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MMO Reference: DCO/2016/00004
Planning Inspectorate Reference: EN010077

24th January 2020

Dear Sir/Madam,

Planning Act 2008, East Anglia ONE North Limited, Proposed East Anglia ONE North Offshore Windfarm Order

Relevant Representation

On 2 December 2019, the Marine Management Organisation (the "MMO") received notice under Section 56 of the Planning Act 2008 (the "PA 2008") that the Planning Inspectorate ("PINS") had accepted an application made by East Anglia ONE North Limited (the "Applicant") for a development consent order (the "DCO Application") (MMO ref: DCO/2016/00004; PINS ref: TR010043).

The Development Consent Order Application includes a draft development consent order (the "DCO") and an Environmental Statement (the "ES"). The draft DCO includes, at Schedule 13 and Schedule 14, draft Deemed Consents under Part 4 (Marine Licensing) of the Marine and Coastal Access Act 2009 (the "Deemed Marine Licence")(DML).

The DCO Application seeks authorisation for the construction, operation and maintenance of East Anglia ONE North Offshore Wind Farm ("EA1N"), comprising of up to 67 wind turbine generators together with associated onshore and offshore infrastructure and all associated development ("the "Project").

This document comprises the MMO's initial comments in respect of the DCO Application in the form of a relevant representation.

This is without prejudice to any future representation the MMO may make about the DCO Application throughout the examination process. This is also without prejudice to any decision the MMO may make on any associated application for consent, permission, approval or any other type of authorisation submitted to the MMO either for the works in the marine area or for any other authorisation relevant to the proposed development.

Yours faithfully,

[redacted]

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1. Development Consent Order (DCO) and Deemed Marine Licences (DMLs)

1.1 DCO Major Comments

1.1.1 Any reference to a condition applies to all schedules where similar conditions exist.

1.1.2 DCO Part 1, Article 2 – Definitions: The MMO does not agree with the definition of 'commence' in relation to 'offshore preparation works'. The term "*including but not limited to surveys, monitoring and UXO clearance*" is not sufficiently precise and has the potential to authorise works which may have the potential to impact upon the environment prior to the approval of appropriate methodologies (e.g. boulder clearance and sandwave levelling). The MMO recommends that the words "*but not limited to*" are removed from the definition of offshore preparation works here and in the definitions for the associated deemed marine licences (DMLs) in Schedules 13 and 14.

1.1.3 DCO Part 1 Article 2 – Definitions: The definition of 'maintain' as stated in the DCO and associated DMLs would permit ancillary works including the installation of new cable and scour protection beyond the end of construction. The MMO does not consider that installation of new cable and scour protection post-construction falls within the definition of 'maintain'. The benthic assessment included in the ES will not remain valid for the lifetime of the project and it is recommended that new benthic surveys are undertaken prior to installation of rock protection for cable repairs to ensure that any required mitigation for protected habitats such as *Sabellaria* reef can be properly secured at the time. The MMO and Natural England have drafted joint position papers on this issue which offer guidance on the expected marine licensing requirements for such activities. Final versions of the guidance are expected to be approved in time for the Planning Inspectorate hearings for the East Anglia ONE North project.

1.1.4 Deemed Marine Licences, Schedules 13 and 14, Part 1 – Details of licensed marine activities (Article 2) and Part 2 (Conditions), Article 16 – UXO clearance: The MMO does not consider that any Unexploded Ordnance (UXO) campaign should be authorised through conditions on the DMLs. UXO campaigns are high risk activities which require detailed, complex impact assessments, conditions and enforcement. It is the MMO's opinion that this activity should be removed from the DMLs and for the MMO to determine an application for the activities in a separate marine licence post-consent, in consultation with relevant stakeholders.

