

Norfolk Boreas Offshore Wind Farm

Appendix 11.2

Fish and Shellfish Ecology Consultation Responses

Environmental Statement

Volume 3

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Glossary of Acronyms

DCO	Development Consent Order
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
HRA	Habitat Regulations Assessment
IBTS	International Bottom Trawl Survey
ICES	International Council for the Exploration of the Sea
IFCA	Eastern Inshore Fisheries and Conservation Authority
IPMP	In Principle Monitoring Plan
MMO	Marine Management Organisation
PEIR	Preliminary Environmental Information Report
PSA	Particle Size Analysis
SSC	Suspended Sediment Concentration

Glossary of Terminology

Interconnector cables	Offshore cables which link offshore electrical platforms within the Norfolk Boreas site
Offshore cable corridor	The corridor of seabed from the Norfolk Boreas site to the landfall site within which the offshore export cables will be located.
Offshore export cables	The cables which transmit power from the offshore electrical platform to the landfall.
Offshore electrical platform	A fixed structure located within the Norfolk Boreas site, containing electrical equipment to aggregate the power from the wind turbines and convert it into a suitable form for export to shore.
Offshore project area	The area including the Norfolk Boreas site, project interconnector search area and offshore cable corridor.
Offshore service platform	A platform to house workers offshore and/or provide helicopter refuelling facilities. An accommodation vessel may be used as an alternative for housing workers.
Project interconnector cable	Offshore cables which would link either turbines or an offshore electrical platform in the Norfolk Boreas site with an offshore electrical platform in one of the Norfolk Vanguard sites
Project interconnector search area	The area within which project interconnector cables would be installed.
The Applicant	Norfolk Boreas Limited
The Norfolk Vanguard OWF sites	Term used exclusively to refer to the two distinct offshore wind farm areas, Norfolk Vanguard East and Norfolk Vanguard West (also termed NV East and NV West) which will contain the Norfolk Vanguard arrays.
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.

1 Fish and Shellfish Ecology Consultation Responses

1. To date, consultation regarding fish and shellfish ecology has been conducted through the Norfolk Boreas Scoping Report and Preliminary Environmental Information Report (PEIR) (Royal HaskoningDHV, 2017a, Royal HaskoningDHV, 2018).
2. In addition, consultation has been undertaken as part of the Evidence Plan Process (EPP) with the Fish and Shellfish Ecology Expert Topic Group (ETG) which includes: the Marine Management Organisation (MMO), the Eastern Inshore Fisheries and Conservation Authority (IFCA), Natural England and the Environment Agency. This included the submission to the ETG of a method statement in February 2018 detailing the assessment methodology proposed to assess the potential effects of Norfolk Boreas on fish and shellfish ecology and a meeting in February 2019 to discuss the feedback from the members of the ETG to the PEIR.
3. The feedback received on the Method Statement has been recorded in an agreement log which is provided as part of the Norfolk Boreas DCO application (document reference 5.1). No further feedback was received from the ETG following the meeting in February 2019. The responses received from stakeholders to the Scoping Report, PEIR as well as feedback to date from the Fish and Shellfish Ecology ETG, are summarised in Table 1.1, including details of how these have been taken account of within Chapter 11 Fish and Shellfish Ecology.
4. In addition to consultation specific to Norfolk Boreas, consultation has also been carried out in respect of fish and shellfish ecology for the neighbouring Norfolk Vanguard project. Responses received as part of the consultation process carried out for Norfolk Vanguard which are relevant to Norfolk Boreas are outlined in Table 1.2. These have also been taken into account in the production of Chapter 11 Fish and Shellfish Ecology.

Table 1.1 Consultation Responses - Norfolk Boreas PEIR Responses, Scoping Opinion, and feedback from the Fish and Shellfish Ecology ETG

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
Natural England	November 2018 Norfolk Boreas PEIR Responses	<p>Issues requiring attention include;</p> <ul style="list-style-type: none"> No further monitoring or independent surveys are proposed regarding Fish and Shellfish ecology within the In Principle Monitoring Plan (IPMP). The role of fish within the food web as supporting Annex II species. The loss of and recoverability of sandeel and herring habitat and impacts on their abundance. 	<p>The In Principle monitoring Plan (IPMP) (document reference 8.12) provides an appropriate framework for agreeing monitoring. Given the impacts of the project, the proposed mitigation outlined in section 11.7 (embedded mitigation) is considered appropriate. No specific surveys for fish and shellfish populations are proposed.</p> <p>The role of fish within the foodweb has been noted in Chapter 11, section 11.6.6, including the fact that some species constitute important prey to Annex II species.</p> <p>Consideration is given in sections 11.7.4, 11.7.5 and 11.7.6 to the potential impacts associated with the project on sandeel and herring habitat during construction, operation and decommissioning.</p>
Marine Management Organisation (MMO)	December 2018 Norfolk Boreas PEIR Responses	The MMO considers the proposed mitigation measures of soft-start pile driving and cable burial to a minimum of 1m to reduce potential effects of Electromagnetic field (EMF) are appropriate for fish.	Noted.
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 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	Consideration has been given in the cumulative assessment 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).

