precautionary scenario does not represent an increase in mortality that would be detectable at the population level. For the cumulative assessment, using a range of mortality of 1–10% for displaced birds and different reference populations predicts changes in population mortality rates which are likely to be undetectable at the lower end and may be detectable at the upper end of the range. The assessment highlights the sources of precaution in the cumulative estimate.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		example, Furness et al. (2013), gave red-throated diver the highest possible score for susceptibility to displacement. Whilst we acknowledge that there is a range of displacement apparent from the literature, this includes, in the most recent study (Mendel et al., 2019) published after the SNCB guidance, a record of 94% displacement. We therefore agree with the SNCB recommendation that displacement of up to 100% and mortality of up to 10% represents an appropriate level of precaution and should be used in the assessment.	A review of available evidence is presented (which it is acknowledged is limited for the effects of displacement on red-throated diver and other seabirds, so studies of other avian taxa are considered). Based on this review and expert judgement a realistic and still precautionary recommendation is made for a combination of 90% displacement and 1% mortality for red-throated divers. On this basis the assessment of cumulative displacement indicates a minor adverse impact.
RSPB	25/03/2019 Section 42 comments	The RSPB also notes that the Applicant considers a 4km buffer to be over-precautionary (paragraph 156, p.57). It is stated that the inclusion of the 4km buffer in the assessment is a source of precaution, as evidence suggests that displacement decreases with distance, in some cases reaching zero by 2km. However, we highlight that there is increasing evidence to show that divers can be displaced from a greater distance, not only from operational wind farms but also from the associated boat traffic (e.g. Mendel et al., 2019). As such we consider that a 4km buffer is an absolute minimum rather than representing a precautionary approach and that impacts are possible over an even greater scale. The assessment concludes that there is a “high likelihood that cumulative displacement would be lower than the worst-case totals” due to the precaution in the assessment. This negates the purpose of the precautionary approach to assessment, and overlooks the use of lower than recommended mortality rates. Even with these lower rates, the increase on baseline mortality is still up to 2.4% (based on the biogeographic population), therefore we also disagree with the subsequent statements that mortality will	As above, the project alone and cumulative assessments of displacement for red-throated diver have been based on 90-100% displacement from the offshore windfarm site and a 4km buffer. While it is acknowledged that some studies show effects at distances further than 4km, other studies show effects at distances less than this. The effect may vary between sites and as a response to other environmental conditions. While the precautionary approach is followed as per SNCB guidance, the cumulative assessment also considers potential sources of ‘over-precaution’ in the assessment.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		be likely to be less than 1% and therefore of minor significance.	
RSPB	25/03/2019 Section 42 comments	12.6.2.1.3 Auks (Razorbill and Guillemot) (p.70) 12.7.3.3 Razorbill (p.123) 12.7.3.4 Guillemot (p.130) Auk displacement assessment – displacement and mortality rates The assessments at paragraph 284 (p.125 – razorbill) and paragraph 290 (p.130 – guillemot) are based on 70% displacement and 1% mortality. We support the recommendations of Natural England which state that the displacement assessment for auks should incorporate a 2km buffer and be based on worst case scenario (WCS) displacement of 70% and mortality of 10%.	The project alone and cumulative assessments of displacement for razorbill and guillemot have been based on 30-70% displacement from the offshore windfarm site and a 2km buffer and 1-10% mortality, including the worst-case scenario as recommended by SNCBs. For the project alone assessment, the most precautionary scenario does not represent an increase in mortality that would be detectable at the population level. For the cumulative assessment, using a range of mortality of 1–10% for displaced birds and different reference populations predicts changes in population mortality rates which are likely to be undetectable at the lower end and may be detectable at the upper end of the range. The assessment highlights the sources of precaution in the cumulative estimate. The assessment refers to a detailed review of available evidence (which it is acknowledged is limited for the effects of displacement on auks and other seabirds, so studies of other avian taxa are considered). Based on this review and expert judgement a realistic and still precautionary recommendation is made for a combination of 70% displacement and 1% mortality for razorbill and guillemot.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
RSPB	25/03/2019 Section 42 comments	12.6.2.3 Collision Risk (p.83) Our concerns are principally around the assessment of impacts on gannet, kittiwake, and lesser black-backed gull and relate to both the methods used in the assessment and the significance of potential impacts	Concerns are noted and responses are provided below.
RSPB	25/03/2019 Section 42 comments	12.6.2.3 Collision Risk (p.83) In order to predict the collision risk mortality of an offshore wind farm in the UK, the Band (2012) model has previously been used in assessment. This model uses a number of input parameters, such as bird size, flight speed and turbine blade dimensions, to calculate the probability of a bird that passes through the swept area of a turbine blade colliding with that blade. For this deterministic model the input parameters were defined as single values with no indication of variability around them. In reality, most of the parameters will exhibit a considerable degree of variability and stochastic collision risk modelling has been developed to allow this to be incorporated into the model and thus generate a potential range of output predicted collision mortalities. Masden (2015) created a stochastic version of the model as proof of concept, in order to demonstrate the feasibility of doing so, although the model remained incomplete. McGregor et al., (2018), under commission of Marine Scotland Science and overseen by an expert steering panel, produced a revised and fully tested stochastic model which has received widespread stakeholder acceptance (see, for example, NE's answer to the Hornsea Project Three Examiners' Question Q1.2.56).	CRM has been re-run using the deterministic Band model (Band 2012).Sources of variation (both natural variation (e.g. seabird densities) and measurement error) have been incorporated through multiple runs of the model for each species using mean values and upper and lower intervals for: flight density (upper and lower 95% confidence intervals); avoidance rate (standard deviations, see ***Table 12.29*** of this chapter); and proportions at collision height (based on the generic dataset in Johnston et al. 2014a, 2014b). In addition, for some species, rates of nocturnal activity were varied. The Stochastic Model commissioned by Marine Scotland was not used at this stage because errors were identified in the model code, and because of time limitations to run all species and scenarios. Natural England has advised (see below) that "*if the MSS stochastic model cannot be used, then we advise that multiple tables of Band/deterministic model outputs are presented where SPR varies each parameter in turn using the Band (2012) model, and not all of them at once.*"

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		By contrast, the Applicant has presented a new and untested version that does not follow a recognised methodology (paragraph 218, p.84), with insufficient detail provided as to how it incorporates variability and uncertainty in the input parameters or how it overcomes the statistical difficulties of non-independence (the degree of interrelation) of some of these parameters. The RSPB therefore does not agree that the model presented by the Applicant is fit for purpose and recommend that the Marine Scotland (McGregor et al., 2018) model version is used in preference.	
RSPB	25/03/2019 Section 42 comments	The RSPB is concerned that the values for bird densities within the deterministic CRM (Band, 2012) appear to be based on median values, resulting in lower mortality predictions than if the correct mean values are used (paragraph 218, p.84). We also note that, while mean monthly bird densities appear to be presented in Annex 1 of Appendix 12.1 Offshore Ornithology Technical Appendix, that paragraph 5 of that document states that the means presented are means of the median values and therefore their use in CRM would again result in lower predicted collisions than if true mean values were used. This has significant implications for conclusions drawn in the HRA. The RSPB recommends that mean values should be used to recalculate impacts and Tables 12.30 (pp.89-93), 12.31 (pp.94-96), 12.33 (pp.101-103) updated to reflect the more appropriate predicted impacts.	CRM has been re-run using the deterministic Band model (Band 2012) and mean monthly bird densities. The density input values have been calculated as the mean of the two values available for each calendar month, in accordance with standard advice.
RSPB	25/03/2019 Section 42 comments	Nocturnal activity rates	CRM has been re-run using the deterministic Band model (Band 2012). For some species rates of nocturnal activity were varied. For kittiwakes and the large gulls, upper and lower limits of nocturnal

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		The RSPB does not agree with the proposed changes in nocturnal activity rates set out in paragraphs 224 to 228 (pp.86-87). For gannet, we welcome the latest published evidence review (Furness et al., 2018), however we are concerned that the Applicant has not used the values presented in this paper, 8% and 3% for the breeding and non-breeding seasons respectively, rather they have used 4.3% and 2.3%, which will result in lower predicted mortalities. We are also concerned that by using revised nocturnal activity rates for gannet (and this is also applicable to kittiwake) mortalities are potentially underestimated because in doing so there is no account for the potential interaction between survey timing and diurnal behavioural patterns. Peaks in foraging activity at first and last light (see for example Fig. 3 in Furness et al. 2018) will not be accounted for in the assessment if these did not coincide with surveys (the timings of which are currently unknown, but likely to be midday if aerial), and the survey may have been carried out at a time of much lower activity. Thereby the application of the revised nocturnal activity rates either recommended by Furness et al., (2018) or the rates suggested by the Applicant could result in underestimates of collision risk. We therefore request that details of the timings of survey are presented. For kittiwake the Applicant cites a paper in preparation that has not yet been published (paragraph 310, p.80, EA2 HRA doc), and therefore cannot be accepted, particularly when this unseen evidence for a change in nocturnal activity rates will result in an unjustified reduction in predicted mortalities.	activity of 25% or 50% have been used in the CRM, as advised by Natural England. For kittiwake the evidence based rate from a manuscript in preparation – applied to CRM in the PEIR – has not been used in the ES assessment. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For each species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in cumulative assessments, were based on the worst case (highest rate – i.e. 25%) of nocturnal activity. For cumulative assessments, the PEIR included an adjustment to collision risk estimate for other windfarms to account for evidence based rates of nocturnal activity in gannet and kittiwake. This adjustment has been removed from the cumulative tables in the ES. The analysis in Furness et al. (2018) uses the same definitions of twilight and night as those in the Band model as this was a key requirement to ensure this analysis was compatible with the inputs for the Band CRM. While it is important to consider the time of day that surveys were conducted, this should be in order to ensure that the surveys are representative of flight