1.1.5 The Applicant will need to separately apply to the MMO for a separate European Protected Species (EPS) licence in order to authorise any UXO campaign for the project. Mitigation measures captured within an EPS licence and marine licence for UXO campaigns are usually aligned and this would not be possible under the proposed arrangement. A separate conditioned marine licence for this activity would be more easily enforceable. Condition complexity is such that a recent marine licence for the UXO campaign at Hornsea 2 required 19 separate project specific conditions and the draft DMLs do not sufficiently secure the required mitigation for this activity. Separating this out from the DMLs would allow for the UXO campaign to be assessed, conditioned and varied independently without needing to vary the DMLs should a greater number or magnitude of ordnance be discovered in post-consent survey work than has currently been assessed in the ES.

1.1.6 DML Schedules 13 and 14, condition 21 – Construction monitoring: The MMO recommends insertion of an additional sub-paragraph to confirm that all piling will cease if noise levels are significantly higher than those modelled and assessed in the ES, and will not restart until the Marine Mammal Mitigation Plan (MMMP) has been updated and the MMO grant permission for the activity to recommence.

1.1.7 Insertion of the following wording is proposed: *'The results of the initial noise measurements monitored in accordance with sub-paragraph (2) must be provided to the MMO within six weeks of the installation of the first four piled foundations of each piled foundation type. The assessment of this report by the MMO will determine whether any further noise monitoring is required. If, in the opinion of the MMO in consultation with Natural England, the assessment shows significantly different impact to those assessed in the ES or failures in mitigation, all piling activity must cease until an update to the MMMP and further monitoring requirements have been agreed.'*

1.1.8 DML Schedules 13 and 14, condition 22 – Post-construction monitoring: The purpose of post-construction monitoring is to validate predicted impacts set out in the ES. Whilst the MMO notes the Applicant's intention to carry out post-construction surveys for up to 3 years, additional surveys may be required if the impacts of the project are found to exceed those predicted in the ES.

1.1.9 The MMO notes that micro-siting does not appear to be mentioned in the context of mitigating impacts on *Sabellaria* reef in the draft Development Consent Order (DCO). However, we recognise that exclusion zones/environmental micro-siting requirements do form part of condition 17 in part 2 of DCO Schedule 13 and condition 13 in part 2 of DCO schedule 14. These conditions are referenced in the Offshore Schedule of Mitigation, which does refer to *Sabellaria* reef specifically (see our paragraph 1.1.10 below).

1.1.10 It is stated in the Offshore Schedule of Mitigation (document reference 3.5) that environmental micro-siting will be used to minimise potential impacts to protected species and habitats (i.e. *Sabellaria* reef) where necessary and practicable. The same document states that this will be agreed through consultation with the MMO, which is reasonable. However, we advise that additional information on what is considered impracticable should be included as this would allow the suitability of the mitigation plans to be assessed in more detail.

1.1.11 Additionally, the MMO advises that "where practicable" should be clearly defined regarding the use of micro-siting to mitigate impacts on *Sabellaria* reef.

1.1.12 The MMO notes that the draft DCO states that the substances or articles authorised for deposit at sea include plastics and synthetics as well as marine coatings and other chemicals. We recommend that depositing such materials and substances at sea should be avoided, where possible.

1.1.13 The MMO does not consider that the draft DCO (Chapter 3.1) and associated DML and licence conditions contain sufficient detail to adequately capture the mitigation options proposed, for example:

a) Micro-siting:
    i. e.g., See Schedule 14, Part 2, Paragraph 13.1(a) of the DML
b) General cable burial depths:
    i. See Schedule 14, Part 2, Paragraph 13.1(d) of the DML
c) Landfall location:
    i. e.g., See Schedule 14, Part 2, Paragraph 13.1(a) of the DML (as shown by the blue hatched area in Figure 7.7)
d) Landfall cable burial:
    i. e.g., See Schedule 14, Part 1, Paragraph 3.5(a) of the DML
e) Foundations with greatest potential scour:
    i. e.g., See Schedule 14, Part 2, Paragraph 13.1(d) of the DML
f) Foundations with lesser potential scour:
    i. e.g., See Schedule 14, Part 2, Paragraph 13.1(d) of the DML
g) Piled foundation types:
    i. e.g., See Schedule 14, Part 2, Paragraph 13.1(d) of the DML