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		<p>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>	
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 suspended sediment concentrations (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 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) that direct loss</p>

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			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.
MMO	December 2018 Norfolk Boreas PEIR Responses	The MMO is content that the key fish receptors requiring consideration have been identified in detail, including species of conservation and ecological importance. Furthermore, the PEIR provides a thorough characterisation of fish ecology for the study area, providing a detailed account of the species known to have spawning and nursery grounds in the area, as well as the months in which spawning activities takes place for these species. As such, the potential impacts to fish resulting from the construction, operation and decommissioning based on worst case scenario have been correctly identified.	Noted.
MMO	December 2018 Norfolk Boreas PEIR Responses	A comprehensive list of data sources has been provided that will be used to inform the EIA. All data sources are considered to be appropriate to inform the EIA, and the limitations of the use of beam and otter trawls in respect of some fish species/groups e.g. pelagic fish, have been acknowledged in the report.	Noted.
MMO	December 2018 Norfolk Boreas PEIR Responses	Potential Atlantic herring spawning habitat (MarineSpace, 2013) criteria have been followed and supplemented using International Herring Larval Survey (IHLS) data. The information presented concludes that the Norfolk Boreas study area is not suitable as a herring spawning ground. The MMO agrees that the area is not considered to be a spawning ground of high importance to either the Banks or Downs herring stocks, although considers there are some	Noted. The potential for discrete inshore areas around Great Yarmouth to support herring spawning has been noted in Chapter 11, Table 11.1 and in Appendix 11.1. Note that these are located to the south of the offshore offshore cable corridor and do not overlap with the offshore project area.

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		discrete coastal areas, e.g. near Great Yarmouth where some spawning activity is likely to occur.	
MMO	December 2018 Norfolk Boreas PEIR Responses	Chapter 11, Paragraph 107 acknowledges that small sandeel, greater sandeel and lesser sandeel have been recorded in the study area using the International Bottom Trawl Survey (IBTS) data which suggests that sandeel are found in relatively low numbers in this area. The MMO does not consider that IBTS survey data is appropriate for determining sandeel abundance in the Norfolk Boreas area. This is because the bottom trawling methods used on IBTS surveys do not adequately target sandeel.	<p>The limitations of bottom trawl gear to adequately target some species, including sandeels, are recognised in Appendix 11.1.</p> <p>The conclusion that the area of the project supports sandeels in relatively low numbers, is supported by the results of the IBTS, but also by the distribution of sandeel fishing activity (derived from VMS data), known sandeel fishing grounds (Jensen et al., 2011) and the fact that the offshore project area and the study area do not overlap with high intensity sandeel spawning and/or nursery grounds (Ellis et al., 2010).</p> <p>The location of high intensity spawning/nursery grounds, the distribution of sandeel fishing grounds and fishing activity, as well as data from the IBTs, all suggest that within Sandeel Assessment Area 1r, key sandeel areas are located north of the offshore project area, particularly around the Dogger Bank.</p>
MMO	December 2018 Norfolk Boreas PEIR Responses	Figure 6.30 presents a map of the array and offshore cable route areas where grab data has been used to assess sandeel habitat suitability. Chapter 11, paragraph 106 acknowledges that a large proportion of the Norfolk Boreas site is classified as 'Preferred' Sandeel habitat based on the PSA undertaken from these grab samples.	<p>Noted.</p> <p>PSA data from benthic surveys undertaken in the offshore cable corridor, the Norfolk Boreas site and areas relevant to the project interconnector search area (Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West)) have been analysed to provide an indication of the suitability of the offshore project area in terms of potential for provision of habitat for sandeels (see Appendix 11.1).</p> <p>As expected, given the sandy nature of the sediment across the offshore project area, preferred and marginal</p>

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			<p>sandeel habitat has been identified across the majority of the offshore project area, with unsuitable areas identified at discrete locations (Appendix 11.1).</p> <p>It should be noted that the habitat classification on which the above analysis is based (Marine Space, 2013) relies on sediment composition only rather than evidence of sandeel usage of the area. Therefore the presence of suitable sediment does not necessarily imply that sandeels are significantly abundant in a particular area.</p>
MMO	December 2018 Norfolk Boreas PEIR Responses	Chapter 11, Paragraph 117 states the receptor sensitivity to be 'medium' and the magnitude of impact to be 'low'. The MMO agrees that the impact of physical disturbance/temporary loss of habitat should be assessed to be of minor adverse significance in relation to shellfish.	Noted.
MMO	December 2018 Norfolk Boreas PEIR Responses	Appendix 5.4 shows that a fleeing animal model for fish receptors has been used, assuming a fish flees from the source at a constant rate of 1.5 ms ⁻¹ , based on data from Hirata (1999). The MMO is not aware of scientific or empirical evidence to support fleeing responses to noise in fish. Whilst this isn't unrealistic for a swimming speed, it is overly simplistic as it overlooks the various swimming capabilities and sizes of different species of fish, as well as the biological drivers in fish, such as migration, spawning and philopatric behaviour. Furthermore, the use of an assumed swimming speed isn't appropriate when modelling the impact ranges for eggs and larvae which are a stationary receptor. The MMO therefore recommends that for the underwater noise assessment in the EIA, modelling is undertaken based on a stationary receptor (for fish, eggs and larvae).	<p>Additional noise modelling has been undertaken taking a stationary animal approach. This is presented in Appendix 5.4, Annex 1, and summarised the Chapter 11.</p> <p>It should be noted that the stationary animal model assumes that, when exposed to any noise from piling, the fish do not react in any way to reduce their exposure to noise, which will remain at the highest level modelled in the water column. It is considered unlikely that, whether the fish reacts specifically to the noise or not, it would remain at the position of highest noise level for the hours of piling. The outcomes of the modelling considering an stationary animal scenario therefore represent a highly conservative worst case.</p>