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		It is also not clear how these revised rates account for the distinction between the definition of daylight as used in the Band model and with the official concept of 'twilight' and 'night'. This is an issue as the Band (2012) model considers the nocturnal period as between sunset to sunrise and so treats flight activity that occurs at twilight as being within the nocturnal flight period. Evidence from tagging shows that an important number of seabirds actively forage at twilight. We also do not agree that the nocturnal activity rate reductions should be applied to other windfarms in the cumulative assessment, noting in particular that it is unlikely that the timings of surveys undertaken for other windfarms are known. Furthermore, any change in nocturnal activity rate cannot be applied post hoc to collision mortality; the model itself needs to be rerun as the modelling calculates the reduction in activity at night through the interaction of nocturnal activity and the latitude of specific wind farm, which therefore is a calculation specific to that wind farm, necessitating a rerun of the model. While we welcome the latest published evidence review for gannet (Furness et al., 2018), we are concerned that the mortalities predicted using revised nocturnal activity rates for gannet (and this is also applicable to kittiwake) are potentially underestimated because they do not account for the potential interaction between survey timing and diurnal behavioural patterns. Peaks in foraging activity at first and last light (see for example Fig. 3 in Furness et al. 2018) will not be accounted for in the assessment if these did not coincide with surveys (the timings of which are currently unknown, but likely to be midday if aerial), and the survey may have been carried out at a time of much lower activity.	activity throughout the day. Thus, while there can be peaks and troughs in activity during the day, the aim should be to ensure that either surveys are undertaken to include these, or to collect data which reflects the average state of activity. Consideration of the activity levels presented in Furness et al. (2018) indicates that surveys conducted between 9-10am and 4-5pm (as the aerial surveys typically have been) fall squarely in this representative range (neither too high nor too low) and therefore meet the requirement of avoiding bias in survey timings.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		Thereby the application of the revised nocturnal activity factor recommended by Furness et al., (2018) could result in inaccurate underestimates of collision risk. The Nocturnal Activity Scores presented for gannet in the application documents are also not in accordance with this latest review (Furness et al., 2018). The values used in the assessment, 4.3% and 2.3% respectively, are even lower than the recommendations of the review (8% in the breeding season and 4% in the non-breeding season) and thus reduce predictions of collision risk further. The robustness of this assessment must therefore be questioned.	
RSPB	25/03/2019 Section 42 comments	Gannet avoidance rate Paragraph 222 (p.85) indicates that the avoidance rate for gannet should be higher than the advised 98.9%. Whilst the RSPB agrees with the use of a 98.9% avoidance rate for non-breeding gannets, in the breeding season, a 98% avoidance rate is considered more appropriate. This is not highlighted in the text, only the autumn migration period information from APEM (2014). Cleasby et al., (2015), while not discussing avoidance rates, demonstrated that foraging birds are at more risk of collision than commuting birds. In order to provision chicks, gannets will need to forage more during the breeding season and will also be constrained by central place foraging. Such behavioural differences are likely to result in changes in avoidance behaviour (Cook et al., 2018), and since the figures used for the calculation of avoidance rates advocated by the SNCBs are largely derived from the non-breeding season for gannet (Cook et al., 2014 and Cook et al., 2018) we recommend a more precautionary avoidance	An avoidance rate of 98.9% has been applied for gannet throughout the year, based on the SNCB recommended rates (JNCC et al. 2014). At the time of writing the detail of the arguments presented by RSPB about potential changes in behaviour and avoidance rate in the breeding season has not been investigated. However, NE has not recommended any such changes. In addition there is the issue of how many, if any, gannets recorded on East Anglia TWO during the breeding season might actually be breeding adults.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		rate of 98% should be presented for the breeding season. The current SNCB advice also highlights that due consideration should be given to uncertainty in collision risk estimates, including the use of confidence intervals around the avoidance rates and flight height estimates. The suggestion that the advised avoidance rate for gannet is over precautionary is therefore considered inappropriate and potentially misleading and the text either revised or removed.	
RSPB	25/03/2019 Section 42 comments	12.7.3 Cumulative Assessment of Operational Displacement (p.118) Our concerns are principally around the assessment of impacts on red-throated diver, guillemot and razorbill and relate to both the methods used in the assessment and the significance of potential impacts. We do not agree that displacement of these species can be considered to result in impacts of minor adverse significance. These impacts should be regarded as of moderate adverse significance.	The assessments have been reviewed. Detailed reviews have been carried out of available evidence on the effects of displacement on mortality rates of red-throated diver and auks. These reviews acknowledge a dearth of empirical information but make recommendations based on the ecology of each species, evidence of changes in mortality rates in other bird species in response to displacement, and expert judgement. Assessments based on the recommendations of these reviews, which are still considered to be precautionary in nature, conclude minor adverse effects.
RSPB	25/03/2019 Section 42 comments	12.7.3 Cumulative Assessment of Operational Displacement (p.118) The assessment of displacement for guillemot and razorbill only considers mortality of 1%, rather than up to 10% as recommended. This, coupled with a failure to present figures for the increase on background mortality (it is only stated that increases are less than 1%), means that we are	Assessments have been revised to consider a range of displacement of 30-70%, and mortality of displaced individuals from 1-10%. For the cumulative assessment, using a range of mortality of 1–10% for displaced birds and different reference populations predicts changes in population mortality rates which are likely to be undetectable at the lower end and may be

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		unable to agree that impacts are of no greater than minor adverse significance.	detectable at the upper end of the range. The assessment highlights the sources of precaution in the cumulative estimate and refers to a detailed review of available evidence (which it is acknowledged is limited for the effects of displacement on auks and other seabirds, so studies of other avian taxa are considered). Based on this review and expert judgement a realistic and still precautionary recommendation is made for a combination of 70% displacement and 1% mortality for razorbill and guillemot. On this basis the assessment of cumulative displacement indicates a negligible impact.
RSPB	25/03/2019 Section 42 comments	12.7.3.1 Red-throated Diver (p.118) Comments as per red-throated diver displacement above	(As above) the cumulative assessments of displacement for red-throated diver have been based on 90-100% displacement from the offshore windfarm site and a 4km buffer and 1-10% mortality. For the cumulative assessment, using a range of mortality of 1–10% for displaced birds and different reference populations predicts changes in population mortality rates which are likely to be undetectable at the lower end and may be detectable at the upper end of the range. The assessment highlights the sources of precaution in the cumulative estimate. A review of available evidence is presented (which it is acknowledged is limited for the effects of displacement on red-throated diver and other seabirds, so studies of other avian taxa are considered). Based on this review and expert

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			judgement a realistic and still precautionary recommendation is made for a combination of 90% displacement and 1% mortality for red-throated divers. On this basis the assessment of cumulative displacement indicates a minor adverse impact.
RSPB	25/03/2019 Section 42 comments	Paragraph 274 (p.120) highlights that final project designs are "likely" to have a reduced consented impact than being considered for the worst case. This is an acceptable point for windfarms where the DCO has been amended and therefore there is legal certainty regarding the reduction, but where windfarms still have their original DCOs, it is not appropriate to do anything less than assess the full extent of those DCOs when considering in-combination/cumulative effects.	Where an operational windfarm has been built out to less than the maximum number of turbines in the consented design envelope it is considered appropriate to revise the likely impacts, to avoid over-precaution in cumulative assessment. ***Appendix 12.3*** provides details of the wind turbine parameters used in the cumulative assessment which are based on the DCO or Non-Material Change Applications of the respective projects. Additionally, a comparison of the estimated collision mortalities, if the assessment was conducted based on the 'as-built' turbine numbers, has been provided in this appendix.
RSPB	25/03/2019 Section 42 comments	12.7.3.3 Razorbill (p.123) Comments as per auk displacement above	Responses as above for section ***12.7.3*** of this chapter.
RSPB	25/03/2019 Section 42 comments	12.7.3.4 Guillemot (p.130) Comments as per auk displacement above	Responses as above for section ***12.7.3*** of this chapter.
RSPB	25/03/2019 Section 42 comments	12.7.4 Cumulative Assessment of Operational Collision Risk (p.136) Our concerns are principally around the assessment of impacts on gannet, kittiwake, lesser black-backed gull and great black-backed gull and relate to both the methods	Noted. Responses on individual species below.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		used in the assessment and the significance of potential impacts. We do not agree that cumulative collision risk to these species can be considered to be of minor adverse significance. These impacts should be regarded as of moderate adverse significance.	
RSPB	25/03/2019 Section 42 comments	The RSPB notes paragraph 293 (p.136) which states "…that all of the windfarms identified for inclusion in the CIA in Table 12.35 have the potential to contribute to a cumulative effect." We support this approach and request that this has been consistently applied throughout the assessment process.	Yes, this approach has been applied throughout unless the BDMPS region for a particular species does not include all windfarms listed (e.g. the southern North Sea for red-throated diver)
RSPB	25/03/2019 Section 42 comments	It is stated that many of the collision estimates for other windfarms are based on higher numbers of turbines than were actually installed – based on a method of updating collision estimates presented by EATL (2016) this is stated to overestimate mortality by 15% for gannets, 15% for kittiwakes, 35% for lesser black-backed gull and 30% for great black-backed gull. This is an acceptable point for windfarms where the DCO has been amended and therefore there is legal certainty regarding the reduction, but where windfarms still have their original DCOs, it is not appropriate to do anything less than assess the full extent of those DCOs when considering in-combination/cumulative effects. (paragraph 297, p.138 – gannet; paragraph 303, p.143 – kittiwake; paragraph 316, p.147 – lesser black-backed gull)	Where an operational windfarm has been built out to less than the maximum number of turbines in the consented design envelope it is considered appropriate to revise the likely impacts, to avoid over-precaution in cumulative assessment. ***Appendix 12.3*** provides details of the wind turbine parameters used in the cumulative assessment which are based on the DCO or Non-Material Change Applications of the respective projects. Additionally, a comparison of the estimated collision mortalities, if the assessment was conducted based on the 'as-built' turbine numbers, has been provided in this appendix.
RSPB	25/03/2019 Section 42 comments	12.7.4.1 Gannet (p.136) Comments as per gannet nocturnal activity rates and collision estimates for other windfarms above.	(As above) for each species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			cumulative assessments, were based on the worst case (highest rate) of nocturnal activity.
RSPB	25/03/2019 Section 42 comments	12.7.4.2 Kittiwake (p.141) Comments as per gannet nocturnal activity rates and collision estimates for other windfarms above.	As above.
RSPB	25/03/2019 Section 42 comments	Kittiwake – density dependent outputs of PVA We do not accept the arguments for including compensatory density dependence in the PVAs for kittiwake put forward in paragraphs 310 and 311 (pp.143-144) of the PEIR. The reasons for this are outlined in Green et al. (2016) and the subsequent BTO review (Cook and Robinson, 2015), and are not that density dependence does not exist, but rather that we do not have the means to accurately quantify the strength and form of it in a biologically meaningful way in order to incorporate it into PVA. Whilst we accept that density dependence is likely to exist in seabird populations, precise species and colony specific knowledge of its size and shape are needed to correctly parameterise the population models. This is important to acknowledge because density dependence is not always compensatory, but can also be depensatory, slowing the rate of population growth at lower population densities. In other words, a population decline arising from an offshore wind farm could have larger consequences on the population than are predicted by the compensatory density dependent or even density independent models. Horswill and Robinson (2015) identified depensation occurring in three gull species (black- legged kittiwake, black-headed gull and herring gull). As such it would be very wrong to simply assume that density independent	The Applicant welcomes the RSPB's agreement that density dependence is likely to exist and consider that the approach to including this in the PVA models (exploration of values and comparison with available trends) is appropriate given the challenges of estimating this empirically. It is acknowledged that density dependence is not always compensatory, however consider this to be a theoretical point that is not particularly relevant to the current situation. This is because depensation occurs in small populations due to factors such as increased predation and reduced productivity due to difficulties in finding mates. The populations of interest are not small, and therefore the overwhelmingly more likely situation is that these will be subject to compensation not depensation.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		outputs are “highly precautionary”, rather that they are the most sensible to use for assessment.	
RSPB	25/03/2019 Section 42 comments	Kittiwake population changes Paragraph 310 (pp.143-144) discusses the changes in the UK kittiwake population over three 15-year periods and use this as evidence that a decline of up to nearly 11% due to windfarm mortality over 25 years would be undetectable against this level of natural change. JNCC (2018a) discusses the rapid decline in the UK kittiwake population observed since the early 1990s and link this to declining productivity and adult survival, with declines in sandeel prey and the effects of climate change on sea surface temperatures noted as likely contributory factors. Frederiksen et al. (2004) also demonstrated the vulnerability of kittiwake populations to human activities through a study based on the Isle of May. Their population modelling showed that this population was unlikely to increase should the local sandeel fishery remain active and would be likely to decline further if sea surface temperature also increased, due to effects on both productivity and adult survival. Given this context of continued declines in the UK population since the early 1990s and the effect of anthropogenic impacts on adult survival and productivity, we strongly disagree with the Applicant’s assertion that declines of the level predicted by the PVA due to offshore windfarm mortality alone would be undetectable against these background changes. Rather, we consider that this could add significantly to the multiple stressors affecting	Notwithstanding the comments of detail on the kittiwake PVA, it is considered that the comparisons presented with the outputs of the model, in terms of the effects of additional mortality on population growth rates are robust. In the context of declines in UK kittiwake populations, mortality from offshore windfarms is considered to be small compared to the major drivers of population decline as described by JNCC (2018a).

