

# Norfolk Boreas Offshore Wind Farm

# Appendix 32.1

## Offshore CIA and Transboundary Impact Consultation

## Environmental Statement

## Volume 3

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*Photo: Ormonde Offshore Wind Farm*

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## 1 CIA and Transboundary Impact Consultation

**Table 1.1 Summary of consultation in relation to cumulative impact assessment**

Consultee	Document & Date	Comment	Response / where addressed in the ES
Chapter 8 Marine Geology Oceanography and Physical Processes			
Secretary of State	Scoping Opinion June 2017	The Applicant should ensure that all projects that have the potential to interact with the Proposed Development are considered and should demonstrate that they have not focussed solely on offshore wind farms, for example by determining whether there are any other developments in the marine area with potential for cumulative impacts.	Projects other than offshore wind farms are considered in the CIA (section 8.8).
Secretary of State	Scoping Opinion June 2017	The SoS considers that the environmental baseline should be established having regard to conditions present at the time of surveys and that Norfolk Vanguard should be considered within the cumulative impact assessment(s) (CIA).	Surveys completed for Norfolk Boreas are summarised in section 8.5.2 and detailed in the baseline environment (section 8.6). Norfolk Vanguard is considered in the cumulative impact assessment (section 8.8)
The MMO	PEIR Section 42 Response December 2018	<p>In comparison to the rest of the PEIR, the presentation of the cumulative assessment for coastal processes appears relatively simplistic. In particular, figures 8.15 and 8.16 show large areas of overlap for the effects in wave and tidal currents due to the several adjacent OWFs. The cumulative assessment within the PEIR describes this as simply an extension of the area of impact, applying the negligible impact assessment for each area individually to the whole. However, the Norfolk Boreas OWF contains the overlapping zones of influence of two other windfarms along the south-south east / north-north west wave propagation axis, suggesting that magnitude of effects may be increased in this area.</p> <p>The MMO requests the EIA acknowledges this and further justification is provided to demonstrate why this is of no concern to the maintenance of marine processes in the southern</p>	The cumulative impacts assessment has been expanded from that presented within the PEIR (section 8.8). This section of the ES includes a cumulative assessment of impacts to the tidal and wave climates (section 8.8.3) and a cumulative assessment of changes to seabed level as a result of multiple projects constructing at the same time (section 8.8.3.3).

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		North Sea. This should acknowledge (i) the observation that the majority of sediments are potentially mobilised 60-80% of the time under measured wave and current conditions (Table 7, sand wave clearance report) and (ii) that the dynamics of sandbank systems are poorly understood and the complex sediment transport patterns could mean that apparently slight changes in some areas could contribute to unexpected wider consequences.	
MMO	PEIR Responses 11 <sup>th</sup> December 2017	This study does show considerable overlap between the envelope of effects on hydrodynamics (in terms of wave height) for an adjacent development (East Anglia Three) and Norfolk Vanguard East. The assessment essentially concludes that effects of each individual development are negligible, and that the cumulative impacts are negligible also. However, the method used (simple extension of modelling results for a third individual development) does not convincingly support this conclusion since the original results did not assess in-combination effects.	The approach to cumulative operational effects on waves was based on expert assessment (overlapping of zones of potential influence) as described in section 8.8.3 The modelling results of East Anglia ONE were used in the expert assessment merely to show that changes to waves due to the presence of foundation structures would be small in magnitude and localised in spatial extent (i.e. restricted to the vicinity of each foundation), and that this applies to cumulative layouts as well as for individual wind farm layouts.
Chapter 10 Benthic and Intertidal Ecology			
Secretary of State	Scoping Opinion June 2017	The Scoping Report states that potential cumulative impacts with proposed adjacent offshore wind farms could occur. However, it also states that there is unlikely to be significant overlap in impact zones during construction given the predicted localised nature of potential impacts and staggered construction programmes. The SoS notes construction of the offshore elements of the Proposed Development would be between 2025-2028 and that the Norfolk Vanguard Scoping Report	Section 10.8 in Chapter 10 Benthic and Intertidal Ecology

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		identified construction between 2023-2027. The SoS therefore considers that there is a high likelihood of overlapping construction periods. The Applicant should take this into account in the cumulative assessment.	
Secretary of State	Scoping Opinion June 2017	The ES should provide evidence to support the assertion that the recoverability of the species found, mean that cumulative impacts are unlikely to be significant.	Section 10.7.4 and section 10.7.5 in Chapter 10 Benthic and Intertidal Ecology
MMO	Section 42 Consultee Response (December 2018)	The MMO notes the findings of the 2014 MMO review, and the limitations of the post-construction monitoring which was based on round 1 wind farms which are neither comparable in size to Norfolk Boreas OWF nor considered as a network of arrays with cumulative or combined effects. Uncertainty remains over the long term impact of these larger developments, therefore the MMO would welcome further discussion with the developer on whether monitoring should be restricted to Annex 1 habitats, and to consider the most appropriate monitoring approach.	Monitoring requirements would be agreed with the MMO in consultation with the relevant SNCBs as outlined in the In Principle Monitoring Plan (document reference 8.12). The current strategy for monitoring is provided in section 10.7.2..
<b>Chapter 11 Fish Ecology</b>			
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology Method Statement Feedback	Eastern IFCA do not agree that already installed infrastructure and practiced licenced activities should not be included in the cumulative impact assessment. All possible cumulative impacts need to be assessed, regardless of whether an activity is already licenced, installed or otherwise. This should include, but not necessarily be limited, planned and licenced wind farm and aggregate dredging activity in the Southern North Sea.	In the cumulative assessment consideration is given to licenced activities such as aggregate dredging in the Southern North Sea and to other offshore wind farms planned, consented and those currently under construction.  In the case of wind farms that are already operational, however, it is considered that these form part of the existing baseline and therefore they are not included in the cumulative assessment (Section 11.8 of Chapter 11 Fish and Shellfish Ecology).

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Eastern IFCA	December 2017 Norfolk Vanguard PEIR Response	Sandeels rely on sandbanks and other sandy substrata similar to those found in the Haisborough, Hammond and Winterton SCI (Ellis et al., 2012). There is a potential pathway for the species to be impacted by the construction and operational work, as well as by the habitat loss associated with unburied, protected cable, however the PEIR has identified these as not significant. This should be further considered to address the cumulative impacts of the project on sandeels with other plans and projects in the Southern North Sea.	<p>Consideration has been given to the potential impacts of the construction and operation phases of the project on sandeels (Section 11.7 and Section and Section 11.8 and Chapter 11 Fish and Shellfish Ecology).</p> <p>The assessment carried out in respect of permanent loss of habitat takes account of the potential habitat loss as a result of the footprint of the project, including areas of unburied cable where protection may be required (Section 11.7.5.1 of Chapter 11 Fish and Shellfish Ecology).</p> <p>An assessment of the potential cumulative impacts of the project on sandeels, and other fish and shellfish receptors, in conjunction with other developments in the Southern North Sea, has been undertaken and is presented in Section 11.8 of Chapter 11 Fish and Shellfish Ecology. All potential impacts assessed for the project alone have also been considered for assessment of cumulative impacts.</p>
Eastern IFCA	December 2017 Norfolk Vanguard PEIR Response	Sandeels depend on the presence of adequate sandy substratum in which they burrow, and are demersal spawners that lay eggs on the seabed. Physical disturbance or loss of the seabed associated with the construction phase of the project could therefore have damaging impacts on this species. [Despite the conclusion that this impact will not be significant], we think the effects of offshore wind construction on fish and	The regional distribution of sandeels has been given consideration both for assessment of potential impacts of the project alone and cumulatively with other developments (Section 11.7, and Section 11.8 of Chapter 11 Fish and Shellfish Ecology).