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MMO	December 2018 Norfolk Boreas PEIR Responses	The MMO would welcome further discussion on the most appropriate mitigation to be secured once the Environmental Impact Assessment (EIA) is completed.	Noted. A number of embedded mitigation measures have been incorporated as part of the project's design process. Those relevant to fish and shellfish ecology receptors are outlined in section 11.7.1 and include, amongst other aspects: <ul style="list-style-type: none"> • Cable burial to at least 1m where possible. • Where cable burial is not achievable (i.e. due to the presence of hard ground and/or at cables crossing) cable protection will be used. • During construction, where possible, overnight working practices would be employed; and • Implementation of soft start pile driving procedures.
Eastern Inshore Fisheries and Conservation Authority (IFCA)	December 2018 Norfolk Boreas PEIR Responses	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'. 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 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	Noted. Consideration has been given in the cumulative assessments 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).

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		seabed. Whilst we appreciate the difficulty in studying potential wide-scale impacts of all offshore activity, this is an important issue requiring consideration.	
Eastern Inshore Fisheries and Conservation Authority (IFCA)	December 2018 Norfolk Boreas PEIR Responses	Many coastal habitats provide important spawning and nursery areas for a variety of marine species. Any disturbance to these habitats has the potential to negatively affect these populations. The inshore areas of the cable corridor identified in the PEIR are understood to support nursery grounds for thornback ray, herring, cod, whiting, mackerel, plaice and sole. Furthermore, the area supports spawning grounds for herring, sole and sandeels (Ellis et al., 2012) – an important prey of the harbour porpoise, which is protected within the Southern North Sea cSAC. 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 – and subsequently on dependent fauna. Whilst we appreciate the difficulty in studying potential wide-scale impacts, we consider the issue does warrant further consideration.	Consideration has been given in this assessment to fish species with known spawning and nursery grounds in areas relevant to the project (Table 11.8 and Table 11.10). Fish species which are of importance as prey to marine mammals, including herring, sole and sandeels have been considered in the impact assessment within this chapter (Table 11.10). Potential impacts of the project on marine mammals are discussed in Chapter 12 Marine Mammals.
Eastern Inshore Fisheries and Conservation Authority (IFCA)	December 2018 Norfolk Boreas PEIR Responses	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	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. In the context of the assessment of EMFs it is important to note that from the results of post-consent monitoring

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		that there will be no adverse effects on fish and shellfish ecology.	<p>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 depth of 1m and protected where cable burial is not feasible.</p>
Eastern IFCA	Norfolk Boreas Offshore Wind Farm Offshore Order Limits Change Report February 2019	<p>Eastern IFCA has reviewed the documents and do not wish to provide additional specific feedback on the amendment to the offshore order limits as the new area is outside of the Eastern IFCA district.</p> <p>The Eastern IFCA would like to reiterate that many of the comments made in our response to the PEIR will now apply to the new area within the order limits.</p>	Noted
VisNed	Norfolk Boreas PEIR Response December 2018	The maps, that are used in the PEIR, are based on research from Ellis 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	<p>Coull et al. 1998 and Ellis et al. 2010 provide a broad scale overview of the potential extent of spawning/nursery grounds and relative intensity and duration of spawning. The limitations of these publications are noted in Appendix 11.1.</p> <p>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 activities in the wider Southern North Sea (section 11.8).</p>

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		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.	
Secretary of State (SoS)	June 2017 Norfolk Boreas Scoping Opinion	The SoS states "The SoS is broadly content with the proposed approach for Fish and Shellfish Ecology and has no specific comments to make on the proposed assessment scope. However, the SoS draws the Applicant's attention to the comments of the MMO (see Appendix 3 of this Opinion) and recommends that these are addressed."	Due consideration has been given to the Marine Management Organisation's (MMO) Comments included in the Scoping Opinion.
SoS	June 2017 Norfolk Boreas Scoping Opinion Response	Exclusion of certain types of fishing may make an area more productive for other types of fishing. The assessment should include detailed surveys of the effects on fish stocks of commercial interest and the potential reduction or increase in such stocks that will result from the presence of the wind farm development and of any safety or buffer zones.	Section 11.7.5.5 of Chapter 11 provides an assessment of the potential impacts on commercial fish stocks associated with changes in fishing activity as a result of the project. This takes account of the findings of Chapter 14 Commercial Fisheries, where a full assessment of the potential impacts of Norfolk Boreas on commercial fisheries is provided.
MMO	June 2017 Norfolk Boreas Scoping Opinion	The document is generally well presented, comprehensive, with appropriate consideration of the resident marine community and associated fisheries in the area. The key species and impacts are appropriate for inclusion within the EIA.	Noted.
MMO	June 2017 Norfolk Boreas Scoping Opinion	Impacts to herring, sandeel, cod and seabass should have their own species specific assessment	Species specific assessments have been carried out for herring, sandeel, cod and seabass as well as other key species where relevant (section 11.7.4). For sandeels and herring, specific assessments are provided in respect of temporary disturbance/habitat loss, increased suspended sediment concentrations (SSCs) and sediment re-deposition, underwater noise during