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		this population and reduce the likelihood of population recovery.	
RSPB	25/03/2019 Section 42 comments	Whilst the RSPB welcomes the inclusion of the outputs of the density independent version of the model alongside the density dependent model, our concerns regarding more recent changes to demographic rates may apply. We also recommend that these outputs be presented in the form of counterfactuals of population size. These are a robust and informative metric which indicate the percentage difference between the population with or without additional mortality at the end of the lifetime of the wind farm.	The Applicant is considering these comments with a view to either updating the PVA (if necessary) or providing further discussion on the use of the existing models.
RSPB	25/03/2019 Section 42 comments	12.7.4.2 Lesser Black-backed Gull (p.145) Comments as per nocturnal activity rates, apportioning of lesser-black-backed gull and collision estimates for other windfarms above.	Responses as above.
RSPB	25/03/2019 Section 42 comments	12.7.4.3 Great Black-backed Gull (p.148) Comments as per nocturnal activity rates and collision estimates for other windfarms above.	Responses as above.
RSPB	25/03/2019 Section 42 comments	We do not accept the arguments for including compensatory density dependence in the PVAs for great black-backed gull put forward in paragraphs 326 and 327 (p.152) of the PEIR. The reasons for this are outlined in Green et al. (2016) and the subsequent BTO review (Cook and Robinson, 2015), and are not that density dependence does not exist, but rather that we do not have the means to accurately quantify the strength and form of it in a biologically meaningful way in order to incorporate it into PVA. Whilst we accept that density dependence is likely to exist in seabird populations, precise species and colony	The Applicant welcomes the RSPB's agreement that density dependence is likely to exist and consider that the approach to including this in the PVA models (exploration of values and comparison with available trends) is appropriate given the challenges of estimating this empirically. It is acknowledged that density dependence is not always compensatory, however consider this to be a theoretical point that is not particularly relevant to the current situation. This is because depensation occurs in small populations due to factors such as

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		specific knowledge of its size and shape are needed to correctly parameterise the population models. This is important to acknowledge because density dependence is not always compensatory, but can also be depensatory, slowing the rate of population growth at lower population densities. In other words, a population decline arising from an offshore wind farm could have larger consequences on the population than are predicted by the compensatory density dependent or even density independent models. Horswill and Robinson (2015) identified depensation occurring in three gull species (black- legged kittiwake, black-headed gull and herring gull). As such it would be very wrong to simply assume that density independent outputs are “highly precautionary”, rather that they are the most sensible to use for assessment.	increased predation and reduced productivity due to difficulties in finding mates. The populations of interest are not small, and therefore the overwhelmingly more likely situation is that these will be subject to compensation not depensation.
Natural England	26/03/2019 Section 42 Comments	Data for baseline characterisation and impact assessments – Natural England note an additional 3 months of digital aerial survey data will be included in the final ES submission. Therefore, we note that all assessments and conclusions will need to be revisited once the full data set is available and hence, we have not made any comments regarding the levels of impact significance.	Noted. The offshore ornithology assessments have been updated based on the complete aerial data sets for East Anglia ONE North and East Anglia TWO.
Natural England	26/03/2019 Section 42 Comments	Seasonal definitions - Natural England advise that for species where breeding birds are predicted to be present in a project area, that the breeding season months follow those presented in Furness (2015) under “breeding season” and not the “migration-free breeding season”, except in cases where colony or site specific information suggests that a different set of months is appropriate for defining colony attendance.	This approach has been adopted.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	Lack of consideration of confidence intervals in bird abundance data for displacement assessments – Natural England require that the variability (uncertainty) in the underlying population estimates (i.e. through consideration of appropriately calculated upper and lower confidence intervals) is considered in the displacement assessments.	This is being investigated. It is noted however that use of the upper 95% confidence limit for displacement will increase the precaution in the assessment. Many sources of precaution have already been applied in the displacement assessment, as highlighted in the relevant species-specific sections.
Natural England	26/03/2019 Section 42 Comments	RTD mortality/displacement levels (EIA & HRA) -Natural England does not consider the 60-80% displacement and 1-5% mortality rate used by the SPR to be appropriate for assessing disturbance and displacement impacts to RTD from offshore wind farms. We note that this does not follow SNCB guidance (SNCBs 2017). Natural England notes the evidence presented by SPR on RTD displacement distances and displacement rates in the PEIR Chapter. However, we note that there are other studies that have been undertaken that have not been considered by SPR.	Displacement rates of up to 100% and mortality rates of 1-10% are presented in the ES chapter. The assessment of significance is based on 100% displacement in the windfarm and 4km buffer and mortality rates of 1-10% along with a review and recommendations of the rate which SPR believe to be supported by the greatest evidence-base.
Natural England	26/03/2019 Section 42 Comments	Collision Risk Modelling - SPR has undertaken the CRM using their consultants own version of a stochastic CRM in order to present the uncertainty in the various CRM parameters (PCH, avoidance rates, densities, nocturnal activity) for EA2. As has been advised at the Norfolk Vanguard project that is currently undergoing examination, we are uncertain of what R code SPR has for their stochastic CRM. We note that the Marine Scotland Science (MSS) stochastic collision risk model is now available for use. Therefore, we request going forward that any collision risk assessments present both the Marine Scotland Science Stochastic Collision Risk Model and the Band model (or non-stochastic/deterministic version) outputs using the central values for the various variables (i.e. mean	CRM has been re-run for the ES using the deterministic Band model (Band 2012) and variations in parameters as requested. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence-based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in cumulative

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		bird density, maximum likelihood flight height distribution from the generic Johnston et al. 2014 data, the SNCB recommended avoidance rates, the currently advised nocturnal activity factors or rates of 2 or 25% for gannet and 3 or 50% for kittiwake and large gulls) in line with other current OWF applications. If the MSS stochastic model cannot be used, then we advise that multiple tables of Band/deterministic model outputs are presented where SPR varies each parameter in turn using the Band (2012) model, and not all of them at once.	assessments, were based on the worst case (highest rate – i.e. 25%) of nocturnal activity.
Natural England	26/03/2019 Section 42 Comments	Data for baseline characterisation and impact assessments - The PEIR offshore ornithology chapter for EA2 is based on 21 months of digital aerial survey data from the site plus a 4 km buffer. We note that the additional 3 months of data for will be included in the final ES submission. As a result of this we note that the figures presented in the PEIR for the assessments of displacement and collision risk are likely to change following the addition of this data. In addition, we understand that the turbine numbers for the worst-case scenario for EA2 will be changing for the final submission (increase in numbers from PEIR to submission). Therefore, we note that all assessments and conclusions will need to be revisited once the full data set is available and hence, we have not made any comments regarding the levels of impact significance.	The offshore ornithology assessments have been updated for the ES based on the complete aerial data sets for East Anglia ONE North and East Anglia TWO, and a revised red-line boundary and wind turbine scenarios for East Anglia TWO.
Natural England	26/03/2019 Section 42 Comments	4.7.2.2. Seasonal Definitions - SPR has considered that due to the very low presence of breeding birds it is appropriate to define breeding as the migration-free breeding period or core breeding period for all species with the exception of lesser black-backed gull. Natural England advise that for species where breeding birds are predicted	The Applicant has given further consideration to seasonal definitions on a species by species basis and this is reflected in the assessment.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		to be present in a project area, that the breeding season months follow those presented in Furness (2015) under "breeding season" and not the "migration-free breeding season", except in cases where colony or site-specific information suggests that a different set of months is appropriate for defining colony attendance. In instances where the full breeding season is used to define the breeding season, there will then be overlap of months considered in both the full breeding season and the non-breeding seasons (e.g. with autumn and spring migration seasons). In cases where this occurs we advise that the non-breeding periods are adjusted accordingly.	
Natural England	26/03/2019 Section 42 Comments	Lesser black-backed gull (LBBG) seasonal definitions - We welcome that the full breeding season as defined in Furness (2015) (i.e. April-August) has been applied for the attribution of potential impacts to relevant populations of LBBG for EIA. However, we note that from Table 12.10 of the PEIR Chapter 12 for EA2 that there is then overlap of this with the autumn migration (considered to be August-October) and spring migration (March-April). It is currently unclear how these overlapping months been treated in the attribution of potential impacts in the PEIR Chapter. Given that the Alde-Ore Estuary SPA is located within the mean-maximum foraging range of LBBGs from the EA2 site, we advise that the extended (full) breeding season is used for the HRA assessment for this site and species, rather than the migration free breeding season as currently used by SPR in the HRA report. We would also advise that the migration (autumn and spring) periods are adjusted accordingly.	The approach recommended by NE has been taken for the ES chapter – for LBBG the full breeding season has been applied and where this overlaps with the spring and autumn migration seasons the latter seasons have been adjusted (i.e. the overlapping months have been assigned to breeding only).

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		Lack of consideration of confidence intervals in bird abundance data for displacement assessments – Natural England require that the variability (uncertainty) in the underlying population estimates (i.e. through consideration of appropriately calculated upper and lower confidence intervals) is considered in the displacement assessments. Currently the assessments only consider the mean peak seasonal abundances. Therefore, we advise that the upper and lower 95 % confidence intervals around the abundance/densities are considered in the displacement assessments in the final submission.	This is being investigated. It is noted however that use of the upper 95% confidence limit for displacement will increase the precaution in the assessment. Many sources of precaution have already been applied in the displacement assessment, as highlighted in the relevant species-specific sections. The above notwithstanding, the assessment will include presentation of outputs estimated using the density confidence limits.
Natural England	26/03/2019 Section 42 Comments	Natural England does not consider the 60-80 % displacement and 1-5 % mortality rate used by SPR to be appropriate for assessing disturbance and displacement impacts to RTD from offshore wind farms. We note that this does not follow SNCB guidance (SNCBs 2017).	The ES and HRA assessments for the site alone will consider the advised ranges of displacement and mortality and within those assessment will be based on the rates considered most appropriate on the basis of available evidence,
Natural England	26/03/2019 Section 42 Comments	Natural England notes the evidence presented by SPR on RTD displacement distances and displacement rates in the PEIR Chapter. However, we note that there are other studies that have been undertaken that have not been considered by SPR. The studies from Horns Rev I and Nysted offshore wind farms in Denmark, reported by Petersen et al. (2006) and monitoring at Horns Rev I and II reported in Petersen et al. (2014) were all undertaken using visual aerial surveys, and cover large study areas. Petersen et al. (2006) reported the maximum extent of RTD displacement to be 4km at Horns Rev I and 2km at Nysted. The work undertaken by Petersen et al. (2014) uses spatially explicit modelling to predict the distribution of red-throated diver pre- and post-	The ES assessment for the site alone considers 100% displacement from an operational windfarm and 4km buffer, as requested by Natural England, and for the cumulative assessment 90-100% displacement.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		construction. This work suggests a maximum displacement extent of 13km (based on the cumulative frequency distribution approach), however the authors suggest that 5-6 km might be a realistic displacement extent and this is supported by the mapped redistribution of RTDs post construction. Webb et al. (2017) reports on the post consent monitoring at Lincs and Lyn and Inner Dowsing (LID) offshore wind farms. This study covered a large area using first visual aerial surveys and then digital video (during the construction phase). Spatially explicit modelling was used (MRSea). The study reported a displacement effect out to 8 km (comparing the pre-construction average with the post construction average distribution). It should be noted that confidence in the findings is weakened by the change in survey platform, particularly as in the case of red-throated diver the change to digital aerial survey coincided with a massive increase in numbers. However, a calibration study was referred to, that concluded no correction was necessary when switching from visual to digital video survey methods for red-throated diver. A further issue is that all comparisons are made in the month of November: this was the peak month for red-throated diver in the post-construction period, whilst during the pre-construction period the peak period for red-throated diver was February/March. This is likely to influence the findings. However, both factors (the change in survey platform and the selection of the non-peak pre-construction month) are more likely to cause an under-estimate in the extent of displacement, rather than an over-estimate, i.e. displacement might be greater than 8 km.	