1.1.14 The MMO agrees that the existing mitigation measures proposed for fish are appropriate and appear to have been captured within the DML conditions. However, as per our comments in paragraphs 3.3.1.1 and 3.3.1.2, it is possible that some additional mitigation measures may be required in respect of the Downs herring stock. There is a potential overlap in noise propagation from piling over parts of the Downs herring spawning ground which may mean that a seasonal piling restriction is needed. If additional mitigation measures such as this are found to be necessary then they will need to be included in the DML conditions.

1.1.15 Furthermore, as per our comments in paragraphs 3.3.1.9 and 3.3.1.10, we recommend that the Applicant undertakes pre- and post-construction sandeel habitat monitoring. This should be secured with specific licence conditions in the DMLs.

1.1.16 DCO Part 7, Article 37 – Arbitration: Article 37 proposes that any difference shall be referred to and settled in arbitration in accordance with the rules at Schedule 15 of the Order. Although arbitration provisions are not explicitly mentioned in the DMLs, they are assumed to apply to subsidiary Schedules 13 and 14 of the Order. The MMO's position on arbitration has been set out in a number of recent Offshore Wind Farm Planning Inspectorate hearings and is repeated here in the following paragraphs.

1.1.17 In comparison to previously approved articles for arbitration, Article 37 sets out significantly different conditions and timeframes, which the MMO does not consider to be acceptable. The MMO notes that arbitration provisions tend to follow model clauses and be confined to disputes between the applicant/beneficiary of the DCO and third parties e.g. in relation to rights of entry or rights to install/maintain

apparatus. The MMO does not consider that it was intended to apply such provisions to disagreements between the undertaker and the regulator, and strongly questions the appropriateness of making any regulatory decision or determination subject to any form of binding arbitration as set out by Article 37 and Schedule 15.

1.1.18 When the MMO was created by Parliament to manage marine resources and regulate activities in the marine environment, the Secretary of State delegated his/her functions to the MMO under the Marine and Costal Access Act (MCAA) 2009 . As both the role of the Secretary of State (in determining DCO applications) and the role of the MMO (as a regulator for activities in the marine environment) are recognised by the Planning Act (PA) 2008, the responsibility for the DML passes from the Secretary of State to the MMO once granted. The MMO is responsible for any post-consent approvals or variations, and any enforcement actions, variations, suspensions or revocations associated with the DMLs.

1.1.19 It was not the intention of Parliament to create separate marine licensing regimes following different controls applied to the marine environment. In fact, one of the aims of the PA 2008 is the provision of a 'one stop shop' for applicants seeking consent for a National Significant Infrastructure Project (NSIP). The new regime allows for the applicant to choose whether to include a DML issued under MCAA 2009 within the DCO provision, or apply to the MMO for a stand-alone licence covering all activities in the marine environment. In any case, it is crucial that consistency is maintained between DMLs granted through the provision of a DCO, and Marine Licences issued directly by the MMO independent of the DCO process.

1.1.20 It is the MMO's opinion that the referral to arbitration in situations where 'difference' may arise, is contrary to the intention of Parliament and usurps the MMO's role as regulator for activities in the marine environment. Considering the draft DMLs, the MMO believes that the 'differences' to which arbitration would be applied are those situations in which the MMO is required to give further consent or approval. These situations appear to arise when small re-determinations of aspects of the marine licence process have to take place.