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
			piling and permanent loss of habitat. In the case of seabass and cod, species specific assessments have been provided in relation to underwater noise during piling (section 11.7.4).
MMO	June 2017 Norfolk Boreas Scoping Opinion	Any previous survey data presented in the desk based assessment and used in the EIA should include, or provide signposting to, all relevant information such as: dates and times of surveys; locations; gear used; mesh size; and duration of tow/soak times. The limitations of any data sources used in the EIA should be presented and acknowledged. Any inconsistencies in survey techniques from past surveys should be discussed in the ES. In addition, catch data should be standardised.	Previous survey data, including full survey reports are provided in Appendix 11.1 (Annex 1). The survey results presented have been standardised (number of individuals/hour). The limitations of the sources of data used, including those from surveys, are described in Appendix 11.1.
MMO	June 2017 Norfolk Boreas Scoping Opinion Response	Page 114, point 448 is contradictory to point 447 by stating that herring and whiting are of relatively low commercial importance. Furthermore, whilst these species may not be of high commercial importance to the UK market, they may be considered of high importance in European markets.	Analysis of landings statistics from the UK and other countries active in the study area (i.e. Netherlands, Belgium) has identified plaice and Dover sole as the main species targeted in the offshore project area. Herring is targeted off the East Anglian coast close to shore by some local vessels (Appendix 14.1). However in inshore areas in the vicinity of the offshore cable corridor, fishing is for the most part focused on shellfish species (edible crab, lobster and whelk). Whilst not extensively fished in areas relevant to the project, the fact that whiting and herring are species of commercial importance in the Southern North Sea has been noted in this chapter (Table 11.10).
MMO	June 2017 Norfolk Boreas	Page 114 of the report states that from the Landings by Weight and International Bottom Trawl Survey (IBTS) data,	Consideration has been given in this chapter to species of commercial importance, including lemon sole, whiting,

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
	Scoping Opinion Response	that plaice, sprat, sole, cod, herring and mackerel are commercially important species. However, the list of species in Table 2.12 from Landings by Weight also includes a number of other species of commercial importance, namely; lemon sole, whiting, bass, brill, turbot, spotted ray and thornback ray all of which should be assessed within the ES.	bass, brill, turbot, spotted ray and thornback ray amongst other species (Table 11.10, Appendix 11.1).
MMO	June 2017 Norfolk Boreas Scoping Opinion	The impacts of dredging, piling, loss of habitat and increased suspended sediment on fish should be clearly assessed in the ES.	Consideration has been given to the potential impacts of dredging, piling and loss of habitat on fish and shellfish species within this chapter (sections 11.7.4 and 11.7.5).
MMO	June 2017 Norfolk Boreas Scoping Opinion	The MMO recommends that in the ES assessment of herring and sandeels, the aggregate industry habitat assessment (Marine Space, 2013) criteria be followed during the EIA which will utilise site specific Particle Size Analysis (PSA) data to assess habitat significance in the array area and along the export cable route. For herring, it is recommended that IHLS data is also used.	Marine Space (2013) criteria have been used to illustrate the suitability of the offshore project area for herring spawning and as sandeel habitat. In addition, in the case of herring, data from the IHLS has been analysed to inform the assessment presented in this chapter (Appendix 11.1).
MMO	June 2017 Norfolk Boreas Scoping Opinion	The proposed project site is located near to known herring spawning grounds. Herring and their eggs and larvae are considered to be sensitive to noise and vibration from anthropogenic activities such as piling and dredging. The ES should include an assessment of impacts from piling noise and cable installation on spawning grounds (including consideration of gravid adults, eggs and larvae).	Consideration has been given within the assessment presented in this chapter to the location of herring spawning grounds in relation to the project. Herring specific assessments have been carried out in respect of noise during construction, physical disturbance/ temporary loss of habitat, permanent loss of habitat and increased suspended sediment concentrations and re-deposition. In addition to impacts on adults, the assessments have considered potential impacts on early life stages such as eggs and larvae, where relevant (section 11.7.4).