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	With regard to the displacement rates, Natural England are aware of seven studies that report the percentage of RTDs displaced within the footprint of offshore wind farms. The displacement rates from these studies range from 73 % at Thanet (Percival, 2013) to a worse-case scenario of 125 % at Lincs (Webb et al. 2017). Of these, four studies have a survey area of 4km or greater and are therefore considered more robust to analysis issues or non-windfarm driven changes in numbers. These report magnitudes of displacement within the windfarm site of: 83-125% (Lincs OWF, Webb et al. 2017), 100% (Horns Rev I, Petersen et al. 2006), 90% (Alpha Ventus, Weckler & Nehls, 2016) and 100% (Alpha Ventus, Mendel et al. 2014).	The ES assessment for the site alone considers 100% displacement from an operational windfarm and 4km buffer, as requested by Natural England, and for the cumulative assessment 90-100% displacement.
Natural England	26/03/2019 Section 42 Comments	Very few studies have estimated displacement rates within the buffer zones, Percival (2009) reports a displacement rate of 63 % at 2-3 km at Kentish Flats, while Webb et al. (2017) report a rate of 55-96% (best and worse-case scenarios) and 34-75 % reduction at 7-8 km at Lincs and LID. While, as summarised by SPR, other studies found no evidence of displacement within the buffers (e.g. Percival 2013 at Thanet and Percival 2014 further analysis/data at Kentish Flats), however, as noted Kentish Flats and Thanet are studies we have lower confidence in due to restricted survey areas.	The ES assessment for the site alone considers 100% displacement from an operational windfarm and 4km buffer, as requested by Natural England, and for the cumulative assessment 90-100% displacement.
Natural England	26/03/2019 Section 42 Comments	Based on the available evidence, Natural England considers that there is no clear justification to change our current advice of a 4 km 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	The ES assessment for the site alone considers 100% displacement from an operational windfarm and 4km buffer, as requested by Natural England, and for the cumulative assessment 90-100% displacement.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		displacement, assuming a magnitude of 100 % out to 4 km is likely to be an over-estimate. Therefore, the use of the two components of our current advice (a conservative estimate of extent and a precautionary estimate of magnitude within that extent) in combination, is likely to result in an appropriate estimate, based on our current understanding of the evidence base. Indeed the recent evidence (described above) suggests that this approach (100%, 4km) might be closer to the truth, and hence less precautionary than has been previously suggested.	
Natural England	26/03/2019 Section 42 Comments	As a result 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. However, we note that the matrix tables presented by SPR in the PEIR chapter cover the full ranges of up to 100 % displacement and 100 % mortality, so the figures for the Natural England preferred worst case scenario of 100 % displacement and 10 % mortality can be assessed.	The ES assessment for the site alone considers 100% displacement from an operational windfarm and 4km buffer, as requested by Natural England, and for the cumulative assessment 90-100% displacement.
Natural England	26/03/2019 Section 42 Comments	We note that the EA2 array boundary is immediately adjacent to Outer Thames Estuary SPA and there is potential that displacement effects could occur several kilometres into the SPA from both construction and operational phases, in addition to displacement and disturbance effects from cable laying. We advise that SPR consider revising their array boundary in order to avoid	The boundary of the East Anglia TWO windfarm site has been revised and is now 8.3km from the boundary of the Outer Thames Estuary SPA at the nearest point.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		displacement effects on the SPA. Natural England has already advised in the context of several other Habitats Regulations Assessments that it is not possible to rule out an adverse effect on integrity in combination with other plans and projects for Outer Thames Estuary SPA. For example, advice to DECC regarding review of consent of London Array phase 1 (May 2013) ii) advice to MMO regarding marine aggregates licensing (February 2014), iii) advice to MMO regarding commercial fishing (July 2016).	
Natural England	26/03/2019 Section 42 Comments	We also consider that the Natural England worst case scenario of 100 % displacement and 10 % mortality should be used in the assessment of construction disturbance and displacement for RTD for both EIA and for the HRA assessment for RTD at the Outer Thames Estuary SPA. However, we note that consideration of this would not alter the conclusions made by SPR in Section 12.6.1.1.1 of the EA2 PEIR Chapter on assessment of offshore cable laying.	The EIA considers 100% displacement and a maximum of 10% mortality for the project alone assessment, and 90-100% displacement and a maximum of 10% mortality for the cumulative assessment.
Natural England	26/03/2019 Section 42 Comments	Regarding vessel movements we welcome the commitment of SPR in Section 12.3.3.1 of the EA2 PEIR Chapter 12 to adopting a best-practice protocol for minimising disturbance to RTDs during construction.	Noted
Natural England	26/03/2019 Section 42 Comments	SPR has undertaken the CRM using their consultants own version of a stochastic CRM in order to present the uncertainty in the various CRM parameters (PCH, avoidance rates, densities, nocturnal activity) for EA2.	Noted
Natural England	26/03/2019 Section 42 Comments	As has been advised at the Norfolk Vanguard project that is currently undergoing examination, we are uncertain of what R code SPR has used for their stochastic CRM. We note	Noted

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		that the Marine Scotland Science (MSS) stochastic collision risk model is now available for use (see: here)	
Natural England	26/03/2019 Section 42 Comments	We understand that SPR's stochastic model has not been subject to any QA or testing by independent authorities, is not publically available and as such cannot be considered to be transparent. In contrast, the MSS stochastic model has been subject to a project steering group (which included representation from Natural England) and the model documents (Shiny App, user guide and full report) are available in the public domain and project outputs can therefore be replicated or checked. Therefore, we request going forward that any collision risk assessments present both the Marine Scotland Science Stochastic Collision Risk Model and the Band model (or non-stochastic/deterministic version) outputs using the central values for the various variables (i.e. mean bird density, maximum likelihood flight height distribution from the generic Johnston et al. 2014 data, the SNCB recommended avoidance rates, the currently advised nocturnal activity factors or rates of 2 or 25 % for gannet and 3 or 50 % for kittiwake and large gulls) in line with other current OWF applications. If the MSS stochastic model cannot be used, then we advise that multiple tables of Band/deterministic model outputs are presented where SPR varies each parameter in turn using the Band (2012) model, and not all of them at once.	CRM has been re-run using the deterministic Band model (Band 2012) and variations in parameters as requested. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence-based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in cumulative assessments, were based on the worst case (highest rate) of nocturnal activity.
Natural England	26/03/2019 Section 42 Comments	Natural England is aware that the non-stochastic CRM for EA2 has been undertaken using R code for the Band model rather than by using the Band (2012) model spreadsheet. Therefore, SPR should provide evidence to clearly demonstrate that the R code that is used is producing the same results as the Band spreadsheet version for all Band	CRM has been re-run for the ES using the deterministic Band model (Band 2012) and variations in parameters as requested. All input parameters for the CRM are provided in ***Appendix 12.2***.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		model options presented. Therefore, we advise that in the ES submission, SPR provides all of the input parameters used in their R model along with the R code in an Appendix, so that the results can then be checked. Whilst we note that Annex 3 of Appendix 12.1 for EA2 contains the majority of the CRM input data, it does not contain information on the wind farm width and latitude used for EA2. Therefore, in order for us to be able to check the CRM when the application is submitted and hence reach conclusions on the level of impact due to EA2 alone, we advise that the full set of input parameters required in order to be able to run the Band (2012) spreadsheets are presented, i.e.: - Density of birds in flight within the EA2 site (noting comments below regarding use of the median and mean densities); - Proportion of birds at EA2 rotor heights (using the Johnston et al. 2014a & b generic data given the issues noted by SPR with the site-specific data); - Bird parameters for each species (bird length, wing span, flight speed, nocturnal activity factor, flight type (flapping/ gliding); - Proportion of flights upwind; - Wind farm data (latitude, number of turbines, width of wind farm, tidal offset); - Turbine data (model, number of blades, rotation speed, rotor radius, hub height, monthly proportion of time operational, maximum blade width, pitch).	Information on windfarm width and latitude is also now included within ***Annex 3*** of ***Appendix 12.2***.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	Natural England notes that the method that has previously been used in offshore wind farm assessments to estimate design-based bird density from a grid of images (as have been collected for EA2) has been to calculate mean bird density from the images (i.e. number of birds counted / number of images). Bootstrapping has typically then been applied to provide variance estimates and confidence limits (e.g. as was done at EA1). Our understanding of the approach taken by EA2 from Section 4.2 of Appendix 12.1 (paragraphs 15 – 17) is that SPR has: - Calculated monthly estimates in this way and averaged these to feed mean monthly densities into the displacement assessment (which Natural England agree with); - Then also pooled all resampled estimates from data pertaining to any given month; - Used all of these estimates for stochastic CRMs; - Used the median of these estimates for CRMs not incorporating stochasticity.	Noted
Natural England	26/03/2019 Section 42 Comments	Based on this, Natural England has a number of queries/areas of uncertainty where it would welcome further clarification from SPR regarding the approach taken in order to reach conclusions around the applicability of the CRM outputs presented. These are: - We are uncertain as to why in the stochastic CRMs SPR has not used the monthly density estimate +/- 95% confidence limits to give a range of predicted collisions. - We consider the use of a bootstrapped median to estimate density in the non-stochastic CRM to be questionable, when a mean density already exists. We note	CRM has been re-run for the ES using the deterministic Band model (Band 2012). This uses the mean density of birds in flight as recommended by NE. Following earlier concerns with the reliability of the stochastic CRM (which was still in the trial period) it has not been possible to confirm the model's suitability for use within the application timetable. As an alternative, the deterministic CRM has been used with upper and lower confidence estimates for density, flight height and avoidance rates.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		that the point of bootstrapping is to estimate variance – SPR claim's that it has to be this way to enable comparison with stochastic CRM outputs, but we aren't looking to compare the two. Additionally, Appendix 12.1 (Offshore Ornithology Technical Appendix) defends this approach by saying that "all collision predictions accurately reflected the observed densities", but Natural England is not certain that this is true. The observed densities are those derived from the images (average of birds per image), whilst the bootstrapped data is a theoretical distribution of densities, from which the median gives an estimate of central tendency – therefore not a probability of being the 'true' density. - As noted recently during the Norfolk Vanguard project examination, Natural England advises that the mean density of birds in flight is the most appropriate to use for the deterministic/Band model, which has been the standard approach for previous offshore windfarm assessments. For the Marine Science Scotland stochastic Collision Risk Model the mean densities should also be used and there are three options for entering this data (see model user guide).	
Natural England	26/03/2019 Section 42 Comments	For CRM of EA2 alone, the stochastic CRM assessment and that where just uncertainty in nocturnal activity was included, SPR has used nocturnal activity rates of: - 4.3 % (S.E. 2.7 %) for the breeding season and 2.3 % (S.E. 0.4 %) for the non-breeding season for gannet; and - 20 % (S.E. 5 %) for the breeding season and 17 % (S.E. 1.5 %) for the non-breeding season for kittiwake.	Noted

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	The nocturnal activity factor input parameter used in the Band Model calculation of collision risk is a ranking score from 1 to 5, derived from an assessment of nocturnal activity in different species in Garthe & Huppop (2004), and not a 'nocturnal activity rate' per se. The Band model converts these factors to a percentage 0 % (factor 1), 25 % (2); 50 % (3), 75 % (4) and 100 % (factor 5) that is applied to the densities of birds in flight collected from surveys during daylight hours to correct for a different pattern of flight behaviour (typically reduced) occurring during the night. Under this broad classification Garthe & Huppop (2004) assigned a factor of 2 to gannet, kittiwake a factor of 3 and herring gull and LBBG a factor of 3 (King et al., 2009, adds great black-backed gull as factor 3).	Noted. However, it should be reiterated that as NE state Garthe & Huppop (2004) use a ranking score and the intention was qualitative. The conversation of these ranks into percentages was never intended by the authors.
Natural England	26/03/2019 Section 42 Comments	The nocturnal activity rate figures used by SPR for gannet and kittiwake are based on the findings of recent reviews of evidence from tracking studies that have been undertaken by Furness et al. The work on gannet has been published in Furness et al. (2018), whilst the work on kittiwake is referred to as Furness et al. (in prep.), which suggests that this work has not yet been accepted and is therefore not published and publicly available. Natural England has provided comments on a draft of the review and notes that there were aspects that we did not agree with.	Noted
Natural England	26/03/2019 Section 42 Comments	The use of these 'empirically derived' nocturnal activity rates has been discussed in detail during the examination processes for both the Hornsea Project 3 and Norfolk Vanguard projects. During these processes, Natural England has noted concerns regarding the use of these 'empirically derived' rates as there is inconsistency in the numbers that are being calculated and presented from the	The Applicant acknowledges these points and notes that the empirically derived estimates represent the most robust nocturnal activity rates available, especially when compared with the simple relative scoring which has been used to date and which has no basis in empirical studies. Survey timings will be presented in the technical

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		various tagging studies and queries regarding whether comparing activity levels derived from a snapshot middle of the day at sea survey to % relative activity levels derived from tagging studies where activity has been calculated for the whole day relative to the whole night is valid.	reporting as per this request and these demonstrate that the surveys have been conducted across a range of times of day and provide representative data on which to base daytime activity levels.
Natural England	26/03/2019 Section 42 Comments	Therefore, given the uncertainty as well as variability in the data on activity levels (both during the daytime and during night), Natural England's position remains that we currently do not have any agreed 'empirically derived' nocturnal activity factors that can be used with the Band model. We recognise from recent evidence presented e.g. by MacArthur Green (2015a) that nocturnal activity levels for some species may be lower than the levels that equate to the nocturnal activity factors currently used in CRM, however we also note that there is uncertainty about the empirical activity levels and uncertainty about how these might translate into nocturnal factors applicable to the Band model.	Noted
Natural England	26/03/2019 Section 42 Comments	Therefore, Natural England advises that collision risk outputs covering a range of nocturnal activity factors are considered to account for the uncertainty/variability (in the same way as has been recommended for bird densities, avoidance rates and flight heights). The suggested range of nocturnal flight activities to be considered within the Band model CRM are: - Gannet: 1-2 (equating to 0-25 % nocturnal activity) - Kittiwake: 2-3 (equating to 25-50 % nocturnal activity) - Large gulls: 2-3 (equating to 25-50 % nocturnal activity) (as has been used by SPR in the stochastic CRM and that	CRM has been re-run using the deterministic Band model (Band 2012) and variations in parameters as requested. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence-based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For kittiwake the evidence based rate has not been run in CRM. For species where nocturnal activity was varied, the project alone assessment and the value for