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		shellfish spawning and nursery grounds should be considered at a regional scale.	Similarly, consideration has been given to the regional distribution of spawning and nursery grounds of relevant species for assessment of potential impacts of the project alone and cumulatively with other projects (Section 11.7, and Section 11.8 of Chapter 11 Fish and Shellfish Ecology).
Eastern IFCA	December 2017 Norfolk Vanguard PEIR Response	Although the best available information (Coull et al., 1998; Jensen et al., 2011; Ellis et al., 2012) shows extensive spawning grounds for many species, Eastern IFCA is concerned about the scale of offshore activities (particularly aggregate extraction and offshore wind farm construction) in the Southern North Sea because of cumulative effects these could have on seabed habitats. Whilst we appreciate the difficulty in studying potential wide-scale impacts, we consider the issue does warrant further consideration.	Cumulative impacts in relation to fish and shellfish species are assessed in Section 11.8 of Chapter 11 Fish and Shellfish Ecology.  Potential cumulative impacts on seabed habitats are discussed in Chapter 10, Benthic and Intertidal Ecology.
Eastern IFCA	December 2017 Norfolk Vanguard PEIR Response	Eastern IFCA maintains concerns about the potential for electromagnetic fields (EMF) from marine electricity cables affecting fish species, especially elasmobranchs (sharks, skates and rays) that are the most widespread electrosensitive fish group of UK coastal waters (CMACS, 2003). This is an increasing concern as the number of offshore energy development (and therefore marine electricity cables) increases – therefore cumulative effects of multiple developments must be considered. Currently there is uncertainty over whether EMF from cables does have an impact on receptive species. We suggest that the environmental impact assessment must present the latest understanding of this issue, and if appropriate, precautionary mitigation must be applied (e.g. use of high-permeability materials for armouring cables) to minimise impacts.	The assessment of the potential impact of electromagnetic fields (EMFs) on fish and shellfish species is based on the worst case scenario identified for the project (Table 11.5 of Chapter 11 Fish and Shellfish Ecology).  In the context of the assessment of EMFs it is important to note that from the results of post-consent monitoring conducted to date, there is no evidence to suggest that EMFs pose a significant threat to elasmobranchs at the site or population level, and little uncertainty

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			<p>remains (MMO, 2014) (see Chapter 11 Fish and Shellfish Ecology).</p> <p>Consideration has been given in the cumulative assessment to the potential impact of EMFs associated with the project and other developments in the wider area on sensitive receptors (Section 11.8 of Chapter 11 Fish and Shellfish Ecology).</p> <p>As described in Section 11.7.1 of Chapter 11 Fish and Shellfish Ecology, cables will be buried where possible to a minimum depth of 1m and protected where cable burial is not feasible.</p>
<p>Natural England</p>	<p>December 2017 Norfolk Vanguard PEIR Response</p>	<p>Overall, NE agree with the conclusions presented regarding the potential impacts of EMFs upon a range of species. It is considered that any effects related to EMF would be temporary and most likely be short term behavioural changes. There has been evidence from certain OWF projects that have displayed increased numbers of elasmobranch species in post-construction surveys. However directly linking that to the presence of the cables and the operation of the windfarm has been difficult. Despite this, a minimum burial depth of between 1 m and 3 m should be retained. If the project gets consent any post-construction monitoring should identify an opportunity to study the effects of EMF further.</p>	<p>The assessment of the potential impact of electromagnetic fields (EMFs) on fish and shellfish species is based on the worst case scenario identified for the project (Section 11.7.5.4 and Table 11.5 of Chapter 11 Fish and Shellfish Ecology).</p> <p>In the context of the assessment of EMFs it is important to note that from the results of post-consent monitoring conducted to date, there is no evidence to suggest that EMFs pose a significant threat to elasmobranchs at the site or population level, and little uncertainty remains (MMO, 2014) (see Chapter 11 Fish and Shellfish Ecology)</p>

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			<p>Consideration has been given in the cumulative assessment to the potential impact of EMFs associated with the project and other developments in the wider area on sensitive receptors (Section 11.8 of Chapter 11 Fish and Shellfish Ecology).</p> <p>As described in Section 11.7.1 of Chapter 11 Fish and Shellfish Ecology, cables will be buried where possible to a minimum of 1m depth and protected where cable burial is not feasible.</p>
Natural England	December 2017 Norfolk Vanguard PEIR Response	It needs to be made clearer whether a cumulative impact assessment regarding impacts of construction noise has already been carried out. There doesn't seem to be much discussion around any associated impacts, considering there could be up to 7 projects within 100 km that could have an effect. NE believes there is a tendency in this section to still be focused on the immediate area of the Vanguard project and not the wider cumulative effects. The more projects that are piling sequentially and concurrently are obviously increasing the area of disturbance, but also reducing the areas the fish can move into to avoid this disturbance. This needs to be reflected in table 11.21, as the cumulative impact of noise from construction will not just affect species with spawning grounds in the Norfolk Vanguard area.	Consideration has been given to all fish and shellfish ecology receptors in relation to potential cumulative impacts with other projects as a result of construction noise (Section 11.8 of Chapter 11 Fish and Shellfish Ecology).
MMO	December 2018 Norfolk Boreas PEIR Responses	Sandeel are demersal fish which spawn in the areas which they inhabit. They have specific habitat requirements in terms of the substrate in which they live, so they are particularly vulnerable to marine developments which either disturb/remove their habitat or change the composition of the substrate in which	Consideration has been given in the cumulative assessment to the potential for other projects and activities in the Southern North to result in cumulative

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		<p>they live. The magnitude of effect of such impacts could be further enhanced, should the activities (e.g. construction, dredging etc.) be undertaken during the winter hibernation period when Sandeel are most vulnerable. The MMO notes that large areas of the Southern North Sea that are considered to be suitable sandeel habitat are currently in the operational, construction or planning stages for large offshore windfarm developments and expects that the cumulative effects will be fully assessed in the EIA.</p>	<p>impacts on fish and shellfish receptors, including sandeels (section 11.8).</p>
MMO	December 2018 Norfolk Boreas PEIR Responses	<p>The MMO considers the likely effects on sandeel are uncertain, as very little monitoring is being undertaken to investigate the cumulative impacts to sandeel as a result of the construction and operation of offshore windfarms. The MMO seeks to understand how this uncertainty will be addressed in the EIA, and how the developer proposes to validate EIA predictions concerning impacts to sandeel.</p> <p>The MMO acknowledges that EIAs for previous developments have concluded impacts to sandeel are unlikely to be significant. The rationale given is that there are other areas of suitable habitat in the wider Southern North Sea area which sandeel can inhabit.</p> <p>However, this conclusion overlooks two key issues. (i) There are many areas of the wider Southern North Sea area that are not suitable sandeel habitat, e.g. due to incompatible substrate composition, water depth. (ii) Large areas of the Southern North Sea are already being utilised by marine developments including OWFs and aggregate extraction, which further reduces available sandeel habitat. The MMO advises that these are addressed in the EIA.</p>	<p>Consideration has been given to the potential impacts of the construction, operation and decommissioning phases of the project on sandeels (sections 11.7, 11.8 and 11.9).</p> <p>In addition, consideration has been given in the cumulative assessment to the potential for other projects and activities to result in cumulative impacts on sandeels (section 11.8).</p> <p>In the context of the cumulative assessment, with regards to construction works, the temporary and localised nature of potential impacts associated with other projects/activities should be noted. Furthermore, with regards to increased SSCs and sediment re-deposition, as noted in Chapter 8 Marine Geology, Oceanography and Physical Processes, negligible cumulative seabed level changes (i.e. 2mm) would be</p>