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
MMO	June 2017 Norfolk Boreas Scoping Opinion	The former East Anglia Zone is located in an area considered to be a cod spawning ground. Piling noise has the potential to damage eggs and larvae and disturb spawning aggregations of adults. An assessment of potential impacts of underwater noise from piling on cod should be undertaken in the ES. The assessment should consider the state of the cod stock and importance of the surrounding spawning and nursery grounds.	Consideration has been given in the assessment of underwater noise to the potential impact on cod with reference to the location and extent of spawning grounds for this species (Figure 11.26). In addition, consideration has been given to the potential impacts of piling noise on early life stages such as eggs and larvae (section 11.7.4.3).
MMO	June 2017 Norfolk Boreas Scoping Opinion	The current state of cod stocks is determined by the International Council on the Exploration of the Sea (ICES). The latest advice issued in November 2016 for North Sea cod shows that stocks are currently harvested sustainably, however recruitment has been poor since 1998 (ICES, 2016). Cod is widely distributed throughout the North Sea but there are indications of subpopulations inhabiting different regions of the North Sea. The Southern North Sea sub-region (where the Norfolk Boreas site is located) has suffered a general decline in biomass and there has been a lack of recovery (ICES, 2016).	Noted. Information on the current status of cod stocks based on the latest ICES advice for this species (ICES, 2017) is described in Appendix 11.1.
MMO	June 2017 Norfolk Boreas Scoping Opinion	The ICES Working Group 2 on North Sea Cod and Plaice Egg Surveys in the North Sea (WGEGGS2) carries out Midwater Ring Net (MIK net) surveys directed primarily at cod and plaice and data has been collected in the North Sea in 2004, 2009, and annually since 2012. The survey data is downloadable from ICES: http://www.ices.dk/marine-data/data-portals/Pages/Eggs-and-larvae.aspx . The MMO recommends that this data is considered in the ES assessment.	Data currently available from the link provided in the MMO response (http://www.ices.dk/marine-data/data-portals/Pages/Eggs-and-larvae.aspx) only covers 2003, 2004, 2008 and 2009 for plaice and 2004 and 2009 for cod. The outcomes of the analysis of the available data are provided in Appendix 11.1.

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
MMO	June 2017 Norfolk Boreas Scoping Opinion	Seabass are a slow growing species that have suffered a long-term decline in population due to overfishing. As a result of declining stocks, fishing regulations have now been implemented to protect juvenile stocks of seabass. Seabass have also been placed under special protection measures as scientific advice has clearly identified the need to drastically reduce catches of this species, following an increase in the fishing pressure and a reduction in reproduction. The ES should consider seabass in the context of the current special measures in place and include consideration of whether cabling activities are likely to disturb nursery grounds or juvenile fish.	The decline in seabass stocks and the recent introduction of measures to protect are discussed in Appendix 11.1 and outlined within this chapter (Table 11.10). Consideration has been given to potential disturbance to fish species (including juveniles) as a result of temporary physical disturbance/loss of habitat and increased suspended SSCs and re-deposition during the construction phase, including during export cable installation (section 11.7.4.1 and 11.7.4.2).
MMO	February 2017 Norfolk Boreas Fish and Shellfish Ecology Expert Topic Group (ETG) Method Statement Feedback	The MMO is content that the baseline environment will be described using a desk-based review and the data sources proposed to inform the fish ecology baseline in the EIA are appropriate. The data sources proposed are comprehensive and appropriate. However, whilst VMS data have shown primary fishing activity is carried out by Dutch trawlers, a higher proportion of long-lining takes place in south-west of the site. The MMO would therefore recommend collecting anecdotal information from fishers local to the development to help ascertain information surrounding shellfish components not usually captured in landings data, i.e. berried lobster, or undersized crab and lobster quantities. This data would be beneficial in reducing uncertainties around shellfisheries impacts	Information gathered through consultation with local commercial fishermen (described in detail in Chapter 14 Commercial Fisheries and Appendix 14.1) has been used to help inform this chapter where relevant.
MMO	February 2017 Norfolk Boreas	The MMO can agree that further data collection in the form of fisheries surveys will not be required.	Information gathered through consultation with local commercial fishermen (described in detail in Chapter 14

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
	Fish and Shellfish Ecology ETG Method Statement Feedback	However, as detailed above, anecdotal data from local fisheries would add evidence for the assessment of commercial shellfish species.	Commercial Fisheries and Appendix 14.1) has been used to help inform this chapter where relevant.
MMO	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Generally, the methods proposed for the EIA are appropriate. However, the MMO was not able to find the proposed approach to assess herring potential spawning habitat in the report. As per our advice for the Norfolk Boreas Offshore Wind Farm Scoping Report of May 2017, the MMO recommend that the aggregate industry Atlantic herring potential spawning habitat (MarineSpace 2013) criteria is followed during the EIA, and that this should be supplemented with recent data from the International Herring Larval Survey (IHLS). The MMO is confident that the methods proposed for shellfish ecology EIA are appropriate.	Marine Space (2013) criteria have been used to illustrate the suitability of the offshore project area for herring spawning and as sandeel habitat. In addition, in the case of herring, data from the IHLS has been analysed to inform the assessment presented in this chapter (Appendix 11.1).
MMO	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	The key fish receptors the MMO would expect to see in the report have been identified, namely; sandeel, herring, cod, plaice, sole, bass, elasmobranchs. Shellfish receptors for the assessment have been identified. As highlighted in the response the MMO provided in May 2017, the area also contains <i>Nephrops norvegicus</i> to the north of the proposed windfarm area, however, catch data from the proposed wind farm location suggests that the area is not of particular commercial importance for this species. Within the last 10 years, commercial landings have totalled 14 tonnes, contributing to less than 0.02% of North	Noted.