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		where uncertainty in nocturnal activity has been considered).	East Anglia TWO included in cumulative assessments, were based on the worst case (highest rate) of nocturnal activity.
Natural England	26/03/2019 Section 42 Comments	We note that herring gull is not fully assessed for CRM from EA2 alone as it has been excluded due to the collision predictions currently being predicted to be less than 1 bird per year. The exclusion of herring gull from full assessment of collision impacts and hence consideration of cumulative impacts under EIA is of concern to Natural England. We note the issues raised above regarding the appropriateness of the use of median values of bird density in the CRM and note that if the mean values of bird density are used in the CRM rather than the median values, then herring gull collision predictions may increase. In addition, the figures may also increase once the full 24 months of data from EA2 are considered. Therefore, we advise that the inclusion of herring gull is reconsidered by SPR for the final submission.	Herring gull is assessed for collision in the ES for both project alone and cumulative assessment (***section 12.6.2.3.1.4*** and ***section 12.7.4.4*** of this chapter).
Natural England	26/03/2019 Section 42 Comments	We also note that migrant seabird species such as great skua and little gull have been excluded from further CRM assessment from EA2 alone, based on predictions from the CRM of less than 1 collision per year. However, we note that this is based on using the digital aerial survey data, which due to the snap shot nature of these surveys may only record such species in small numbers. Therefore, we advise that the turnover of these species passing through the EA2 is considered in the final assessment through methods such as that undertaken by WWT & MacArthur Green (2013).	WWT Consulting (2014) indicates that migration through Scottish North Sea waters for these species is as follows: Great Skua - likely to track coastlines within a band 0-40km from shore. Little gull - likely to occur on a broad front between southern Scandinavia and east Scotland, then tracking the east coastline southwards in a relatively narrow band from 0 to 20 km from shore. As the East Anglia TWO windfarm site is between 32 and 50.8km offshore from the coast at the nearest point, there is some overlap with the

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			migration corridor for great skua but not little gull, so migrant CRM will be presented for the former species only.
Natural England	26/03/2019 Section 42 Comments	Figures used in cumulative and in-combination assessments of displacement and CRM assessments Natural England welcome that SPR has included figures for the Norfolk Vanguard, Hornsea Project 3, Thanet Extension, EA1N and Norfolk Boreas projects in the cumulative displacement assessments. We assume that the figures presented for the Norfolk Vanguard, Hornsea Project 3 and Thanet Extension have been obtained from the ES submission documents for these projects. We note that these projects are currently going through the examination phase, and that a number of issues/concerns have been raised with the figures presented for these projects. Therefore, we advise that in the final submission SPR updates the figures in the cumulative assessments for these projects with the final agreed figures following the completion of the examination of these projects. We also note that the figures presented for Norfolk Boreas and EA1N projects have been obtained from the PEIRs for these projects. We advise that in the final submission SPR updates the figures in the cumulative assessments for these projects with the submission figures (timescales allowing). The list of wind farms considered in the cumulative assessments appears to be missing consideration of a	The cumulative impact assessments (CIAs) have been updated with the latest available figures for Norfolk Vanguard, Hornsea 3, Thanet Extension, East Anglia TWO / East Anglia ONE North and Norfolk Boreas (EIA or DCO examination updates) as well as other sites where non-material variations have been consented (e.g. Dogger Bank Creyke Beck, Sofia) The CIAs have also been updated to include Kincardine, Hywind and Moray West offshore windfarms.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		number of relevant offshore wind farms (e.g. the Scottish wind farms Kincardine, Hywind and Moray West).	
Natural England	26/03/2019 Section 42 Comments	Given that Natural England does not agree with the use of the 'empirical' nocturnal activity rates used by SPR in its CRM assessment for EA2 alone for gannet and kittiwake for the reasons set out above, we also do not consider it appropriate to adjust the CRM figures for the other OWFs included in the cumulative and in-combination assessments to account for this. Additionally, it is not appropriate to simply adjust the CRM figures for the other OWFs included in the cumulative assessments to account for a change in nocturnal activity rate without re-running the CRM, as the modelling calculates the reduction in activity at night through the interaction of nocturnal activity and the latitude of the specific wind farm. Therefore, this is a calculation specific to that wind farm and hence a re-run of the model is required.	The cumulative EIA assessment for East Anglia TWO does not include adjustments for other offshore windfarms in relation to nocturnal activity.
Natural England	26/03/2019 Section 42 Comments	The cumulative RTD operational displacement mortality assessment for EA2 has been conducted by SPR using the same precautionary magnitudes of displacement (80 %) and mortality (1-5 %) applied to all birds within the 4 km wind farm buffer. As with the assessment of operational displacement for EA2 alone, Natural England does not consider this to be precautionary and advises that a worst case scenario of 100 % displacement and 10 % mortality is used.	The ES assessment for the site alone considers 100% displacement from the operational windfarm and 4km buffer and a maximum of 10% mortality, as requested by Natural England, and for the cumulative assessment 90-100% displacement and a maximum of 10% mortality. Based on a detailed review of likely mortality of RTD from displacement, an evidence based maximum mortality rate of 1% is recommended.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	SPR has considered that all wind farms at which turbines were installed before or during 2012 form part of the EA2 baseline. Whilst we agree that as EA2's baseline characterisation surveys didn't start until 2015, any displacement effects from offshore wind farms operating at that time would be picked up in SPR's survey data if the effects from the other wind farms cover the EA2 survey area. Natural England does not agree that these wind farms should be considered part of the baseline. This is because, although some of these wind farms have been operational for over 10 years, the RTD population data pre-date the installations (e.g. that used in Furness 2015 to inform the RTD BDMPS comes from a variety of sources including O'Brien et al. 2008, which draws on aerial survey data from 2001-06 and Wetland Bird Survey and county bird records from 1995-2005). Therefore the baseline cannot be assumed to include the effects of these wind farms. Therefore, all OWFs located within the south-west North Sea RTD BDMPS in Furness (2015) should be included in the cumulative operational displacement assessment for RTD.	The cumulative assessment for RTD displacement has been revised to consider all windfarms in the southern North Sea BDMPS (Furness 2015). The available information in assessments for windfarms in this area is variable and they have been divided into four categories: windfarms with no population estimates presented (Dogger Bank sites and Blyth demonstrator), coastal windfarms with low numbers of over-wintering birds reported (Teesside, Humber Gateway and Westernmost Rough), windfarms with sightings made during months considered to belong to the breeding season (Hornsea projects) and windfarms with quantitative information on over-wintering birds by season (Thanet Extension, Norfolk Vanguard, Norfolk Boreas). A generic, common-currency based approach using SeaMast data will also be presented, following the method discussed for the Thanet Extension windfarm.
Natural England	26/03/2019 Section 42 Comments	We suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for RTD, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a worst case scenario of 100 % displacement and 10 % mortality. The assessment should include all offshore wind farms located within the south-west North Sea RTD BDMPS.	The assessment includes all offshore windfarms located within the south-west North Sea RTD BDMPS, depending on the available information in assessments for individual sites. A displacement matrix of bird abundance estimates summed from individual windfarms has not been provided due to the variability of information available in assessments for different offshore windfarms included in the cumulative assessment. Instead ranges of mortality for 90-100%

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			displacement and 1-10% mortality of displaced birds.
Natural England	26/03/2019 Section 42 Comments	In addition to the overarching comment above regarding the figures included for the projects currently in examination (Norfolk Vanguard, Hornsea Project Three and Thanet Extension) and those where PEIRs have been submitted (Norfolk Boreas and EA1N), we suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for gannet, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a range of displacement of 60-80% and mortality of 1-10 %. This also applies to the assessment of LSE for in-combination assessment of gannet displacement from the FFC SPA. Therefore, we advise that once the figures are agreed and the summed figures accurately presented that the assessment and conclusion of the LSE screening for gannet in-combination displacement from FFC SPA is reviewed by SPR.	The potential for effects (collision and displacement) on gannets from the Flamborough and Filey Coast SPA will be reviewed and the assessment updated as required.
Natural England	26/03/2019 Section 42 Comments	In addition to the overarching comment above regarding the figures included for the projects currently in examination (Norfolk Vanguard, Hornsea Project Three and Thanet Extension) and those where PEIRs have been submitted (Norfolk Boreas and EA1N), SPR has considered that a value of 1% mortality when combined with the precautionary 70% displacement rate is considered appropriate for wintering auks. Natural England notes that definitive mortality rates associated with displacement for seabirds, including auks are not known and therefore we advise consideration of a range of mortality rates are used	The assessment considers a range of 30-70% displacement and 1-10% mortality of displaced birds. With reference to a detailed review of the potential effects of displacement from offshore windfarms on auks carried out for Norfolk Vanguard, it is acknowledged that that the impact of displacement of razorbills and guillemots by offshore windfarms is uncertain, but considered that a precautionary maximum mortality rate is 1%.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		in assessments. Whilst Natural England agrees that the mortality for auks is likely to be at the low end of the range, we do not agree that using 1% mortality for the cumulative assessment (with 70% displacement) can be considered the worst case scenario. Therefore, our recommendation is a range of mortality rates of 1-10% and displacement rates of 30-70%, with 70% displacement and 10% mortality as the worst case, which is the same as that used by SPR in the assessment of auk displacement impacts from the EA2 project alone. Whilst SPR has presented the number of birds at risk of displacement for the Natural England preferred scenarios, its assessment and conclusions regarding the levels of significance of the predicted impacts are based on their preferred rates of 70% displacement and 1% mortality. In the joint SNCB interim advice on displacement (SNCBs 2017) the SNCBs encourage developers to indicate their interpretation of the most likely displacement levels and mortality scenarios by highlighting a range of cells within the matrix, and simultaneously to provide sufficient empirical/modelling evidence to support any highlighted subset of cells. The SNCBs also advise that a range of displacement values are taken through to the assessment of population impacts and not a single figure. The range of population impacts can then also be presented as a matrix so that those levels of displacement which might exceed a particular level of population impact can be easily identified and evaluated. But if only a single figure can be taken forward, this in most cases should be the more precautionary of the sub-set selected. Therefore, we advise that in the final submission the cumulative auk assessments also consider the level of predicted impact against baseline mortality for the Natural England	

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		recommended range of rates as well as SPR's preferred rate.	
Natural England	26/03/2019 Section 42 Comments	As noted at Norfolk Vanguard, we note that the EA2 cumulative displacement tables for razorbill and guillemot both do not include any figures for the non-breeding seasons for Seagreen Alpha and Bravo. We acknowledge that the Environmental Statement (ES) for these projects does not present displacement figures for the non-breeding seasons. However, graphs of monthly abundances of each auk species at each of the project sites across the two survey years are presented in the ES Chapter (Seagreen Wind Energy 2012). These indicate that both guillemot and razorbill were recorded in in all surveys of both Alpha and Bravo during the study period. Therefore, consideration should be given to this in the cumulative assessments.	For cumulative displacement assessments of razorbill and guillemot, Tables 12.37 and 12.39 have been updated to include seasonal estimates for Seagreen projects.
Natural England	26/03/2019 Section 42 Comments	As has been raised during the Norfolk Vanguard and Hornsea 3 examinations, Natural England does not consider that the PVA models produced for East Anglia 3, Hornsea 2 and Galloper are adequate to inform the assessments for these projects and the same will apply for EA2. This is due to the following reasons: - The stochastic simulations for the East Anglia 3, Hornsea 2, Galloper models and the SOSS gannet model were not run as matched pairs. Where stochastic PVA models are used, it is important to use a 'matched-runs' approach where a metric is derived for each matched pair of baseline and impacted simulations. Stochasticity is included in the population models, but the survival and productivity rates used for a 'pair' of impacted and un-impacted populations at each time step are the same. This means that the effect that is measured with the metric can be more clearly	The Applicant acknowledges the points raised with respect to the PVA models specified in this comment. Within the timetable of the project application it has not been possible to update these models to address these comments. However, it should be noted that none of these points is considered fundamental to how the models operate (i.e. these do not refer to the way the models function) and as a consequence the outputs remain robust, albeit they are not all presented in the formats Natural England currently request.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		attributed to the impact, than to model uncertainties such as the variability in the demographic parameters that have been sampled or to observation errors. Cook & Robinson (2017) tested the effect of using unmatched compared to matched runs in PVA models and demonstrated that the median values of several evaluation metrics (e.g. counterfactual of population size) were greater when a matched runs approach was used compared to when the simulations were unmatched and the uncertainty around the metrics was much greater in the unmatched scenario. Models were run with 1,000 iterations. It may be the case that the median values of the matched versus unmatched runs approach will converge if a larger number of simulations (e.g. 5,000) are used, however the confidence limits are still expected to vary between the two approaches. Natural England therefore advises that one amendment required to the existing PVA models used by SPR is to run the simulations using matched-pairs. - Natural England recommends using the counterfactual of population growth rate and the counterfactual of population size to quantify the relative changes in a population in response to anthropogenic impacts. Whilst the EIA models for kittiwake and GBBG present the counterfactual of population size they do not present the output for counterfactual of growth rate. The other models utilised do not present outputs for the required metrics. The change in median growth rate metric that SPR has used in the kittiwake and gannet FFC SPA in-combination CRM assessments are not the same as the counterfactual of growth rate that Natural England advises, as it has not been calculated as the growth rate at the end of the duration of the projection and SPR has calculated the median growth rate across all years simulated in the model.	