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			<p>expected given the rapid dispersion of sediment plumes.</p> <p>With regards to longer term cumulative impacts during operation such as permanent loss of habitat, the fact that habitat loss would only occur around relatively small localised areas at each individual project should be noted. Furthermore, studies of fish assemblages in operational wind farms (Stenberg et al., 2011; 2015) have not detected significant changes to sandeel populations. It has been suggested (Stenberg et al., 2015) tha direct loss of habitat associated with offshore wind farm infrastructure and indirect effects (i.e. changes to sediment composition) are too low to influence the abundance of sand-dwelling species such as sandeels. This would also apply in a cumulative context.</p>
<p>Eastern Inshore Fisheries and Conservation Authority (IFCA)</p>	<p>December 2018 Norfolk Boreas PEIR Responses</p>	<p>Sandeels, which inhabit and spawn in the project area, are among the most important prey species for harbour porpoise. We acknowledge that the PEIR assessment determined that there will be only a low magnitude of impact on fish species, including sandeel and herring, and that the impact of the proposed works on prey species of the Harbour Porpoise are therefore of ‘minor adverse significance’.</p> <p>We defer to Natural England for formal conservation advice on this matter, however we would like to once again highlight Eastern IFCA’s concern about the scale of both licensed and planned offshore activities (particularly aggregate extraction and</p>	<p>Noted.</p> <p>Consideration has been given in the cumulative assessmen to the potential for other projects and activities in the Southern North to result in cumulative impacts on fish and shellfish receptors, including sandeels (section 11.8).</p>

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		<p>offshore wind farm construction) in the Southern North Sea, because of cumulative effects these could have on seabed habitats. Sandeels depend on the presence of adequate sandy substratum in which they burrow and are demersal spawners that lay eggs on the seabed. Whilst we appreciate the difficulty in studying potential wide-scale impacts of all offshore activity, this is an important issue requiring consideration.</p>	
<p>Inshore Fisheries and Conservation Authority (IFCA)</p>	<p>December 2018 Norfolk Boreas PEIR Responses</p>	<p>Eastern IFCA holds concerns about the proliferation of marine electricity cables off the East Anglian coast and the potential – but very poorly understood – impacts of electromagnetic fields on marine life. We would like to highlight that there are appreciable gaps in the scientific literature as to the potential effects of EMF emissions from subsea cables on marine fauna, and therefore there remain uncertainties in the ability of the Applicant to determine that there will be no adverse effects on fish and shellfish ecology.</p>	<p>The assessment of the potential impact of electromagnetic fields (EMFs) on fish and shellfish species is based on the worst case scenario identified for the project (Table 11.13) and taking account of best available information.</p> <p>In the context of the assessment of EMFs it is important to note that from the results of post-consent monitoring conducted to date, there is no evidence to suggest that EMFs pose a significant threat to elasmobranchs at the site or population level, and little uncertainty remains (MMO, 2014) (section 11.7.5.4.1).</p> <p>Consideration has been given in the cumulative assessment to the potential impact of EMFs associated with the project and other developments in the wider area on sensitive receptors (section 11.8).</p> <p>As described in section 11.7.1, cables will be buried where possible to a minimum</p>

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			depth of 1m and protected where cable burial is not feasible.
VisNed	Norfolk Boreas PEIR Response December 2018	The maps, that are used in the PEIR, are based on research from Eliis et al. 2010 and Coull et al. from 1998. The latter one is a study more than twenty years old. For a proper view, you need to have at least maps with data from the past five years. Even if you have this information, it remains extremely difficult to measure the nursery and spawning grounds in the future. To get a fair picture of the impact of offshore windmills, you should use a different economic approach. This assessment should not only focus on the micro effects of this/any specific windfarm involved, but include the cumulative economic and ecological impact from the large scale transformation of EEZ's resulting from the large scale rolling out of renewable energy projects. VisNed is available to help with this subject.	Coull et al. 1998 and Ellis et al. 2010 provide a broad scale overview of the potential extent of spawning/nusery grounds and relative intensity and duration of spawning. The limitations of these publications are noted in Appendix 11.1.  Potential impacts on fish and shellfish species have been considered in relation to the project alone (section 11.7) as well as cumulatively with other projects and activitie in the wider Southern North Sea (section 11.8).
Chapter 12 Marine Mammals			
Secretary of State	June 2017 (Scoping Opinion)	The SoS considers that the environmental baseline be established having regard to conditions present at the time of surveys and that Norfolk Vanguard should be considered within the cumulative impact assessment(s) (CIA).	The environmental baseline will consider the existing conditions.  Norfolk Vanguard is included within the CIA scenario in Appendix 12.5.
Secretary of State	June 2017 (Scoping Opinion)	The Applicant should ensure that all projects that have the potential interact with the Proposed Development are considered and should demonstrate that they have not focussed solely on offshore wind farms, for example by determining whether there are any other developments in the marine area with potential for cumulative impacts.	The CIA (section 12.8 of Chapter 12 Marine Mammals) considers all marine projects that could have the potential for cumulative impacts.
The Wildlife Trust	08/12/17	Fishing must be included in the cumulative impact assessment. This is based on a precedent set when TWT began Judicial Review proceedings against the Department for Energy and Climate Change in August 2015 against the approval of Dogger	Fishing activity is considered part of the existing baseline, as it has existed in the North Sea for a long time before any OWF construction, it is not a recent or an

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	Norfolk Vanguard PEIR Response - 3.4: Cumulative impact assessment	Bank Offshore Wind Farm Order due to the exclusion of fishing from the in-combination assessment as part of the HRA. Fishing is a licensable activity and according to the Waddenzee case <sup>1</sup> , the regular grant of licenses constitutes a plan or a project. Although our position remained, TWT withdrew the claim due to assurances given by the government regarding the management of fishing within Dogger Bank SAC. One of those assurances was that steps would be put in place to ensure that this scenario would not happen again and that Defra and DECC would work together to ensure fishing would be included in future offshore wind farm impact assessments. Although our challenge was in relation to the lack of inclusion of fishing as part of the HRA assessment, the same principle should apply to the EIA cumulative assessment.	increasing activity (in most areas fishing is currently in decline). It is more appropriate for fishing to be assessed as part of a more strategic assessment rather than project / developer led assessment.
Natural England	03/01/2018 – Point 7: Technical Advice	Marine mammal swimming speed in response to proposed mitigation and PTS cumulative SEL exposure: We note that this is a different approach to other EIAs and HRAs, but we are content to consider the increased marine mammal swimming speed of 1.8m/s (rather than the standard 1.5m/s) providing adequate evidence is provided as justification supporting this approach and is not used for assessing disturbance in the EIA.	The SEL <sub>cum</sub> in the noise modelling has been based on the average swimming speed of 1.5m/s (Otani et al., 2000), as a precautionary approach. However, where relevant the assessment also includes reference to a swimming speed of 1.8m/s, which is more representative of a fleeing animal (e.g. Kastelein et al. (2018) recorded swimming speeds of 1.97m/s during playbacks of pile driving sounds).
The Wildlife Trust	letter dated 7 <sup>th</sup> December 2018  Comments on the Norfolk Boreas PEIR	TWT consider that fishing should be included in both cumulative and in-combination assessments. Fishing is a licensable activity that has the potential to have an adverse impact on the marine environment. This is supported in the leading case C-127/02 Waddenzee [2004] ECR I-7405, the CJEU held at para. 6.	By-catch by commercial fisheries is recognised as a historic and continuing cause of harbour porpoise mortality in the Southern North Sea (SNS). This will therefore be a factor in shaping the size