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
		<p>Sea landings. As such, the MMO believes Nephrops exclusion from the EIA is justified.</p> <p>Spiny lobster/crawfish, <i>Palinurus</i> spp. Has also previously been caught in the proposed area though at low abundances; data from I-Fish (please see http://webarchive.nationalarchives.gov.uk/20120313162711/http://www.defra.gov.uk/statistics/files/defra-stats-natstats-adminsources-marinemangement-111212.pdf for I-FISH details) indicates the record is from one specimen. <i>Palinurus elephas</i> is considered 'threatened' on the IUCN Red List, but it is possible that the one record from the proposed windfarm area may be erroneous. Therefore, the MMO does not consider that this species requires further consideration in the EIA.</p>	
MMO	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	<p>(In relation to fish species) The MMO can confirm that the potential impacts of disturbance and loss of habitat, increased suspended sediment, EMF, and underwater noise have all been identified.</p> <p>The MMO can generally confirm that the correct impacts on shellfish ecology have been identified. This is except for sediment disturbance associated with the laying of the cables which could unsettle buried, egg-bearing edible crab (<i>Cancer pagurus</i>); this impact should be added to the EIA and considered in further assessments.</p>	<p>Noted.</p> <p>Consideration has been given in the chapter to the potential for buried egg-bearing edible crab to be disturbed through seabed disturbance (section 11.7.4.1).</p>
MMO	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	<p>The worst case scenario has generally been identified. Whilst the MMO acknowledges that piling is the worst-case scenario for underwater noise, the effects of noise generated by other activities such as rock-dumping, cable installation and increased vessel traffic should also be explored in the EIA.</p>	<p>Consideration has been given in this chapter to the potential impact of construction noise associated with impact piling, but also to that associated with other activities such as rock dumping, cable installation and increased vessel noise (section 11.7.4.4)</p>

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the data proposed to inform the fish and shellfish ecology baseline EIA is comprehensive and appropriate. The data includes information from all known sources. Continued informal and formal dialogue with Eastern IFCA, Cefas, Natural England, the Environment Agency and the Marine Management Organisation, as well as other stakeholders that can provide local knowledge is encouraged on an ongoing basis to support the assessment of the data identified.	Noted.
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that there is no further requirement for data collection. Survey data collections for the East Anglia THREE and East Anglia FOUR developments (2013) and for the ZEA.	Noted.
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the methods proposed for the fish and shellfish ecology EIA are appropriate.	Noted.
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the key fish and shellfish species and potential impacts on fish and shellfish ecology have been identified.	Noted.

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
Eastern IFCA	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the worst-case scenario considers the correct project design elements for the assessment of impacts on fish and shellfish ecological receptors.	Noted.
Natural England	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the data proposed to inform the fish and shellfish ecology baseline EIA is comprehensive and appropriate and that there is no further requirement for data collection.	Noted.
Natural England	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the methods proposed for the fish and shellfish ecology EIA are appropriate and the method statement is well defined	Noted.
Natural England	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Agree that the key fish and shellfish receptors and correct potential impact have been identified.	Noted.
Natural England	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Natural England confirm agreement that the WCS considers correct project design elements for the assessment of impacts on fish and shellfish receptors. We wish to highlight the general concern for the phased build approach – as advised for Norfolk Vanguard in recent correspondence (the following responses and meetings: PEIR response 11 th December 2017; onshore ornithology	Noted. The project programme for Norfolk Vanguard was refined after submission of the Preliminary Environmental Information Report (PEIR) for the project with the duration of the construction period reduced to up to 4 years and only a single phase or two phase approach proposed.

Consultee	Date /Document	Comment	Response / where addressed in Chapter 11 Fish and Shellfish Ecology
		meeting 19 th February 2017; and our response providing further advice on the benthic impacts sent 22 nd February 2017) we advise that the construction timeframes are thoroughly considered as the proposed phased build complicates the Worst Case Scenario (WCS) potentially increasing the impacts significantly for all topics	The same approach has been taken for Norfolk Boreas, with only a single and two phase approach being considered.
Natural England	February 2017 Norfolk Boreas Fish and Shellfish Ecology ETG Method Statement Feedback	Natural England confirm agreement that the list of projects for inclusion in the CIA for the assessment of fish and shellfish ecological receptors are appropriate.	Noted.

Table 1.2 Consultation Responses - Norfolk Vanguard Scoping Opinion and PEIR

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
MMO	November 2016 Norfolk Vanguard Scoping Opinion (The Planning Inspectorate, 2016)	We recommend that any fisheries data taken from previous surveys that is used in the EIA includes all relevant information such as; dates and times of surveys, locations, gears used, mesh size, duration of tow/soak times. Any limitations of the data sources used should be presented in the ES.	Detailed information on survey locations, methods, dates and times is given in Appendix 11.1, including full survey results. Information on the limitations and sensitivities of the data sources used is provided in Appendix 11.1.
MMO	November 2016 Norfolk Vanguard Scoping Opinion (The Planning Inspectorate, 2016)	For the ES, we recommend a longer time series of data (e.g. up to ten years' worth of fisheries landings data) is used rather than the seven years proposed, to be consistent with applications of a similar nature. Requests for additional data can be submitted to the MMO for consideration. The ES should explain how landing weights have been calculated and we recommend showing the average landed weights broken down by International	MMO landings weight data by species and ICES rectangle for a 10 year period (2007 -2016) have been analysed to inform this chapter (section 11.6.3 and Appendix 11.1).