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		Clarification is required from SPR regarding the lifespan of the EA2 project, as the existing PVAs utilised by SPR have been run over 25 years. We note that more recent projects (e.g. Hornsea Project 3, Norfolk Vanguard and Norfolk Boreas) have lifespans of greater than this (35 years for Hornsea 3 and 30 years for Norfolk Vanguard and Boreas). If the EA2 project is to have a lifespan of greater than 25 years then the counterfactuals of population size and growth rate should be calculated at the end of the impact period (i.e. the lifespan of the EA2 project). If the lifespan of EA2 is to be greater than 25 years then SPR's approach whereby PVA models are run over 25 years would lead to an underestimate of impact, as potential impacts occurring in the last years of operation not covered by 25 years will not be accounted for in the models. - A further issue with deriving the metrics from the existing PVAs is that SPR has had to select impact levels from those published for Hornsea 2, Galloper etc., which means that SPR can only derive metric values from a pre-populated set of impact levels and cannot calculate a metric that is specific to the impact level that they have calculated for EA2. We also note that that further PVA models have been run for gannet, kittiwake and guillemot at the FFC SPA as part of the Hornsea 3 Examination (see: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-001142-DI_HOW03_Appendix%209.pdf). These models have attempted to address the concerns raised by Natural England regarding the previous FFC SPA PVA models used by both the Hornsea 3 and Norfolk Vanguard Applicants, as they have been run using a matched pairs	

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		approach, have been run over 35 years and present outputs for the Natural England recommended counterfactuals of population growth rate and population size. However, Natural England has outstanding concerns and clarification requests related to these updated PVAs and their outputs that have been raised during the Hornsea 3 Examination process in our Written Submission for Deadline 3 and in Appendix 2 of this document. These are currently under discussion during the Hornsea Project 3 examination, so we advise the SPR keeps a watch on the decisions made regarding suitability of these.	
Natural England	26/03/2019 Section 42 Comments	12.3.2 – worst case: We note that in Annex 3 of Appendix 12.1, Table 5 of the turbine specifications used in the CRM suggests the CRM is based on 67 x 12MW turbines, 42 x 15MW turbines and 42 x 19MW turbines. These are different from the turbine numbers suggested in paragraph 21 of Chapter 12 of the PEIR, which suggests the CRM has been done on 67 x 12MW and 53 and 48 x 19MW turbines. Which is also different from Table 12.2 of Chapter 12, which suggests the realistic worst case is a maximum of 75 x 12MW turbines with other scenarios of 60 x 50MW or 48 x 19MW turbines. We advise that SPR checks the various turbine specifications presented in Chapter 12 and Appendix 12.1 and ensures that the worst case in terms of collision risk is presented and that this is consistent throughout the documents. We note that the collision risk model has not been re-run for the updated scenarios because of time constraints, but an assessment of the updated parameters will be included	The ES chapter and appendices for East Anglia TWO have been updated to ensure that the wind turbine scenarios on which the assessment is based are consistent throughout and consistent with those presented elsewhere in the ES. These updated parameters and the full offshore ornithology aerial data sets have been used for the updated collision risk modelling (which has also incorporated responses to other comments on collision risk modelling)

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		within the ES and this will also incorporate the remaining three months of aerial survey data.	
Natural England	26/03/2019 Section 42 Comments	12.4.2.3 – desk based assessment: Given that the offshore cable corridor passes through the Outer Thames Estuary SPA, we welcome that RTD densities in the site from JNCC (2013) and from the APEM 2013 surveys have been used.	We welcome that NE are happy with the use of 2013 data. Reference will also be made to the more recent surveys conducted in 2018 (Irwin et al. 2019).
Natural England	26/03/2019 Section 42 Comments	12.5.1 and Table 12.10 – existing environment, key species: We welcome that the full breeding season as defined in Furness (2015) (i.e. April-August) has been applied for the attribution of potential impacts to relevant populations of lesser black-backed gull (LBBG). However, we note that from Table 12.10 there is then overlap of this with the autumn migration (considered to be August-October) and spring migration (March-April) – it is unclear how these overlapping months been treated in the attribution of potential impacts. We would suggest that where the breeding season is modified from the migration free breeding season given in Furness (2015) that the non-breeding season period definitions are adjusted accordingly. So in the case of LBBG if the full breeding season (Apr-Aug) in Furness (2015) is the most appropriate then the autumn migration period should be adjusted to Sept-Oct and the spring migration period adjusted to March.	Adjustment of seasons for LBBG has been made as recommended by NE
Natural England	26/03/2019 Section 42 Comments	Table 12.12 – designated sites: We agree that the designated sites listed in Table 12.12 have potential connectivity with the proposed EA2 site. SPR should also screen in/consider SPAs where there is an impact pathway in the non-breeding season (even if there is no impact	In relation to the potential effects noted by Natural England, the Applicant considers it relevant to take into account the distance between SPAs and the project and the timing of those potential effects. On this basis, if the relative scale and magnitude is

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		pathway in the breeding season). Given the potential for all three auks (guillemot, razorbill and puffin) to winter in the North Sea, this would therefore include consideration of the Farne Islands SPA (guillemot and the seabird assemblage feature, which includes razorbill and puffin) and Coquet Island SPA (seabird assemblage feature, which includes puffin).	such that it is apparent that the potential for an effect is extremely small then that should be used as the basis for screening such effects out.
Natural England	26/03/2019 Section 42 Comments	12.6.1.1.1 – export cable installation, RTD construction displacement: We agree that for assessing red-throated diver (RTD) disturbance/displacement impacts from cable laying assuming 100 % displacement out to 2 km is reasonable. Our understanding of what has been undertaken in the assessment is that 100 % of the birds present are displaced from a 2 km buffer surrounding each cable laying vessel and that it is assumed that both of the cable laying vessels are effectively stationary all winter It is then assumed that the birds will return to the area once the vessels have left. If our understanding is correct then we consider this to be a precautionary approach.	This understanding is correct.
Natural England	26/03/2019 Section 42 Comments	12.6.1.1.1 – export cable installation, RTD construction displacement: We note that definitive mortality rates associated with displacement for seabirds, including RTD are not known and therefore we advise consideration of a range of mortality rates are used in assessments (as per operational disturbance and displacement advice). Therefore, as with operational disturbance and displacement we advise that a range of mortality rates of 1-10 % are used for RTD assessments rather than the figure of 1-5 % as used by SPR. We also note that under Table 12.13 for red throated diver the rationale is “For the offshore export cable corridor only	The potential displacement of red-throated divers within the offshore windfarm site during construction is considered in the ES chapter in response to NE comments. Mortality rates of 1-10% are considered.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		as this overlaps with the Outer Thames Estuary SPA for which red-throated diver is a qualifying species". Not considering potential disturbance and displacement effects from the array itself during construction and operation is serious omission.	
Natural England	26/03/2019 Section 42 Comments	12.6.1.1.2 & 12.6.1.1.3 – razorbill & guillemot construction displacement: We note that the assessments of construction disturbance/displacement impacts for EA2 for both razorbill and guillemot assess impacts for each individual season separately. However, the seasonal impacts should be summed to give an overall annual predicted impact.	A year round assessment of construction disturbance/displacement impacts is included in the ES.
Natural England	26/03/2019 Section 42 Comments	12.6.2.1.1 – RTD displacement: Natural England does not consider the 60-80 % displacement and 1-5 % mortality rate used by SPR to be appropriate for assessing disturbance and displacement impacts to RTD from offshore wind farms. We note that this does not follow SNCB guidance (SNCBs 2017). As noted in our main comments above, based on the available evidence, Natural England currently considers that there is no clear justification to change our current advice. Therefore, 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 4 km buffer and suggest that a range of displacement rates up to 100 % and a mortality rate of up to 10% are considered. Table 12.4 - We would question whether the red throated diver density data has been assigned to the correct season, as there are high numbers in the breeding season.	The ES assessment for the site alone considers 100% displacement from the operational windfarm and 4km buffer and a maximum of 10% mortality, as requested by Natural England, and for the cumulative assessment 90-100% displacement and a maximum of 10% mortality. Based on a detailed review of likely mortality of RTD from displacement, an evidence based maximum mortality rate of 1% is recommended. ***Table 12.14*** of this chapter presents seasonal peak means for red-throated diver in the full and migration-free bereding season, the former higher estimate overlaps with the spring migration (so the seasonal peak mean is assigned to that season). Only small numbers of RTD were recorded during the migration free-breeding season – these may be