<sup>1</sup> C-127/02 Waddenzee [2004] ECR I-7405



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		<p>“The act that the activity has been carried on periodically for several years on the site concerned and that a licence has to be obtained for it every year, each new issuance of which requires an assessment both of the possibility of carrying on that activity and the site where it may be carried on, does not itself constitute an obstacle to considering it, at the time of each application, as a distinct plan or project within the meaning of the Habitats Directive”.</p> <p>This case law demonstrates that fishing is considered a plan or a project and therefore not part of the baseline.</p> <p>Current Defra policy is to ensure that all existing and potential fishing operations are managed in line with Article 6 of the Habitats Directive. The current, risk-based, ‘revised approach’ to fisheries management in European Marine Sites is a compromise agreed by all to prevent the closure of fisheries during assessment. This approach further supports that fishing is considered a plan or a project and therefore must be included in the in-combination assessment in line with Article 6(3) of the Habitats Directive.</p> <p>A precedent was set for the inclusion of fishing in in-combination assessments when TWT began Judicial Review proceedings against the Department for Energy and Climate Change (DECC) in August 2015 against the approval of Dogger Bank Teesside A &amp; B Offshore Wind Farm Order due to the exclusion of fishing from the in-combination assessment as part of the HRA. TWT withdrew the claim due to assurances given by the government regarding the management of fishing within Dogger Bank SAC. One of those assurances was that steps would be put in place to ensure that this scenario would not happen again and that Defra and DECC would work together to ensure fishing would be included in future offshore wind farm impact assessments.</p>	<p>of the current North Sea (NS) MU population.</p> <p>The available prey resource for harbour porpoise has also been influenced by historic and continuing commercial fishing.</p> <p>As a result, the Norfolk Boreas CIA and in-combination assessment considers commercial fisheries to be part of the baseline environment for marine mammals, including harbour porpoise.</p> <p>Noise from vessels associated with other, non-wind farm, plans or projects such as oil and gas, aggregates and commercial fisheries, are also considered to be part of the baseline conditions.</p> <p>This approach is in accordance with the Planning Inspectorate Advice Note 17 Cumulative Effects Assessment.</p> <p>The draft RoC HRA suggests that by-catch has not hindered the population achieving FCS. Information from the BEIS (2018) draft RoC HRA have been included in section 12.4.2.</p> <p>See Appendix 12.1 for full response.</p>

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The Wildlife Trust	letter dated 7th December 2018 Comments on the Norfolk Boreas PEIR	<p>TWT is pleased that Norfolk Boreas has considered the additive effect of all noise producing activities from construction on marine mammals. However, we note in table 12.77 that concurrent piling has not been taken into account. As the worst-case scenario, this should be considered.</p> <p>Due to the difficulties in undertaking cumulative and in-combinations assessments, TWT advocates a strategic approach and we are pleased that Norfolk Boreas is also supportive of this. TWT would like to work with industry, SNCBs, regulators and government to develop the most appropriate approach. The BEIS draft HRA for the review of offshore wind farms consents in the Southern North Sea SCI has considered the effect of a loss of habitat due to infrastructure in relation to objective 3 for the site. This should be considered for the Norfolk Boreas assessment.</p>	<p>The approach to the summary and conclusions of the CIA, based on the five UK offshore wind farms single piling, would allow for some of these sites not to be piling at the same time while others, including Norfolk Boreas, could be concurrent piling. This is considered the more realistic worst-case scenario, as even although the offshore wind farms have the potential for overlapping piling periods, it is highly unlikely that all five offshore wind farms could be concurrently piling at exactly the same time (i.e. all five offshore wind farms hitting two piles at exactly the same time).</p> <p>Norfolk Boreas is supportive of strategic initiatives, and will continue to work alongside other developers, Regulators and SNCBs in order to further understand the potential for significant cumulative impacts and in-combination effects.</p> <p>The effect of a loss of habitat due to infrastructure has been assessed in the ES and the Information to Support HRA in the assessment for any changes to prey availability. This is deemed the most appropriate approach to assessing habitat loss due to infrastructure and the potential impacts on marine mammals, including harbour porpoise in the SNS Special Area of Conservation (SAC).</p>

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Natural England	03/01/2018 – Point 2: Technical Advice	Use of SCANS III population data: We can confirm that it is appropriate to use the SCANS III population data as the same area is used as the Management Unit. Vattenfall should ensure that the following abundances are used: North Sea MU harbour porpoise abundance 345,373 (CV – 0.18, CL low – 246,526 and CL high 495,752).	The North Sea MU population of 345,373 (CV = 0.18; 95% CI = 246,526-495,752; Hammond et al., 2017) based on the SCANS-III data has been used as the reference population throughout the assessment.
Natural England	03/01/2018 – Point 7: Technical Advice	Marine mammal swimming speed in response to proposed mitigation and PTS cumulative SEL exposure: We note that this is a different approach to other EIAs and HRAs, but we are content to consider the increased marine mammal swimming speed of 1.8m/s (rather than the standard 1.5m/s) providing adequate evidence is provided as justification supporting this approach and is not used for assessing disturbance in the EIA.	The SEL <sub>cum</sub> in the noise modelling has been based on the average swimming speed of 1.5m/s (Otani et al., 2000), as a precautionary approach. However, where relevant the assessment also includes reference to a swimming speed of 1.8m/s, which is more representative of a fleeing animal (e.g. Kastelein et al. (2018) recorded swimming speeds of 1.97m/s during playbacks of pile driving sounds).
Whale and Dolphin Conservation	letter dated 28th November 2018 Comments on the Norfolk Boreas PEIR	We have serious concerns about the potential impacts these developments, both individually and cumulatively, have on cetaceans. These concerns are detailed in our report "Marine Renewable Energy: A Global Review of the Extent of Marine Renewable Energy Developments, the Developing Technologies and Possible Conservation Implications for Cetaceans" available at <a href="http://uk.whales.org/sites/default/files/wdc-marine-renewable-energy-report.pdf">http://uk.whales.org/sites/default/files/wdc-marine-renewable-energy-report.pdf</a>	Acknowledged.
Whale and Dolphin Conservation	letter dated 28 <sup>th</sup> November 2018 Comments on the Norfolk Boreas PEIR	We agree with the approach for the cumulative impact assessment (CIA) in paragraph 51, as this is the only way to ensure the cumulative impacts on the SNS SCI are adequately assessed. We agree with the other offshore wind farms that have been included in the CIA, however activities other than offshore wind farm construction within the SNS SCI, do not seem to be included e.g. oil and gas, marine aggregates etc.	The project and plans included in the CIA were determined in the CIA screening (Appendix 12.3), including marine aggregates etc. Seismic surveys from the oil and gas industry have been included in the CIA.