1.1.21 Generally, the MMO considers these to be technical determinations that fall properly to the MMO to make, (as the expert regulator in this field and the body created by Parliament for this purpose), and that MMO's determinations in this regard should not be open to challenge through an arbitration process. Furthermore, once the DCO is granted, the DML falls to be dealt with as any other Marine Licence, and any decisions and determinations made once a DML is granted fall into the regime set out in the MCAA 2009. Any decisions or actions the MMO carries out in respect of a DML should not be made subject to anything other than the normal approach under the MCAA 2009. To do so introduces inconsistency and potentially unfairness across a regulated community. In the case of any disagreement which may arise between the applicant and the MMO throughout this process, there is already a mechanism in place within that regime to challenge a decision through the existing appeal routes under Section 73 of MCAA 2009. The MMO feels it is inappropriate to take such decision relating to post-consent issues with a DML outside of the normal mechanisms available to challenge such decisions, and to apply arbitration.

1.1.22 The arbitration process as set out in Schedule 15 describes a private process and requires the agreement that all discussions and documentation will be confidential and not disclosed to third parties without written consent. The MMO would like to highlight that the regulatory decisions, and indeed any challenges through the existing mechanisms should be publically available and open to scrutiny. In many cases, members of the public or other stakeholders may wish to make representations in relation to post-consent matters. Ordinarily, their views would be considered by the MMO and they would have the opportunity to follow up and challenge the decision making e.g. through the MMO complaints process, by complaint to the Ombudsman, or by Judicial Review. A private arbitration to resolve post-consent disputes would reduce transparency and accountability.

1.1.23 The MMO considers that Article 37 and Schedule 15 would shift the MMO's decision making responsibility from the hands of the regulator with primary responsibility for administering the marine licensing regime to an independent arbitrator. This would be contrary to the intention of Parliament set out in the Marine and Coastal Access Act (MCAA) 2009 and would potentially usurp the MMO's role as a regulator. The MMO therefore requests that the MMO is explicitly not subjected to these provisions, in line with the recommendation of the Planning Inspectorate in their proposed changes to the draft DCO for the Hornsea Three Offshore Wind Farm (Relevant Representation PD-017: The Examining Authority's Schedule of Changes to the draft DCO).

1.2 DCO Interpretations, Articles and Requirements Comments

1.2.1 DCO Schedule 1, Part 1 – Authorised development: The MMO refers to paragraph 1.1.3 above regarding new rock and scour protection for cables post-construction.

1.2.2 DCO Schedule 1, Part 3 – Detailed offshore design parameters: The MMO recommends that maximum rock and scour protection areas and volumes are detailed here in addition to the DMLs in Schedules 13 and 14 for consistency.

1.3 DML Schedules 13 and 14

1.3.1 Schedules 13 and 14, Part 1, Article 1: Definitions of 'commence', 'maintain' and 'offshore preparation works' – see comments in paragraphs 1.1.2 and 1.1.3 above.

1.3.2 Schedules 13 and 14, Part 1, Article 4: Please note the MMO local office in Lowestoft's telephone number is 0208 026 6094.

2. Other Application Documents

2.1 Outline Offshore Operations and Maintenance Plan (OOMP) (Document 8.12)

2.1.1 Paragraph 1.1: Purpose of this Document – Point 3: The MMO recommends that the Offshore Operations and Monitoring Plan is submitted six months prior to the commencement of operation of the licensed activities to allow sufficient time for consultation responses to be incorporated and amended prior to approval of this document.

2.1.2 Paragraph 1.1: Purpose of this Document – Point 3: Logistical set-up of the operations and maintenance base is included in the OOMP. Please note that any works below mean high water spring tide may require a separate marine licence.

2.1.3 Appendix 1 – Operations and Maintenance List: "*The use of large jack-up vessels operating for significant periods to carry out …major maintenance activities*": The MMO notes that this activity may have a significant impact on benthic habitats which may have recovered from initial activities post-construction. Additional survey work may be required prior to undertaking these activities to ensure that impacts from these works on ephemeral features such as *Sabellaria* reef can be effectively mitigated against.