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			late migrants or sub-adult birds remaining in wintering areas.
Natural England	26/03/2019 Section 42 Comments	12.6.2.1.1.4 – RTD displacement: In addition to assessing the year round impact of operational direct disturbance/displacement against the biogeographic population, we would suggest that SPR also assess the impact against the largest relevant BDMPS figure, as for EIA the level of potential impact likely lies somewhere within this range.	Assessment updated as requested.
Natural England	26/03/2019 Section 42 Comments	12.6.2.1.2 – gannet displacement: Whilst SPR has calculated that 1 gannet would be at risk of dying in the breeding season under SPR's scenarios of 60-80 % displacement and 0-1 % mortality, we note that the PEIR is not based on the full 24 months of data and that the numbers will likely change with inclusion of the full data set. Therefore, we advise that SPR revisits the decision to not include a displacement matrix for the breeding season once the full dataset is analysed. However, we welcome that SPR has included the breeding season predictions in the year round total figure.	A displacement matrix for gannet in the breeding season is included (Table 12.22). The maximum estimated mortality at 80% displacement and 1% mortality of displaced birds is two individuals.
Natural England	26/03/2019 Section 42 Comments	12.6.2.1.2 – gannet displacement: In addition to assessing the year round impact of operational direct disturbance/displacement against the biogeographic population, we would suggest that SPR also assess the impact against the largest relevant BDMPS figure, as for EIA the level of potential impact likely lies somewhere within this range.	Assessment updated as requested.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	12.6.2.1.3 – auk (guillemot and razorbill) displacement: We welcome that the auk operational assessments include figures for predicted displacement across a range of displacement (30-70 %) and mortality scenarios (1-10 %), and that the predictions for each relevant season, including the breeding season, are then summed to give an annual predicted total that have been assessed against the baseline mortality for the largest BDMPS. We would also suggest that in addition to this, the year round impact is also assessed against the biogeographic population, as for EIA the level of potential impact likely lies somewhere within this range.	Assessment updated as requested.
Natural England	26/03/2019 Section 42 Comments	12.6.2.3 – collision risk: We welcome that SPR has incorporated uncertainty in seabird density, collision avoidance rates, flight heights and nocturnal activity in their collision assessments of EA2 alone. However, this has been undertaken using stochastic collision risk models scripted in R that we understand is a stochastic model R code developed by SPR's consultant. As noted in our main comments regarding CRM, Natural England does not consider that it is appropriate to use this model and advises that in the final submission the CRM is undertaken using the MSS stochastic model along with the presentation of Band/deterministic model outputs using the central/mean input parameters for bird density, avoidance rate, flight heights and nocturnal activity. If it is not possible for SPR to use the MSS stochastic model, then we advise that multiple tables of Band/deterministic model outputs are presented where SPR varies each parameter in turn using the Band (2012) model. In addition, the full set of CRM input parameters (including wind farm width and latitude) should	CRM has been re-run using the deterministic Band model (Band 2012) and variations in parameters as requested. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence-based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For kittiwake the evidence based rate has not been run in CRM.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		be provided in the submission documents to enable to the predicted CRM figures to be checked.	
Natural England	26/03/2019 Section 42 Comments	12.6.2.3 – collision risk: As highlighted in our main comments regarding CRM, Natural England has a number of queries/areas of uncertainty where it would welcome further clarification from SPR regarding the approach taken in order to reach conclusions around the applicability of the CRM outputs presented. However, we consider that the use of median bird densities in the CRM is not appropriate and advise that the mean densities are used for the final submission. We note that the use of the median values means that lower monthly densities of birds are used and hence the predicted CRM results will be lower than if the mean densities are used.	Mean monthly densities of birds in flight have been used to run the deterministic CRM.
Natural England	26/03/2019 Section 42 Comments	12.6.2.3 – collision risk: As noted in our main comments regarding CRM, for CRM of EA2 alone, the stochastic CRM assessment and that where just uncertainty in nocturnal activity was included, SPR has used nocturnal activity rates based on the findings of recent reviews of evidence from tracking studies that have been undertaken by Furness et al. (2018 for gannet and in prep. for kittiwake). Natural England currently does not advise that these figures are the agreed ones to use in CRM impact assessments (the reasons for this are outlined in our main comments) and our position remains that outlined during the Hornsea Project 3, Thanet Extension and Norfolk Vanguard examinations, namely: We currently do not have any agreed 'empirically derived' nocturnal activity factors that can be used with the Band model. We recognise from recent evidence presented e.g. by MacArthur Green (2015a) that nocturnal activity levels	CRM has been re-run using the deterministic Band model (Band 2012) and variations in parameters as requested. For gannet three nocturnal activity scenarios were run at rates of 25%, 0% (the range recommended by Natural England) and an evidence-based rate (8% flying activity at night during the breeding season (March to September) and 4% flying activity at night during the non-breeding season (October to February); Furness et al. 2018). For species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in cumulative assessments, were based on the worst case (highest rate) of nocturnal activity.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		for some species may be lower than the levels that equate to the nocturnal activity factors currently used in CRM, however we also note that there is uncertainty about the empirical activity levels and uncertainty about how these might translate into nocturnal factors applicable to the Band model. Therefore, Natural England advises that collision risk outputs covering a range of nocturnal activity factors are considered to account for the uncertainty/variability (in the same way as has been recommended for bird densities, avoidance rates and flight heights). The suggested range of nocturnal flight activities to be considered within the Band model CRM are: · Gannet: 1-2 (equating to 0-25% nocturnal activity) · Kittiwake: 2-3 (equating to 25-50% nocturnal activity) · Large gulls: 2-3 (equating to 25-50% nocturnal activity) (as has been used by SPR in the stochastic CRM and that where uncertainty in nocturnal activity has been considered).	
Natural England	26/03/2019 Section 42 Comments	Combined impacts of displacement and collision risk: Displacement predictions for gannet should be added to collision predictions for gannet, and the combined impacts considered for EA2 alone and cumulatively with other relevant offshore wind farms. This should be considered in the final submission.	Given the high levels of precaution in the collision risk assessment for gannet, in relation to avoidance rate, nocturnal activity, (and for cumulative, reductions in rotor swept area of built versus consented designs); and the likelihood that gannets range so widely that displacement from offshore windfarms would not affect survival rates, considering combined collision risk and displacement mortality, for the project alone and cumulatively, is considered to be over-precautionary.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	12.6.3 – decommissioning impacts: We agree that any effects of decommissioning are likely to be similar to those generated during the construction phase. However we note that further consultation regarding decommissioning activities will be required with SNCBs to allow any best practice to be incorporated to minimise potential impacts.	Noted.
Natural England	26/03/2019 Section 42 Comments	Table 12.35 – OWFs in cumulative assessments: Table will need updating to reflect those wind farms that have now been constructed, e.g. Rampion and those currently in examination (e.g. Hornsea 3, Thanet Extension, Vanguard). This table does not include all relevant OWFs, e.g. Kincardine, Hywind and Moray West OWFs are all missing and should be included in the final submission.	***Table 12.37*** of this chapter has been updated as requested.
Natural England	26/03/2019 Section 42 Comments	12.7.3 – cumulative displacement: We welcome that SPR has included figures for the Norfolk Vanguard, Hornsea Project 3, Thanet Extension, EA1N and Norfolk Boreas projects in the cumulative displacement assessments. We assume that the figures presented for the Norfolk Vanguard, Hornsea Project 3 and Thanet Extension have been obtained from the ES submission documents for these projects. We note that these projects are currently going through the examination phase, and that a number of issues/concerns have been raised with the figures presented for these projects. Therefore, we advise that in the final submission SPR updates the figures in the cumulative assessments for these projects with the final agreed figures following the completion of the examination of these projects. We also note that the figures presented for Norfolk Boreas and EA1N projects have been obtained from the PEIRs for these projects. We advise that in the final submission SPR	Cumulative displacement figures have been updated as requested for the windfarms referred to be NE.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		updates the figures in the cumulative assessments for these projects with the submission figures (timescales allowing).	
Natural England	26/03/2019 Section 42 Comments	12.7.3.1– RTD cumulative displacement: As detailed in our main comments, we do not consider it appropriate that all wind farms at which turbines were installed before or during 2012 form part of the EA2 baseline.	The cumulative assessment for RTD displacement has been revised to consider all windfarms in the southern North Sea BDMPS (Furness 2015). The available information in assessments for windfarms in this area is variable and they have been divided into four categories: windfarms with no population estimates presented (Dogger Bank sites and Blyth demonstrator), coastal windfarms with low numbers of over-wintering birds reported (Teesside, Humber Gateway and Westernmost Rough), windfarms with sightings made during months considered to belong to the breeding season (Hornsea projects) and windfarms with quantitative information on over-wintering birds by season (Thanet Extension, Norfolk Vanguard, Norfolk Boreas). A generic, common-currency based approach using SeaMast data will also be presented, following the method discussed for the Thanet Extension windfarm.
Natural England	26/03/2019 Section 42 Comments	12.7.3.1 – RTD cumulative displacement: As noted previously, Natural England does not agree that 80% displacement and 1-5% mortality are precautionary magnitudes to use for RTD displacement assessments.	The EIA considers 100% displacement and a maximum of 10% mortality for the project alone assessment, and 90-100% displacement and a maximum of 10% mortality for the cumulative assessment.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
Natural England	26/03/2019 Section 42 Comments	12.7.3.1 – RTD cumulative displacement: As noted during the Norfolk Vanguard examination process, we suggest that for EA2 a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for RTD, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a worst case scenario of 100% displacement and 10% mortality. Or alternatively, a 'like for like' approach could be to take a similar approach to that taken by Thanet Extension, currently in Examination, which used the predicted density map and the underlying dataset of the SeaMaST project (Seabird Mapping and Sensitivity Tool) described in Bradbury et al. (2014) as a common data source of RTD density in the North Sea. The underlying dataset can be accessed from Natural England following a specific data-request. This approach is outlined in Annex C of Thanet Extension's Appendix 1, Annexes A to G to Deadline 1 Submission.	The cumulative assessment for RTD displacement has been revised to consider all windfarms in the southern North Sea BDMPS (Furness 2015). The available information in assessments for windfarms in this area is variable and they have been divided into four categories: windfarms with no population estimates presented (Dogger Bank sites and Blyth demonstrator), coastal windfarms with low numbers of over-wintering birds reported (Teesside, Humber Gateway and Westernmost Rough), windfarms with sightings made during months considered to belong to the breeding season (Hornsea projects) and windfarms with quantitative information on over-wintering birds by season (Thanet Extension, Norfolk Vanguard, Norfolk Boreas). A generic, common-currency based approach using SeaMast data will also be presented, following the method discussed for the Thanet Extension windfarm.
Natural England	26/03/2019 Section 42 Comments	12.7.3.2 – gannet cumulative displacement: We suggest that a similar approach to that undertaken for the auk cumulative displacement assessments is undertaken for gannet, i.e. to sum the bird abundance estimates for each relevant offshore wind farm and put this total through a displacement matrix, and then assess with a range of displacement of 60-80% and mortality of 1-10%.	As stated in the PEI, the potential for the proposed East Anglia TWO project to contribute to a cumulative displacement effect such as this is considered to be very unlikely. The period when gannet displacement is of potential concern is during autumn migration. At this time, very large numbers of gannets are migrating from breeding colonies in Northern Europe to wintering areas farther south, predominantly off the coast of West Africa. Displacement due to windfarms in the North

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
			Sea is considered trivial when compared with the range over which individuals of this species travel.
Natural England	26/03/2019 Section 42 Comments	12.7.3.3 – razorbill cumulative displacement: We note our advice in our main comments regarding the use of 70% displacement and 1% mortality in the EA2 assessments of razorbill and guillemot cumulative displacement.	The assessment considers a range of 30-70% displacement and 1-10% mortality of displaced birds. With reference to a detailed review of the potential effects of displacement from offshore windfarms on auks carried out for Norfolk Vanguard, it is acknowledged that that the impact of displacement of razorbills and guillemots by offshore windfarms is uncertain, but considered that a precautionary maximum mortality rate is 1%.
Natural England	26/03/2019 Section 42 Comments	Tables 12.37 – auk cumulative displacement: These tables list no figures for razorbill and guillemot in the non-breeding seasons for Seagreen A and Seagreen B. This is not supported by the Environmental Statements for the Seagreen projects. There are also no figures presented for the Kincardine, Hywind or Moray West OWFs.	***Tables 12.38*** and ***12.39*** of this chapter have been updated to include seasonal estimates for Seagreen projects and the additional Scottish windfarms referred to by NE.
Natural England	26/03/2019 Section 42 Comments	12.7.4 – cumulative CRM: As with the cumulative displacement assessments, welcome that SPR has included figures for the Norfolk Vanguard, Hornsea Project 3, Thanet Extension, EA1N and Norfolk Boreas projects in the cumulative displacement assessments. We assume that the figures presented for the Norfolk Vanguard, Hornsea Project 3 and Thanet Extension have been obtained from the ES submission documents for these projects. We note that these projects are currently going through the examination phase, and that a number of issues/concerns have been raised with the figures presented for these projects. Therefore, we advise that in the final submission SPR updates the figures in the cumulative assessments for these projects with the final	Cumulative collision risk figures have been updated as requested for the windfarms referred to by NE and include Hywind, Kincardine and Moray West.

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		agreed figures following the completion of the examination of these projects. We also note that the figures presented for Norfolk Boreas and EA1N projects have been obtained from the PEIRs for these projects. We advise that in the final submission SPR updates the figures in the cumulative assessments for these projects with the submission figures (timescales allowing). We also again note that the cumulative CRM assessments do not include figures for the Hywind, Kincardine and Moray West OWFs.	
Natural England	26/03/2019 Section 42 Comments	12.7.4.1, 12.7.4.2, Tables 12.41 & 12.42 – gannet & kittiwake cumulative CRM: Given that Natural England does not agree with the use of the 'empirical' nocturnal activity rates used by SPR in its CRM assessment for EA2 alone for gannet and kittiwake for the reasons set out above, we also do not consider it appropriate to adjust the CRM figures for the other OWFs included in the cumulative assessments to account for this. Additionally, it is not appropriate to simply adjust the CRM figures for the other OWFs included in the cumulative assessments to account for a change in nocturnal activity rate without re-running the CRM, as the modelling calculates the reduction in activity at night through the interaction of nocturnal activity and the latitude of the specific wind farm. Therefore this is a calculation specific to that wind farm and hence a re-run of the model is required.	CRM has been re-run using the deterministic Band model (Band 2012) and variations in parameters as requested. For species where nocturnal activity was varied, the project alone assessment and the value for East Anglia TWO included in cumulative assessments, were based on the worst case (highest rate) of nocturnal activity (evidence based rates used for gannet and kittiwake as presented in the PEI were not used). Similarly for other windfarms included in the cumulative assessment, adjustments for nocturnal activity, applied in the PEI, have been removed.
Natural England	26/03/2019 Section 42 Comments	12.7.4.1 – gannet cumulative CRM: The figures currently presented in the cumulative assessment of 2,615 gannet collisions per annum (Table 12.41 of EA2 PEIR) equates to 3.0% of baseline mortality of the largest BDMPS and 1.16%	The updated cumulative collision risk assessment for gannet in the EA2 EIA predicts 2,607 collisions annually – although several sources of precaution