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Whale and Dolphin Conservation	letter dated 28 <sup>th</sup> November 2018 Comments on the Norfolk Boreas PEIR	During piling activities, it is possible that there could be two vessels driving piles at any one time, and that pile-driving will start at one site, and then continue at another. We recommend that the CIA includes pile driving commencing at a second location, whilst the first is still being driven. The impact of the second pile driving location on the harbour porpoise population of the SNS SCI is highly dependent upon the location of the second pile-driving site which is likely to have a different potential area of impact to the first. This second pile-driving location will increase the noise levels generated and have a cumulative impact.	An assessment of the potential effects of concurrent piling has been undertaken for both Norfolk Boreas alone (see section 12.7.3.2.4) and for concurrent piling at Norfolk Boreas cumulatively with other offshore wind farms (see section 12.8.4.1).
Whale and Dolphin Conservation	letter dated 28 <sup>th</sup> November 2018 Comments on the Norfolk Boreas PEIR	WDC are pleased to see that that Cumulative Impact Assessment (CIA) includes a full range of projects that may overlap with impacts from other offshore activities. We agree with the listed projects and plans in Appendix 2.2 Marine Mammal Cumulative Impact Assessment (CIA) Screening, and believe these to be appropriate. We appreciate that the CIA has been based on the best available information, and that plans for any projects may change at any time; we agree that the approach taken provides the best information to base the most reliable CIA assessment.	Acknowledged.
Whale and Dolphin Conservation	letter dated 28 <sup>th</sup> November 2018 Comments on the Norfolk Boreas PEIR	We are pleased that other developments, including cross boundary developments are being taken into account when undertaking the assessment. We recognise that the impacts on transboundary sites will be included in the Report to inform the HRA, and we request to see a copy of this document for review once it is available. Cumulative effects from across marine boundaries need to be considered to consider all potential transient impacts across such boundaries, especially considering the mobile nature of cetaceans.	Acknowledged. A draft of the information to inform HRA was provided to the EPP for review on the 25 <sup>th</sup> March 2019.

Consultee	Document & Date	Comment	Response / where addressed in the ES
Whale and Dolphin Conservation	letter dated 28th November 2018 Comments on the Norfolk Boreas PEIR	In addition, having a second pile-driving location will increase the noise levels generated and have a cumulative impact. We recommend that the same consideration is given to marine mammals when the second pile-driving occurs as is given to the first and that it is not assumed that animals have moved out of the area as pile driving has already commenced elsewhere.	An assessment of the potential effects of concurrent piling has been undertaken for both Norfolk Boreas alone (see section 12.7.3.2.4) and for concurrent piling at Norfolk Boreas cumulatively with other offshore wind farms (see section 12.8.4.1).
Eastern Inshore Fisheries and Conservation Authority	letter dated 7th December 2018 Response to Norfolk Boreas PEIR	<p>Whilst the East Marine Plans state that proposals that contribute to offshore wind energy generation within the Plan area should be supported, consideration needs to be given to the cumulative impacts that developments within the area and adjacent areas have on the ecosystem.</p> <p>The East Marine Plans support sustainably-developed offshore wind energy generation projects. There are many such projects in the southern North Sea, including Dudgeon, Sheringham Shoal, Scroby Sands, Race Bank, Triton Knoll, Lynn and Inner Dowsing, Lincs, East Anglia and Norfolk Vanguard offshore wind farms as well as other projects and plans. While Eastern IFCA appreciate that the cumulative impacts of Norfolk Boreas with Norfolk Vanguard, East Anglia THREE and aggregate extraction activities have been comprehensively assessed within this PEIR, Eastern IFCA do not agree with the cumulative impact approach taken, in particular the consideration that already operational offshore wind farms, active licenced activities and implemented measures form part of the existing environment. Eastern IFCA would encourage further assessment of the cumulative impacts of all Southern North Sea wind farm activity, licenced or otherwise, as well as other activities. The impacts of these projects on the marine environment and fisheries should be assessed in-combination, highlighting any potential cumulative effects associated with the licence application and guiding</p>	<p>The project and plans included in the CIA were determined in the CIA screening (Appendix 12.3).</p> <p>The CIA for marine mammals has taken into account operational offshore wind farms (see section 12.8.5.2).</p>

Consultee	Document & Date	Comment	Response / where addressed in the ES
		decision-making and plan implementation in a stepwise approach.	
Chapter 13 Offshore Ornithology			
Secretary of State	Scoping Opinion, June 2017	The potential for cumulative construction impacts should be considered, particularly with Norfolk Vanguard.	This aspect has been considered in section 13.8 of Chapter 13 Offshore Ornithology
Natural England	Scoping Opinion, June 2017	Have the relevant potential cumulative impacts been identified? If not, please provide details. 583: We agree with the potential cumulative impacts that have been identified by the Applicant, namely: collision risk, barrier effects which impact upon migration routes and indirect impacts on prey species. However, consideration should also be given to cumulative displacement impacts.	Cumulative displacement has been assessed in section 13.8.2.6 of Chapter 13 Offshore Ornithology
Natural England	Scoping Opinion, June 2017	We also note that other offshore windfarms within the former East Anglia Zone could be of relevance in terms of potential for overlap in construction periods (particularly Norfolk Vanguard) and hence advise that cumulative construction impacts are considered.	The potential for cumulative construction impacts has been considered in section 13.8.1 of Chapter 13 Offshore Ornithology
Natural England	PEIR 27 <sup>th</sup> November 2018	Natural England has identified a number of concerns that have not been addressed sufficiently and need addressing in the assessment of impacts on offshore ornithology receptors. These can be summarised as follows: <ul style="list-style-type: none"> <li>• Seasonal definitions;</li> <li>• Seasonal apportioning of impacts for Habitats Regulations Assessments (HRA);</li> <li>• Assessment of displacement impacts (EIA and HRA);</li> <li>• Collision risk modelling (CRM) (EIA and HRA);</li> <li>• Cumulative and in-combination assessments (displacement and CRM);</li> <li>• Population modelling approaches (EIA and HRA).</li> </ul>	Seasonal definitions are defined in section 13.6.2.1. Where relevant the assignment of months to seasons has been discussed in the text.  Impacts in relation to Special Protection Areas (SPAs) are assessed in full in the Information for the Habitats Regulations Assessment, including consideration of appropriate apportioning among populations and seasons.

Consultee	Document & Date	Comment	Response / where addressed in the ES
			<p>Displacement is assessed in sections 13.7.3.1, 13.7.4.1 and 13.8.2.6, These assessments have been informed by responses provided for the Norfolk Vanguard project by Natural England and the applicant.</p> <p>Collision risk is assessed in section 13.7.4.3. This assessment has been informed by responses provided for the Norfolk Vanguard project by Natural England and the applicant.</p> <p>No new population modelling has been undertaken for the current assessment as the existing population projections produced for previous applications are considered to remain valid.</p>
RSPB	PEIR 7 <sup>th</sup> December 2018	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 deterministic collision risk model, the use of revised nocturnal activity factors and the change in approach to the baseline used in cumulative assessments.	The assessment has been updated to address the comments raised by the RSPB (section 13.7.4.3).
RSPB	PEIR 7 <sup>th</sup> December 2018	Cumulative collision Risk:	The cumulative collision risk assessment has been updated (section 13.8.2.7) and

Consultee	Document & Date	Comment	Response / where addressed in the ES
		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 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.	is considered to provide a robust, evidence based assessment
RSPB	PEIR 7 <sup>th</sup> December 2018	Projects constructed in 2016 or earlier are considered part of the baseline for the purposes of the cumulative collision risk assessment for the reason that these pre-date the Norfolk Boreas ornithological surveys. We note that previous projects have considered that the baseline does not include the effects of older windfarms due to the fact that much of the available seabird population data pre-dates these projects. Given that this represents a change to the previously accepted approach and the justification does not address the original issues raised, we do not consider that sufficient evidence has been presented to accept this change.	This statement by the RSPB appears to be in error: this approach was not used in the assessment of collision risk presented in the PEIR and has also not been used in the collision assessment presented in this ES.
		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 13% for gannets, 14% 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.	It is acknowledged that the legal aspect of the argument made by the RSPB with respect to acceptance of lower collision risks for wind farms constructed with fewer turbines (and invariably using turbines which generate lower per capita collision risks). However, it is still informative to consider this aspect as it contributes to the growing degree of precaution in offshore wind farm impact assessments.