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
		Council for Exploration of the Sea (ICES) rectangle. This will show any variation in abundance per rectangle for each species.	
Cefas	16 th February 2017 Norfolk Vanguard Evidence Plan Process Meeting Minutes	Will impacts to crab larvae be considered? This has been suggested by a local fisherman.	Due consideration has been given to the potential impacts of the project on life stages of limited mobility such as eggs and larvae throughout the impact assessment (section 11.7).
Cefas	16 th February 2017 Norfolk Vanguard Evidence Plan Process Meeting Minutes	Sandeel will need to be considered. Monitoring at an offshore windfarm recently did not provide very positive results with regard to sandeel population recovery however this has been attributed to poorly designed surveys.	Due consideration has been given to the potential impacts of the project on sandeels throughout the impact assessment (section 11.7).
Cefas	16 th February 2017 Norfolk Vanguard Evidence Plan Process Meeting Minutes	EMF should be considered for spurdog subject to cable burial depth.	Due consideration has been given to the potential impact of electromagnetic fields (EMFs) on elasmobranchs (section 11.7.5.4.1), including shark species such as spurdog.
Cefas	16 th February 2017 Norfolk Vanguard Evidence Plan Process Meeting Minutes	Impacts of increased suspended sediment on whelk should be considered.	Whelks, together with other relevant shellfish species, have been considered for assessment of the impact of increased suspended sediment (section 11.7.4.2).
MMO	December 2017 Norfolk Vanguard PEIR Response	With regard to underwater noise impacts for fish species, piling, seabed preparation, rock dumping, cable installation and increased vessel traffic have all been identified as potential sources of underwater noise during construction. Although piling will produce the highest level of underwater noise, potential effects on fish receptors from other noise-generating activities should still be explored in the assessment including different phases such as operational and associated peripheral activities such as	The assessment of potential impacts associated with noise during construction has taken account of piling and other noise generating activities (cable installation, vessels noise, etc). With regards to the operation phase, consideration has been given to noise impacts associated with the operational turbines and vessel noise (sections 11.7.4.3, 11.7.4.4. and 11.7.5.3).

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
		boulder clearance and UXO which have not been fully assessed.	In addition, peripheral activities such as UXO clearance have also been included for assessment (section 11.7.4.5).
Departmental Directorate of the Sea and Territories of Pas-de-Calais	December 2017 Norfolk Vanguard PEIR Response	Underwater structure that will be installed can have positive effect in terms of biodiversity (reef effect), the production and nursery of juveniles but can also have detrimental impacts such as the introduction of invasive species or the replacement of the pre-existing biodiversity by other species, modifying the baseline environment.	The potential impact of the introduction of hard substrate associated with project infrastructure on fish and shellfish receptors is assessed in section 11.7.5.2. An assessment specific to benthic habitats is provided in Chapter 10 Benthic and Intertidal Ecology, including the potential for introduction of non-native species.
Departmental Directorate of the Sea and Territories of Pas-de-Calais	December 2017 Norfolk Vanguard PEIR Response	Important research programs could be associated to OWF projects, promoting technologies that minimise effects on EMFs sensitive species and engineering techniques that would be eco-friendly in the marine environment. These technologies are still in development and would benefit from further research.	Consideration has been given within this assessment to the potential impacts of EMFs on fish and shellfish receptors associated with array, interconnector and export cables (section 11.7.5.4). In all cases, the assessment provided is based on the worst case scenario identified for the project (Table 11.13). The assessment of potential impacts of EMFs provided in this chapter is based on best available information and research publications and takes account of the results of monitoring work carried out to date in operational wind farms.
Natural England	December 2017 Norfolk Vanguard PEIR Response	It is stated that alternative methods, i.e. drilling or vibration may be required depending on the ground conditions. These alternative techniques need to be fully assessed throughout the ES, particularly under the fish and marine mammal's chapters.	Piles are generally expected to be driven but drilling may be required at some locations. In addition, other techniques, such as pile vibration, are also being considered. This will be confirmed post consent on receipt of more detailed geotechnical information. It should be noted that both pile vibration and drilling are considered to be low-noise foundation installation methods in comparison to pile driving. Therefore for the purposes of this assessment under the worst case scenario (Table 11.13), it is assumed that all foundations