2.1.4 Appendix 1 – Operations and Maintenance List: "*Additional cable protection in the different locations to cable protection installed during construction*" and "*Cable burial using surface protection*": See comments in paragraph 1.1.3 above. The MMO and Natural England do not consider that additional cable protection in new locations post-construction should fall under the definition of 'maintain'. These activities should therefore be changed to red (an additional marine licence would be required) in the penultimate column.

2.1.5 Appendix 1 – Operations and Maintenance List: "*UXO clearance via detonation*": This is a high risk activity and therefore should not be authorised for the lifetime of the project. East Anglia ONE North sits within a designated area for harbour porpoises which are highly sensitive to noise impacts and the MMO considers that any operations and maintenance detonations of UXO should be licenced separately (see comments in paragraph 1.1.4 above). The quantities described in the OOMP appear to correspond to the total assessed to include the pre-construction UXO campaign. It is unclear whether this is (inappropriately) included in the OOMP since a pre-construction UXO campaign is not an operations and maintenance activity. Again, the penultimate column should be changed to red since the MMO considers that this activity would require an additional marine licence.

2.1.6 Appendix 1 – Operations and Maintenance List: "*Recovery of dropped objects*": This activity is correctly detailed as requiring report to the MMO via a Dropped Object Procedure Form, therefore the final column should state 'Yes'.

2.2 Offshore In Principle Monitoring Plan (OIPMP) (Document 8.13)

2.2.1 Heading 1.3 - Description of the East Anglia Two Project:.Note this should be changed to "*East Anglia One North Project*".

2.2.2 Table 2: In-Principle Monitoring Proposed – Benthic Ecology; Post-construction: "*Where no Sabellaria reef is identified by the pre-construction survey of the proposed works or where reef has been identified but avoided (and associated buffers), no post-construction surveys will be undertaken*": See comments in paragraphs 1.1.3 and 2.1.3 above; certain post-construction activities may require additional benthic surveys (i.e. drop-down video) prior to the commencement of works to ensure effective mitigation for ephemeral protected features.

2.2.3 Paragraph 1.6.5 – Fish Ecology: The MMO recommends additional modelling for fish is undertaken to properly assess potential impacts on the Downs herring stock (see section 3.3.1 below). Until such modelling has been undertaken, the MMO cannot agree with the impact assessment of 'minor adverse' for fish ecology.

2.3 Marine Mammal Mitigation Protocol (MMMP) (Document 8.14)

2.3.1 With reference to section 5.1.3 in the draft MMMP, the maximum potential permanent threshold shift (PTS) range for marine mammals from an unexploded ordnance (UXO) with a possible maximum charge weight of 700 kg is in fact 11 km (based on the Peak Sound Pressure Level (SPLpeak) for harbour porpoise). Basing the proposed mitigation on the 3.6 km range for the single strike sound exposure level (SEL), as the draft MMMP currently does, is misleading and inappropriate. The MMO recommends that this is amended.

2.4 Site Characterisation Report (Windfarm Site) (Document 8.15)

2.4.1.1 The MMO requests that the Applicant provides the particle size distribution data and contaminant analysis data in full so that a comprehensive assessment of what

can be considered sufficient sampling data can be conducted. The reasoning for this is explained below.

2.4.1.2 The MMO notes that Figure 3 shows the sample sites for contaminant testing. Three sites are located within the windfarm area, and eight are located within the cable corridor. OSPAR guidelines for the disposal of dredged material at sea recommend that at least three sample stations should be sampled for dredge campaigns up to 25,000m³. As the likely foundation type will require between 8,000m³ and 27,000m³, it is reasonable to infer that each foundation site will require three sample stations. The proposed number of turbines is 75, thus, the immediate recommendation for sampling would be to recommend approximately 225 sample stations for the wind farm area. However, given the likely particle size distribution (PSD) of the area, which is likely to be sand and gravel, material is likely to be lower risk in terms of sediment contaminant levels compared to finer PSD material such as silt. We would not therefore consider it necessary to test for 225 samples, however we are not convinced that three sample stations for the entirety of the wind farm area is sufficient to assess the suitability of the material for disposal at sea. It is reasonable to deem acceptable a reduced regime of sampling compared to what would be recommended by OSPAR guidelines, however, any reduced sampling regime should be sufficient to adequately represent the area both in spatial extent and in terms of the activities proposed regarding the volume of dredged material.