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		of baseline mortality of the biogeographic population in Furness 2015), which at this level is a significant impact and therefore requires further consideration. However, we note that the EA2 alone figures are likely to change following inclusion of the remaining 3 months of data and the increase to the turbine numbers. Additionally the figures for some other the other projects included in the cumulative assessment may change come the final submission and that there are currently relevant OWFs that have not been included. Therefore, the information in the PEIR does not currently allow conclusions to be made by Natural England regarding the level of cumulative impact. Therefore, the information in the PEIR does not currently allow conclusions to be made regarding the level of cumulative impact. We note the use of the SOSS gannet Population Viability Analysis (PVA) model outputs (WWT 2012). However, we note the issues around existing PVAs detailed in our main comments regarding the use of matched pairs, counterfactuals of final population size and population growth rate, which have not been considered by SPR's reference to the population growth predictions and risk of population declines. We therefore suggest that these are considered by SPR to allow robust conclusions to be made regarding the significance of cumulative collision impacts on gannet.	in this estimate are highlighted and the real cumulative total is likely to be lower. This level of additional mortality represents more than 1% increase in the mortality rate of the largest BDMPS and the biogeographical population with connectivity to UK waters. These levels of additional mortality could result in detectable effects at the population level. Notwithstanding the comments of detail on the SOSS gannet PVA, it is considered that the comparisons presented with the outputs of the model, in terms of the effects of additional mortality on population growth rates are robust. It is also very pertinent that the UK gannet population has grown substantially since the PVA was conducted and, at the last census, was over 30% larger. This increase adds considerable precaution to the conclusions of the original PVA and that this aspect should be given considerable weight when considering if there is a need for the PVA to be updated.
Natural England	26/03/2019 Section 42 Comments	12.7.4.2 – kittiwake cumulative CRM: The figures currently presented in the cumulative assessment of 3,574 kittiwake collisions per annum (Table 12.42 of EA2 PEIR) equates to 2.76% of baseline mortality of the largest BDMPS and 0.45% of baseline mortality of the biogeographic population in Furness 2015), which at this level is a significant impact	The updated cumulative collision risk assessment for predicts 3,160.7 collisions annually – although several sources of precaution in this estimate are highlighted and the real cumulative total is likely to be lower.

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		and therefore requires further consideration. However, we note that the EA2 alone figures are likely to change following inclusion of the remaining 3 months of data and the increases to the turbine numbers. Additionally the figures for some other the other projects included in the cumulative assessment may change come the final submission and that there are currently relevant OWFs that have not been included. Therefore, the information in the PEIR does not currently allow no conclusions are to be made by Natural England regarding the level of cumulative impact. SPR makes reference to the PVA model that was developed at EA3 to assess the potential effects of cumulative mortality on the kittiwake BDMPS populations (EATL 2015). Natural England notes that its position remains that we consider the density independent model to be the most appropriate, but we appreciate that SPR has presented the outputs for both. With regard to the PVA model for kittiwake undertaken for East Anglia 3, we note the issues raised around existing PVAs detailed in our main comments regarding the use of matched pairs and counterfactuals of final population size and growth rate which should be calculated at the end of the impact period. We therefore suggest that these are considered by SPR before any conclusions can be made regarding the significance of cumulative collision impacts on kittiwake.	This level of additional mortality represents more than 1% increase in the mortality rate of the biogeographical population with connectivity to UK waters but not the largest BDMPS and. These levels of additional mortality could result in detectable effects at the population level. Notwithstanding the comments of detail on the kittiwake PVA, it is considered that the comparisons presented with the outputs of the model, in terms of the effects of additional mortality on population growth rates are robust. The Applicant acknowledges the points raised with respect to the kittiwake PVA model. Within the timetable of the project application it has not been possible to update this model to address these comments. However, it should be noted that none of these points is considered fundamental to how the model operates (i.e. these do not refer to the way the model functions) and as a consequence the outputs remain robust, albeit they are not all presented in the formats Natural England currently request.
Natural England	26/03/2019 Section 42 Comments	12.7.4.3 – LBBG cumulative CRM: The figures currently presented in the cumulative assessment of 550 LBBG collisions per annum (Table 12.43 of EA2 PEIR) equates to 2.09% of baseline mortality of the largest BDMPS and 0.51% of baseline mortality of the biogeographic population in Furness (2015). The impact likely lies somewhere	The updated assessment of cumulative collision mortality for lesser black-backed gulls (576 birds annually) predicts changes in population mortality rates which may be detectable in relation to the largest BDMPS, but not in relation to the annual biogeographic population with connectivity to UK

Consultee	Date / Document	Comment / agreement made at ETG	Response / where addressed in the ES
		between the ranges of these figures. We suggest that the assessment of the predicted impact also considers the population trend of the LBBG population the assessment is dealing with. However, we note that the EA2 alone figures are likely to change following inclusion of the remaining 3 months of data and the increase to the turbine numbers. Additionally, the figures for some other the other projects included in the cumulative assessment may change come the final submission and that there are currently relevant OWFs that have not been included. The current information in the PEIR does not currently allow any conclusions to be made regarding the level of cumulative impact.	Waters. This estimate includes sources of precaution – including a likely overestimate of nocturnal activity - which are described in the assessment so the actual total is likely to be lower. The assessment concludes a minor adverse impact on this species.
Natural England	26/03/2019 Section 42 Comments	12.7.4.4 – GBBG cumulative CRM: The figures currently presented in the cumulative assessment of 1,030 great black-backed gull (GBBG) collisions per annum (Table 12.44 of EA2 PEIR) equates to 6.09% of baseline mortality of the largest BDMPS and 2.37% of baseline mortality of the biogeographic population in Furness 2015), which at this level is a significant impact and therefore requires further consideration. However, we note that the EA2 alone figures are likely to change following inclusion of the remaining 3 months of data and the increase to the turbine numbers. Additionally the figures for some other the other projects included in the cumulative assessment may change come the final submission and that there are currently relevant OWFs that have not been included. Therefore, the information in the PEIR does not currently allow conclusions to be made regarding the level of cumulative impact. SPR makes reference to the PVA model that was developed at EA3 to assess the potential effects of	The updated assessment of cumulative collision mortality for great black-backed gull (1105 birds annually) predicts changes in population mortality rates which may be detectable in relation to the largest BDMPS and the annual biogeographic population with connectivity to UK Waters. This estimate includes sources of precaution – including a likely overestimate of nocturnal activity - which are described in the assessment so the actual total is likely to be lower. The assessment concludes a minor adverse impact on this species. The Applicant acknowledges the points raised with respect to the great black-backed gull PVA model. Within the timetable of the project application it has not been possible to update this model to address these comments. However, it should be noted that none of these points is considered fundamental to how the model operates (i.e. these do not refer to the way the model functions) and as a

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		cumulative mortality on the GBBG BDMPS populations (EATL 2016). We appreciate that SPR has presented the outputs from both the density dependent and density independent models. We note the issues raised around existing PVAs detailed in our main comments regarding the use of matched pairs and counterfactuals of final population size and growth rate which should be calculated at the end of the impact period. We therefore suggest that these are considered by SPR to allow robust conclusions to be made regarding the significance of cumulative collision impacts on GBBG.	consequence the outputs remain robust, albeit they are not all presented in the formats Natural England currently request.
Natural England	26/03/2019 Section 42 Comments	12.7.4.4 – GBBG cumulative CRM: We note that at East Anglia 3 Natural England concluded that a significant effect at the EIA scale could not be ruled out for GBBG for cumulative collision mortality. As there have been no changes in CRM methodology since East Anglia 3 in terms of avoidance rates etc., and that more collisions are being added to these totals from the additional projects currently under examination (Hornsea 3, Norfolk Vanguard and Thanet Extension) and those currently at PEIR stage (Norfolk Boreas, EA2, EA1N) it is considered unlikely these positions will change. Therefore, we would advise that SPR gives consideration to mitigation measures which seek to reduce the project's contribution to cumulative/in-combination total impacts.	The annual cumulative total of predicted collisions is 1,060 GBBGs of which East Anglia TWO contributes 7.56 birds. At this level it is considered that mitigation measures are not appropriate and would more effectively be applied to windfarms contributing higher proportions of the total.
Suffolk County Council (SCC) and Suffolk Coastal District Council (SCDC)	27/03/2019 Section 42 Comments	The PEIRs state that migrating wildfowl and waders have been scoped out of the assessments, the Councils need to understand the justification for this especially considering 75% of Europe's wildfowl commute through the North Sea and are are often important migratory visitors to Suffolk.	It was agreed at ETG2 on 06/03/2018, after submission of a supplementary information report titled Non-seabird migrants – East Anglia ONE and East Anglia THREE Migropath (document reference EA1N_EA2-DEV-Rep-IBR-000096) that

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		This includes those birds migrating east– west, such as waxwings, as well as north–south.	impacts on migrating wildfowl and waders could be scoped out of the assessment.
Eastern IFCA	12/03/2019 Section 42 Comments	Outer Thames Estuary Special Protection Area (SPA) Impact on designated features Eastern IFCA recognise that the Applicant has acknowledged that there is potential for disturbance and displacement of non-breeding Red-throated divers resulting from the presence of up to two cable laying vessels installing the export cable in the Outer Thames Estuary SPA. The site was designated for Annex 1 species Red-throated diver as the sole feature (Natural England and JNCC 2010; JNCC 2011c) and an estimated 6,466 Red-throated divers wintered in the SPA from 1989-2006/07), but an aerial survey in February 2013 counted 14,161 Red-throated divers within the SPA boundary, suggesting that numbers have increased and the population is in favourable conservation status (Goodship et al. 2015). The relevant conservation objective for the Outer Thames Estuary SPA is “subject to natural change, maintain or enhance the Red-throated diver population and its supporting habitats in favourable condition” (JNCC and Natural England 2013). Given the speed that operational cable routing vessels will be travelling within the SPA (300m/hr.) coupled with the likelihood that any displaced individuals will vacate to an adjacent area of the SPA, the low magnitude of effect and low sensitivity of the receptor, the PEIR predicts that the impact of the cable corridor will be of negligible significance for Red-throated diver, surmising that there will be no adverse effect on the integrity of Outer Thames Estuary SPA as a result of the proposed East Anglia TWO project. Eastern IFCA consider that despite the potential for disturbance to Red- throated	Noted.

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		divers, the evidence provided supports that the project is unlikely to result in significant impacts on the Red-throated diver population within the Outer Thames Estuary SPA.	
Eastern IFCA	12/03/2019 Section 42 Comments	The Greater Wash Special Protection Area (SPA) The proposed East Anglia TWO project is located approximately 35km from the Greater Wash SPA at its closest point, and the offshore cable corridor does not cross any part of the SPA. The East Anglia TWO site is also beyond the range at which any construction or operation activities could affect Red-throated divers within the SPA. Consequently, the potential impact would arise with birds passing through the windfarm on migration to and from the SPA. The features of this SPA for which assessment of potential effects due to the proposed East Anglia TWO project are considered are non-breeding Red-throated divers, and little gulls whilst on migration and while present in winter, both of which are sensitive to disturbance due to vessel movements, windfarm construction and windfarm operation. The PEIR outlined that impacts on both species during migration are considered to be negligible, further SPA as a result of East Anglia TWO project. Eastern IFCA consider that although the potential for disturbance to migration through barrier and collision in the wind farm array is a potential risk to both the Red-throated diver and Little gull populations, the evidence provided in the PEIR supports that the project is unlikely to result in significant impacts within the Greater Wash SPA	Noted.
Natural England	ETG 4 Meeting 20/06/2019	There is now no operational windfarm array displacement issue (as a result of physical presence) for EA2 with regards to the Outer Thames Estuary SPA.	Acknowledged, no assessment of this impact has been carried out for the proposed East Anglia TWO project.

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RSPB	ETG 4 Meeting 20/06/2019	Irwin 2019 data provides sufficient reassurance of adequate data coverage negating the need for site specific surveys in the offshore cable corridor.	Noted
Natural England	ETG 4 Meeting 20/06/2019	NE satisfied with the approach to the assessment regarding the use of Nocturnal Activity Factors (NAF) (present outputs for alternative rates with discussion).	Acknowledged, the assessment has been carried out as agreed.

12.1.4 References

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

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

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

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

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