Consultee	Document & Date	Comment	Response / where addressed in the ES
		<p>Cumulative displacement:</p> <p>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.</p>	<p>The assessment of red-throated diver displacement (sections 13.7.3.1.2, 13.7.4.1.1 and 13.8.2.6.1) and for guillemot and razorbill (sections 13.7.4.1.3 and 13.8.2.6) have been conducted using accepted methods and with rate of displacement and mortality derived from a detailed review of available evidence. The magnitude and significance of predicted impacts follows the methods as set out in section 13.4.1.</p>
Ministry of Infrastructure and Water Management, Netherlands (RWS)	Email received 14th January 2019	<p>With regard to ornithology we appreciate you took into consideration our earlier comments to Norfolk Vanguard. We also understand your remarks regarding the operational wind parks. But it does not consider the fact that by 2023 4,5 GW of wind parks in the Netherlands will have been built. These volumes can not be ignored when assessing displacement.</p> <p>We understand that there is no international cumulative approach yet.</p>	<p>It is acknowledged that as yet there is no international cumulative approach. As noted in this response, methods for combining impacts from projects assessed in different countries have not been developed. However, the impact assessments for the planned wind farms in the Netherlands have been discussed in section 13.9.</p>
<b>Chapter 14 Commercial Fisheries</b>			
Secretary of State	June 2017 Norfolk Boreas Scoping Opinion Response	<p>The SoS welcomes that the proposed cumulative assessment will take into account other wind farm developments within the former East Anglia Zone. However, consideration should be given to the wider cumulative impacts arising from other wind farms off the Norfolk Coasts which lay outside this zone.</p>	<p>The assessment of cumulative impacts (Section 14.8 of Chapter 14 Commercial Fisheries) takes account of other offshore wind farm projects in the former East Anglia Zone and the wider area, including both UK and non-UK projects and takes account of all relevant fleets, including local fleets.</p>

Consultee	Document & Date	Comment	Response / where addressed in the ES
Norfolk County Council	June 2017 Norfolk Boreas Scoping Opinion Response	The Scoping Report specifically refers to the need to take into account the potential cumulative impacts of other wind farm developments within the former East Anglia Zone (page 161 para 622). While supporting this principle, it is felt that the EIA should take into account the wider cumulative impacts arising from other operational, consented and proposed wind farms off the Norfolk Coast (i.e. taking into account wind farms consented under earlier consenting rounds / licencing regimes). Commercial fishing contributes to the coastal economy in Norfolk and as such the impacts of this proposal alongside those already operational, consented or planned needs to be carefully considered.	The assessment of cumulative impacts (Section 14.8 of Chapter 14 Commercial Fisheries) takes account of offshore wind farm projects under construction, consented and proposed in the former East Anglia Zone and the wider area, including both UK and non-UK projects and takes account of all relevant fleets, including local fleets.  As outlined in Section 14.5 of Chapter 14 Commercial Fisheries, operational projects are considered to be part of the existing environment and therefore have not been included in the cumulative assessment.
Norfolk County Council	June 2017 Norfolk Boreas Scoping Opinion Response	The EIA/PEIR should consider the potential impact of the offshore scheme, including any underwater cable routes and other ancillary development, on Norfolk's commercial fishing interests. The EIA will need to consider the wider cumulative impacts taking into account existing operational wind farm; those under constructions; those consented and those in planning. The EIA should set out appropriate mitigation, and where necessary indicate what compensation, will be given to those commercial fishing interests in Norfolk adversely impacted by the operation of the wind farm and/or ancillary development.  In addition the EIA should provide an indication of the likely impact on the local fishing industry particularly when other proposals are taken into account.	Consideration has been given in this chapter to all relevant offshore infrastructure associated with the project for assessment of potential impacts on commercial fisheries, including offshore cables (Table 14.19 of Chapter 14 Commercial Fisheries).  Proposed and consented wind farms in the former East Anglia Zone and the wider area (both UK and non-UK projects) have been included for assessment of cumulative impacts for all fisheries receptors, including local fleets (Section 14.8 of Chapter 14 Commercial Fisheries).  Operational wind farms are considered part of the existing environment and

Consultee	Document & Date	Comment	Response / where addressed in the ES
			<p>have therefore not been included in the cumulative assessment.</p> <p>A number of embedded mitigation measures have been incorporated as part of the design of the project. Those of relevance to commercial fisheries are described in Section 14.7.1 of Chapter 14 Commercial Fisheries. Where appropriate, additional mitigation measures have been identified. These will be implemented taking an evidence based approach in line with FLOWW guidance (Section 14.7.4.2.3 of Chapter 14 Commercial Fisheries).</p>
Eastern IFCA	October 2017 Norfolk Vanguard Consultation on PEIR	<p>The East Marine Plans support sustainably-developed offshore wind energy generation projects. There are many of such projects in the southern North Sea, including Dudgeon, Sheringham Shoal, Scroby Sands, Race Bank, Triton Knoll, Lynn &amp; Inner Dowsing, Lincs, and East Anglia offshore windfarms as well as other projects and plans. While Eastern IFCA appreciates that the cumulative impacts of Norfolk Vanguard with Norfolk Boreas and East Anglia THREE offshore wind farms have been comprehensively assessed within this PEIR, Eastern IFCA would encourage further assessment on an ongoing basis of the cumulative impacts of all Southern North Sea wind farm activity, as well as other activities including aggregate extraction activities. The impacts of these projects on the marine environment and fisheries should be assessed in-combination, highlighting any potential cumulative effects associated with the licence application and guiding decision-making and plan implementation in a stepwise approach.</p>	<p>The assessment of cumulative impacts (Section 14.8 of Chapter 14 Commercial Fisheries) takes account of offshore wind farms under construction as well as consented and proposed projects in the former East Anglia Zone and the wider area, including both UK and non-UK projects.</p> <p>Operational offshore wind farm projects are considered to form part of the existing environment and therefore have not been included in the cumulative assessment.</p> <p>In addition to offshore wind farms, other projects/activities have been given consideration for assessment of cumulative impacts, including aggregate dredging areas (Section 14.8 of Chapter 14 Commercial Fisheries).</p>