2.4.1.3 When considering the wind farm area as a whole i.e. 75 turbines ranging between 8,000m³ and 27,000m³ per foundation, the volume of dredged material ranges between 600,000m³ and 2,025,000m³, however the report later states that the worst case scenario for total foundation installation would be approximately 1,500,000m³. The Applicant states that approximately 3,000,000m³ of material will be required to be dredged in a worst case scenario when including other operations such as platform construction. This range falls into the OSPAR recommendation band of 500,000 to 2,000,000m³, for which between 16 and 30 sample stations are recommended, with an additional 10 stations for each subsequent 1,000,000m.

2.4.1.4 As such, should this material comprise fine sands and silts, it is likely that up to 40 stations would be required. As stated above however, the MMO would be content to consider a reduced sampling regime. In our analysis of the documents provided, we have not located any explanation as to what “sand” is classified to be in this process. Figure 2 indicates that most of the area is largely sand, however, there is no indication whether these are fine or coarse sands. As such, before we consider a sufficient reduced sampling regime, we request that you provide the PSD data in full.

2.4.1.5 The MMO notes that the Applicant has tested material from the three sample sites for trace metals, polycyclic aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCB), amongst other contaminants not listed under OSPAR contaminants of concern for at-sea disposal of sediment. However the Applicant did not test sediment for organotin levels, which is an OSPAR contaminant of concern. The Applicant states that results are largely below Cefas Action Level 1, and Canadian Sediment Quality Guidelines were utilised to assess PAH and PCB levels in absence of an official Cefas Action Level 2. Additionally analyses were conducted by SOCOTEC, which, as has been recognised, are validated by the

MMO for all analyses conducted. These samples were collected in 2018, however the MMO is not aware that specific sampling advice was obtained from the MMO in the form of a sample plan prior to this activity taking place.

2.4.1.6 Therefore, we advise that you provide the sediment analysis data in full so that an appropriate analysis of PAH and PCB levels can be conducted in respect of Cefas' approach to interpreting contaminant levels which considers an effects-range system. This effects-range analysis cannot be conducted on average values alone, and requires data in full.

2.4.1.7 Furthermore, we recommend you to provide the following information within the ES:

- Dredging method
- Dredging depth
- Dredging volume
- Disposal site (location, reason to designate a new site, characteristics)

We are not able to identify the depth of material to be dredged, the dredging method to be used, or if any sample analysis was conducted on subsurface sediment, i.e. sediment deeper than 1m below the seabed surface. We consider this essential should any dredging below 1m of the seabed surface be required. Therefore we recommend you to provide this information.

2.4.1.8 The MMO understands that the Applicant's preferred disposal site is HU212, named EAOW3, which we understand will be used by East Anglia Three and One Offshore Windfarms. The MMO would like clarity on whether the capacity of HU212 can support disposal from three windfarms. The Applicant also discusses the potential for dredged sediment to be used as ballast for certain foundation types, though the extent to which this would occur is not clear and should be clarified. Additionally, the potential for dredged sediment to settle or disperse locally is discussed, though it is not clear in this case whether this is relevant for a majority or minority of dredged sediment. Again, this should be clarified.

2.5 In Principle Site Integrity Plan for the Southern North Sea Special Area of Conservation (IPSIP) (Document 8.17)

2.5.1 The MMO welcomes the inclusion of clearance of UXO in the IPSIP, which is an appropriate place to detail the scale of potential noise impacts from the project on the Southern North Sea SAC. The MMO considers however that a more detailed Habitats Regulations Assessment of this activity should follow post-consent together with the submission of a detailed marine licence application for the required UXO campaign (see paragraph 1.1.5 above).