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
			will be installed using pile driving as this would result in the greatest noise impacts.
Natural England	December 2017 Norfolk Vanguard PEIR Response	We agree that none of the protected areas designated include fish and shellfish species as qualifying features. However these habitats undoubtedly support (commercially) important fish species that would not necessarily reside here if the habitat i.e. the qualifying features, were damaged. Therefore, the ecology of the fish are intrinsically linked to the protected site and this needs further consideration and discussion.	The importance of the protected areas in terms of provision of key habitat for fish and shellfish species has been noted (section 11.6.5). In addition, where relevant, information provided in Chapter 10 Benthic and Intertidal Ecology in relation to impacts on protected areas has been used to inform the assessment.
Natural England	December 2017 Norfolk Vanguard PEIR Response	We advise that links between prey availability and bird species are made. The construction area overlaps with certain spawning areas which may represent a food source for a range of birds. If these aggregations move to other areas or are dispersed it may cause a loss in prey or require further foraging requirements. A similar situation may occur for populations that just move out of the area during disturbance.	The assessment provided in this chapter is focused on the impact of the project on fish and shellfish receptors. Potential impacts of the project on birds, including those associated with loss of prey are described in Chapter 13 Offshore Ornithology.
Natural England	December 2017 Norfolk Vanguard PEIR Response	Recent research (https://www.sciencedirect.com/science/article/pii/S0006320717303634) has highlighted the effect of induced parturition caused by stress on elasmobranchs. Although the research focussed upon landed elasmobranchs the paper suggests that it could be stress induced as well. It would be interesting to consider the effects from construction on those elasmobranchs that give birth to live young.	Consideration has been given to the potential impact of Norfolk Boreas on elasmobranch species throughout this chapter. Elasmobranch species identified as key receptors requiring assessment include various shark species which give birth to live young (Table 11.10). There is no research or evidence currently available to inform an assessment of the potential impacts of offshore wind farm construction in terms of potential induced parturition caused by stress on elasmobranchs.
Natural England	December 2017 Norfolk Vanguard PEIR Response	There is no mention of elasmobranch species that lay eggs or their young. Egg cases cannot move out of the area and	Specific reference has been made in the impact assessment to the limited mobility of egg cases and their potential increased sensitivity to impacts associated with

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
		are fixed in position and therefore can be impacted at a greater level.	construction activities at Norfolk Boreas (section 11.7.4.1 and section 11.7.4.2).
Natural England	December 2017 Norfolk Vanguard PEIR Response	Behavioural responses caused by TTS such as fish moving from preferred sites, needs to be studied in conjunction with the potential effects of prey availability for bird and other predatory fish species.	Potential impacts associated with changes in distribution of prey on predatory fish species have been assessed in section 11.7.4.3. The potential impacts associated with this on ornithological receptors are assessed in Chapter 13 Offshore Ornithology.
Natural England	December 2017 Norfolk Vanguard PEIR Response	Sandeels are anticipated to be present in large numbers within the project area. PSA data has indicated areas of preferred sandeel habitat, with sections of prime habitat been identified within both project areas, primarily NV West. Due to their high site fidelity and little ability to recolonise they are at risk of being adversely affected. As a result, the potential to microsite/ avoid these prime areas could be a potential method of mitigation. Further data collection may also be needed.	PSA data from benthic surveys undertaken in the offshore cable corridor, the Norfolk Boreas site and areas relevant to the project interconnector search area (Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West)) have been analysed to provide an indication of the suitability of the offshore project area in terms of potential for provision of habitat for sandeells (see Appendix 11.1). As expected, given the sandy nature of the sediment across the offshore project area, preferred and marginal sandeel habitat has been identified across the majority of the offshore project area, with unsuitable areas identified at discrete locations (Appendix 11.1). It should be noted that the habitat classification on which the above analysis is based (Marine Space, 2013) relies on sediment composition only rather than evidence of sandeel usage of the area. Therefore the presence of suitable sediment does not necessarily imply that sandeels are significantly abundant in a particular area. The assessment of potential impacts on sandeels has taken account of the sediment characteristics of the

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
			<p>offshore project area, but also of information on known spawning and nursery grounds, records from the IBTS, surveys carried out in East Anglia THREE and the former East Anglia FOUR, as well as information on known sandeel grounds and sandeel fishing records for the area. On this basis and in the context of the extent of the Sandeel Assessment Area 1r (Figure 11.17), it is not considered that the offshore project area is of key importance to sandeels.</p> <p>The above evidence suggests that key sandeel areas are predominantly located north of the offshore project area (see Appendix 11.1).</p>
Natural England	December 2017 Norfolk Vanguard PEIR Response	There needs to be a greater emphasis on the effect of introducing hard substratum in to protected sites and the effect upon species assemblages in these areas. Although the array does not overlap with any protected sites, the cable route goes through the SAC and any effects need to be determined in relation to this site.	<p>The focus of this chapter is on fish and shellfish ecology. Specific issues relating to benthic ecology are discussed in Chapter 10 Benthic and Intertidal Ecology. Where relevant, the findings of the benthic assessment are presented in support of this chapter.</p> <p>Consideration has been given in section 11.7.5.2 to impacts associated with the introduction of hard substrate within the offshore project area (i.e. cable protection), including areas relevant to the SAC.</p>
Natural England	December 2017 Norfolk Vanguard PEIR Response	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	<p>The assessment of the potential impact of electromagnetic fields (EMFs) on fish and shellfish species is based on best available information and takes account of the worst case scenario identified for the project (section 11.7.5.4 and Table 11.13).</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</p>

Consultee	Date /Document	Comment	Response / where addressed in the PEIR
		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>site or population level, and little uncertainty remains (MMO, 2014) (see paragraph 294).</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 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).
Natural England	December 2017 Norfolk Vanguard PEIR Response	As above the report correctly identifies that the protected sites listed are designated based on the presence of habitats. However, these habitats support a range of important species that are not only commercially important but ecologically as well. If these sites become damaged or disturbed it could have a further effect on the species that reside here. This needs to be made clearer within this section.	The importance of protected areas in terms of key habitat to fish and shellfish species has been noted (section 11.6.5). In addition, where relevant, information provided in Chapter 10 Benthic and Intertidal Ecology in relation to impacts on habitats within protected areas has been noted.

2 References

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