Consultee	Document & Date	Comment	Response / where addressed in the ES
Eastern IFCA	October 2017 Norfolk Vanguard Consultation on PEIR	Where conclusions have been drawn within the PEIR that the project could have cumulative impacts with other plans/projects, these should be mitigated for wherever possible. This includes mitigation of the cumulative impacts on offshore ornithology, marine mammals and commercial fisheries.	The cumulative impacts of the project in conjunction with other projects and activities are assessed in Section 14.8 of Chapter 14 Commercial Fisheries. The cumulative assessment carried out did not identify significant cumulative impacts on fisheries receptors. Specific mitigation in respect of cumulative impacts, additional to those proposed in the assessment of the project alone has therefore not been proposed. Cumulative impacts on seabirds are discussed in Chapter 13 Offshore Ornithology.  Cumulative impacts on marine mammals are discussed in Chapter 12 Marine Mammals.
French Transboundary (Ministry for the Environment, France)	October 2017 Norfolk Vanguard Consultation on PEIR	There is a clear impact on professional sea fishing, especially for Dutch and Belgium fishers. Even though, the impact on French professional fishers is very limited, we have to take into account the potential impact of the movement of foreign ships in the French fishing area. This concern is due to the rising presence of windfarm projects in the North Sea.	Consideration has been given to the potential impacts of the project on all fishing fleets active in areas relevant to Norfolk Boreas, including the French fleet (Section 14.6.5 of Chapter 14 Commercial Fisheries).  The potential impact of loss of fishing grounds and subsequent potential for displacement has been assessed for the project alone and cumulatively with other projects (Section 14.7 and Section 14.8 of Chapter 14 Commercial Fisheries).
Natural England	October 2017 Norfolk Vanguard	Natural England do not necessarily agree that only impacts assessed as significant resulting from the construction and operation will have the potential to contribute to cumulative	All the potential impacts on commercial fisheries assessed for the project alone have been taken account of in the

Consultee	Document & Date	Comment	Response / where addressed in the ES
	Consultation on PEIR	effects. A range of smaller impacts over a long period of time could eventually become a significant impact	cumulative assessment (Section 14.8 of Chapter 14 Commercial Fisheries). Exceptions to this are safety issues and risks associated with seabed obstacles as it is understood that the same obligations will apply to other projects and therefore there is no potential pathway for a cumulative impact.
VisNed	Norfolk Boreas PEIR Response December 2018	<p>Several vessels (e.g. fly shoot fishery) fish in the area where the turbines will be built. This area is important, as can be seen on several maps in the Preliminary Environmental Information Report (EIR). The loss of a fishing ground is minor adverse for this specific win farm, but all the farms together have a severe influence on the fishing industry. Displacement is a consequence of the reduction of space.</p> <p>The fly shoot vessels that fish in the Boreas area now, are obliged to go to an area where other ships are fishing. It is an omission, in the opinion of VisNed, that there are no figures of the expulsion effects when vessels that fly shoot (or beam trawl) need to go to other areas. The consequence of this lack of information is that it is now unclear what the consequences of the wind farms are for this specific fishing industry.</p> <p>Furthermore, an economic approach by dividing zones, does not give a fair look at the impact that the wind mills will have on the fishing industry. The value of an area can differ per period and expulsion effects will also have an effect.</p>	<p>The assessment presented in the chapter considers the impact of loss of grounds on seine netting (fly shoot fishery) and associated displacement, both as a result of the project alone and cumulatively with other projects and activities (section 14.7 and section 14.8). With regards to wind farm projects, the cumulative assessment assumes that there is little potential for activity by seine netters to resume in operational wind farm sites.</p> <p>In the context of the assessment of cumulative impacts on this fleet, it is important to note that the highest levels of activity are recorded in the English Channel with relatively low levels of activity in the area of the project and the wider North Sea, where the majority of other projects and activities which could result in cumulative impacts are located.</p>
National Federation of Fishermen's Organisations (NFFO)	Norfolk Boreas PEIR Response December 2018	In the case of safety issues, we disagree that the same factors and obligations would apply to other projects/ activities that would negate the potential for cumulative effects occurring (Ch14, p54, para 236). This presupposes that those measures	With regards to safety risks in a cumulative context, as outlined in ES Chapter 14, it is considered that the same factors and obligations applied for the

Consultee	Document & Date	Comment	Response / where addressed in the ES
		removes the safety risk. In our view each project, where there is an interaction with fisheries will incrementally increase risk to a fleet overall, irrespective of measures applied.	project would apply to other projects/activities. Safety risks in a cumulative context would therefore remain as assessed for the project alone (i.e. within acceptable limits).
Chapter 15 Shipping and Navigation			
Secretary of State	Scoping Response / June 2017	If the Davy platform is still in place upon undertaking of the EIA, it should still be considered cumulatively even if it is planned to be decommissioned prior to construction. This includes cumulative effects of the decommissioning process.	The scenario in which the Davy platform is not decommissioned prior to the construction of Norfolk Boreas is included within the impact assessment (section 15.7 of Chapter 15 Shipping and Navigation).
MMO	Scoping Response / June 2017	Non-renewable developments such as aggregate dredging and port and harbour developments should be considered within the Cumulative Impact Assessment (CIA).	Marine aggregate dredging and port/harbour developments have been considered as part of the baseline (Section 15.6 of Chapter 15 Shipping and Navigation).
Trinity House	Scoping Response / June 2017	The NRA should include: <ul style="list-style-type: none"> <li>Comprehensive vessel traffic analysis in accordance with MGN 543; and</li> </ul> Cumulative effects on shipping routes.	Marine traffic analysis has been undertaken as part of the NRA (Appendix 15.1), with a summary provided in section 15.6 of this chapter. Cumulative effects on routeing are assessed in detail within the NRA (Appendix 15.1) and in Section 15.8 of Chapter 15 Shipping and Navigation.
Trinity House	Scoping Response / June 2017	National trans-boundary issues should be assessed, through consultation with the Dutch authorities.	The Dutch authority (Rijkswaterstaat) has been consulted with in regards to cumulative effects on vessel routeing.

Consultee	Document & Date	Comment	Response / where addressed in the ES
Trinity House	Scoping Response / June 2017	TH stated any issues relating to alignment with platforms (oil or gas) will need to be assessed. Oil and gas decommissioning activities will need to be assessed cumulatively where information is publicly available.	The layout will be agreed with the MCA post consent via agreement with the MMO which will be secured in the DML.
Rijkswaterstaat	Consultation telephone meeting / May 2018	Cumulative routeing within the Dutch sector and within the vicinity of Norfolk Boreas was discussed.	The output of this consultation has been incorporated into the cumulative routeing assessment undertaken in the NRA (Section 19.3 of Appendix 15.1).
BP Shipping, CoS and RYA	Hazard Workshop/ May 2018	CoS stated the IMO routeing measures should be included within the cumulative case.	All routeing assessment (pre wind farm, post wind farm, and cumulative) has taken account of the IMO routeing measures.
Cruising Association (CA) and Scotline	Hazard Workshop/ May 2018	CA stated concerns over cumulative effects.	Cumulative impacts are assessed within Section 15.8 of Chapter 15 Shipping and Navigation
Scotline	April 2018/Regular Operator Consultation	Expressed concern over the cumulative impact of multiple OWFs within the North Sea.	Cumulative impacts are assessed within Section 15.8 of Chapter 15 Shipping and Navigation.
MCA	PEIR Response	Possible cumulative and in combination effects on routes should be considered taking into account Norfolk Vanguard East, Norfolk Vanguard West, East Anglia 3 and other Southern North Sea operations.	Cumulative impacts are assessed in section 15.8 of this chapter.
Rijkswaterstaat	PEIR Response	Of the 40+ potential impacts on shipping and navigation, only 12 have been assessed as 'Tolerable' of which 4 Tolerable with mitigation'. The other potential impacts are assessed as 'Broadly acceptable' or 'no impact'. This seems a mild result, certainly if cumulative effects are considered. Could you elaborate on this issue and especially on the following two issues?	The impact assessment has been undertaken using the IMO FSA, as per MCA requirements and in line with the shipping and navigation assessments that have been undertaken for similar UK developments. Under the relevant MCA guidance this approach is primarily