2.5.2 The Applicant is advised that the Department of Business, Energy and Industrial Strategy (BEIS), together with the MMO, intend to provide further advice on the recommended content of IPSIPs for harbour porpoise SACs, and that this should be incorporated into future versions of the document post-consent.

3. Environmental Statement (ES)

3.1 Coastal Processes

3.1.1 Comments on Chapter 7 - Marine Geology, Oceanography and Physical Processes

3.1.1.1 In relation to section 7.7 'Cumulative Impacts', the MMO are satisfied that standard EIA methodology has been followed to attempt to minimise the proposed project's potential impact on environmental receptors. However, we are cautious of the conclusions drawn and consider the existing knowledge base to be insufficient to know, with certainty, whether or not the cumulative impact of the Offshore Wind Farm (OWF) sector will have a significant impact on marine geology, oceanography and physical processes and subsequently upon other receptors (e.g., benthic fauna and fisheries). This is primarily due to the complexity of the environmental systems in which OWF typically exist (e.g., southern North Sea) and the temporal scale over which impacts on marine geology, oceanography and physical processes would likely manifest to a degree that they could be measured and assigned a cause with a sufficient degree of confidence, following the impact pathway receptor model generally applied. Whilst the models used to predict potential cumulative impacts conclude no significant impact (sections 7.7.1 – 7.7.3), and we agree with that conclusion based on existing knowledge and the information presented within the ES, the MMO believe that these models are based on an imperfect understanding of the system and consider unforeseen impacts to be possible over the lifespan of the proposed and other OWF projects. The significance of these impacts is also considered unlikely to be understood in the foreseeable future. Similarly, a change in baseline condition of 5% was previously agreed to represent the "accepted threshold of significance". Whilst we understand the need for a pragmatic approach, this 5% is nominal and should be treated with caution.

3.1.1.2 Furthermore, whilst the MMO acknowledges that the ES concludes that there will be no significant impacts on the wave climate, given the proposed project's greater proximity to the coastline (in comparison to previous OWF projects) and the long-term uncertainty described in paragraph 3.1.1.1 above, we recommend that wave data is collected at a location situated between the proposed site and the "East Anglia sensitive coast" receptor prior to construction (baseline) and for a sufficient period post-construction. This would allow an assessment of the accuracy of potential impacts on wave climatology modelled and consequently, the validity of the ES conclusions. For example, this could involve the deployment of an acoustic wave and current (AWAC) profiler or wave buoy. This would contribute to the knowledge base relevant to planning and address the uncertainties and assumptions described above (3.1.1.1).

3.1.1.3 The MMO acknowledges that the Applicant has recognised the importance of minimising disturbance to circulatory sediment transport pathways that exist between the coast and Sizewell Bank, and the choice of landfall location and commitment to install the export cable at the landfall location using HDD techniques is welcomed. Regarding the potential landfall location (as shown by the blue hatched area in Figure 7.7), the MMO recommends that the punch out location is located as far south and east as possible within this area, in order to minimise potential disturbance to bedload sediment transport in this region across Thorpeness headland and between the headland and Sizewell Bank.

3.1.1.4 In relation to sand wave levelling, section 7.6.1.6 states that "*the dynamic nature of the sand waves in this area means that any direct changes to the sea bed elevation associated with sand wave levelling are likely to recover over a short period of time due to natural sand transport pathways*". Whilst natural processes may result in mobilised sediments reforming sand wave features, the MMO advises that it is improbable that this will be with the same configuration. This will have an additional impact on localised tidal flows and subsequent sediment transport. Future removal of foundations during decommissioning would likely again reset this configuration (rather than returning to the existing baseline sand wave configuration). It is acknowledged that these impacts will be localised and unpredictable, but we recommend that it is noted that "recovery" does not necessarily mean a return to the natural baseline condition.