Consultee	Document & Date	Comment	Response / where addressed in the ES
			<p>concerned with ensuring mariner safety, considering consequence (safety) and the frequency of the effect into account to determine overall impact significance. Further details are provided in section 15.4 of the ES.</p> <p>The rankings for the Norfolk Boreas ES are considered justified on the basis that impact significance has been based on the likely frequency at which any given consequence will occur (as assessed within this comprehensive NRA).</p>
Rijkswaterstaat	PEIR Response	<p>It is stated that DFDS IJmuiden – Newcastle is the busiest route required to deviate, however minor and that’s a fair assessment. But it can also be said that with minor adjustments to the OWF (‘topping off’), this deviation can be avoided and collision will further decrease. Is this something Vattenfall would consider?</p>	<p>This was raised previously during a consultation call between Rijkswaterstaat and Vattenfall on the 8th May 2018. At this application stage of the project it cannot be confirmed how much of the site will be built out, however Vattenfall will consider consultation responses on the subject during the layout approval process which will be undertaken with the MCA and Trinity House (TH). No concerns were raised during consultation with regular operators regarding the northern boundary of the Norfolk Boreas site (including from the operator of the route that intersects the Northern tip). Cumulative assessment also shows any deviation to be manageable when considered with the identified projects that could include cumulative impacts. It</p>



Consultee	Document & Date	Comment	Response / where addressed in the ES
			is noted that as per Environmental Impact Assessment regulations it is only reasonable that Vattenfall consider cumulative projects which are reasonably foreseeable.
Rijkswaterstaat	PEIR Response	The Dutch government has indeed planned a corridor in the scheduled OWF 'IJmuiden Ver' coinciding with the routing IJmuiden Newcastle.	As per EIA regulations any assessment of cumulative impacts is based on projects or other activities that are active or reasonably foreseeable. Given that a detailed design of the proposed navigation corridor is not publicly available we are not able to make an assessment.
<b>Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage</b>			
Historic England via The Planning Inspectorate (Secretary of State)	June 2017/Scoping Opinion	Matters to do with potential cumulative impacts with specific reference to Norfolk Vanguard should also be considered further through the PEIR especially as and when geophysical and geotechnical survey interpretation can support desk-based sources of information.	Cumulative impacts are discussed in section 17.8.2 of Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage
Historic England via The Planning Inspectorate (Secretary of State)	June 2017/Scoping Opinion	Potential cumulative impacts would need to include reference to other offshore wind farms where relevant to this project, specifically other offshore arrays such as the East Anglia series.	Cumulative impacts are discussed in section 17.8.2 of Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage
Historic England/Norfolk County Council Historic Environment Service	March 2018/ETG Offshore Archaeology Meeting Log	For cumulative impact there needs to be reference to other industries that are interested in shallow areas of the North Sea (i.e. the minerals industry). The spatial footprint of projects is not the only consideration but the palaeolandscape or historic materials which would be impacted and how this [Norfolk Boreas] project compounds the impacts.	The results of cumulative impact assessment, including consideration of all other relevant industries, are discussed in section 17.8.2 of Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage

Consultee	Document & Date	Comment	Response / where addressed in the ES
Historic England	Section 42 Consultee Response (The proposed project) (07/12/2018)	There is an area of cross over between onshore and offshore methodologies and heritage and visual impact methodologies and the LVIA report needs to consider cumulative impacts as well as the differences between landscape and seascape where it is relevant to a heritage asset, and how this will be delivered in the resulting ES.	Cross references are made throughout Chapter 17 and Chapter 28 as to where the cross over exists. Heritage setting and character considerations are presented in Chapter 28 (Onshore Archaeology and Cultural Heritage) rather than LVIA Chapter 29.
Historic England	Section 42 Consultee Response (PEIR Chapter 5 Site Description) (07/12/2018)	In our view more analysis needs to be undertaken in relation to the cumulative impact of multiple planned offshore arrays and the overall numbers of turbines.	It is acknowledged that strategic analysis in relation to the cumulative impact of multiple constructed and planned projects would facilitate greater understanding of the cumulative effect of offshore wind development within the North Sea. Although this is considered beyond the scope of an individual project Norfolk Boreas Limited are committed to making data from the Project available should a request for data be made to them for such a strategic study.

**Table 1.2 Summary of consultation in relation to transboundary impact assessment**

Consultee	Document and date	Comment	Response / where addressed in the ES
Chapter 8 Marine Geology Oceanography and Physical Processes			
Secretary of State	Scoping Opinion June 2017	The ES will also need to address interrelationships in each topic area and summarise the position on trans-boundary effects of the Proposed Development, taking into account inter-relationships between any impacts in each topic area.	Section 8.9 of Chapter 8 Marine Geology, Oceanography and Physical Processes describes inter-relationships of marine physical processes with other receptors. Transboundary impacts are unlikely to occur and are scoped out of this chapter.

Consultee	Document and date	Comment	Response / where addressed in the ES
			This approach was confirmed during the Evidence Plan Process.
<b>Chapter 12 Marine Mammals</b>			
Secretary of State	June 2017 (Scoping Opinion)	The ES will also need to address this matter in each topic area and summarise the position on trans-boundary effects of the Proposed Development, taking into account inter-relationships between any Impacts in each topic area.	Transboundary impacts have been assessed in Section 12.9 of Chapter 12 Marine Mammals, and the inter-relationships between any impacts have been assessed in Section 12.10 of Chapter 12 Marine Mammals
<b>Chapter 13 Offshore Ornithology</b>			
Natural England	Scoping Opinion, June 2017	Have the relevant potential transboundary impacts been identified? If not, please provide details 586: We agree with the Applicant's approach to assessing potential transboundary impacts and welcome building upon the work undertaken by East Anglia ONE and East Anglia THREE to identify potential receptors and stakeholders	Noted
<b>Chapter 14 Commercial Fisheries</b>			
French Transboundary (Ministry for the Environment, France)	October 2017 Norfolk Vanguard Consultation on PEIR	There is a clear impact on professional sea fishing, especially for Dutch and Belgium fishers. Even though, the impact on French professional fishers is very limited, we have to take into account the potential impact of the movement of foreign ships in the French fishing area. This concern is due to the rising presence of windfarm projects in the North Sea.	Consideration has been given to the potential impacts of the project on all fishing fleets active in areas relevant to Norfolk Boreas, including the French fleet (Section 14.6.5 of Chapter 14 Commercial Fisheries).  The potential impact of loss of fishing grounds and subsequent potential for displacement has been assessed for the project alone and cumulatively with other projects (Section 14.7 and Section 14.8 of Chapter 14 Commercial Fisheries).

Consultee	Document and date	Comment	Response / where addressed in the ES
Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage			
Historic England	March 2018/Response to Offshore Archaeological Method Statement	We appreciate the attention to Potential Transboundary Impacts and add that this aspect of the assessment will require careful consideration about interpretation and evidences for palaeolandscapes and what collaborative networks exist that could support research between States. Furthermore, analysis will be required to determine how any interpretation of what we consider to represent historic seascape is compatible with or at variance with any comparable initiative used by any neighbouring maritime State.	Transboundary impacts are assessed in section 17.9 of Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage. It is considered beyond the scope of this PEIR to consider comparable initiatives beyond methods and guidance from the UK.