3.1.1.5 The MMO is unable to comment on the appropriateness of the proposed mitigation until the outstanding evidence gaps explained above are resolved.

3.1.2 Comments on Chapter 8 - Marine Water and Sediment Quality

3.1.2.1 Regarding the use of plastic fronded mattresses as a scour protection tool, the MMO note that fronded mattresses remains a potential scour protection measure (Chapter 6.1.8), with the applicant stating that "*mattresses are being trialled at East Anglia ONE which will establish a knowledge base which can be used at post-consent for East Anglia TWO. The frond mats will be weighed prior to installation and results made available for break tests. Upon recovery, the mats will be visually inspected and re-weighed, using the same test equipment to allow a direct comparison of before and after results*" and that "*the use of fronded mattresses will be decided post-consent based on the monitoring commitment above. This will be confirmed through the Construction Method Statement, to be provided pre construction for approval by the MMO as secured under the requirements of the draft DCO*". Whilst the MMO is content with this approach (i.e., ongoing research and a decision made following an assessment of the monitoring results pre-construction) the MMO's preference remains the avoidance of the introduction of frond mattresses containing hard plastic into the marine environment as far as possible.

3.2 Benthic ecology

3.2.1 Comments on Chapter 9 – Benthic Ecology

3.2.1.1 The MMO recognises that the 2018 side-scan survey showed no evidence of reef in the offshore cable corridor (section 9.5.5.1.1, paragraph 153). However, the findings of the 2017 side-scan survey within the windfarm site don't appear to be described in the ES. The MMO recommends that this information is added to section 9.5.5.1.1.

3.2.1.2 The MMO agrees that *Sabellaria spinulosa* reef is the main feature of conservation concern of relevance to the proposed development (section 9.5.5.1.1). Additionally, we are content with the proposed mitigation measure of micro-siting the turbines and cable corridor based on the potential presence of *Sabellaria* reef, which will be confirmed or otherwise by pre-construction drop-down video surveys (sections 9.3.3.2.1, 9.5.5.1.1 and 9.6.1.1). However, while the MMO agrees that pre-construction surveys for *Sabellaria spinulosa* are appropriate, we are aware that there may be visibility issues for the video surveys due to high turbidity in the area. The absence of *Sabellaria* reef should only be concluded from images/videos of sufficient quality to detect the feature if it were present, and we advise that a freshwater lens or an ARIS camera may be required to obtain images of sufficient quality.

3.2.1.3 The MMO also notes that there is no monitoring proposed for benthic ecology receptors (sections 8.13 and 9.3.4).The MMO recommends that grab samples are collected to monitor the effect of turbine installation on sediment composition and benthic communities. This would allow the predicted effects on benthic ecology to be confirmed or otherwise.

3.2.1.4 The MMO notes that sediments at the windfarm site are primarily sand and gravel (section 9.5.1.1), but some stations close to the shore on the cable corridor have predominantly silty sediments (section 9.5.1.2). It is important that contaminant samples are available for these stations, however it's not clear whether this is the case in the Benthic Ecology chapter of the ES. The MMO requests that the Applicant confirms whether contaminant samples were collected from stations with high silt/mud content.

3.2.1.5 The MMO recognises that the number of individuals and taxa per grab sample and trawl are reported (paragraphs 122 and 140, respectively). We advise that this information would be more useful if the sample area (i.e. the surface area of the grab and swept area of the trawl) was reported alongside.

3.2.1.6 The MMO notes that the Applicant has not addressed the possibility that benthic ecology receptors will be indirectly affected by sediment suspension due to effects on phytoplankton growth or egg and larval survival. While we recognise that the justification for this is stated in Appendix 9.1 of the ES, on the basis that sediment suspension would result from activities that make up a relatively short period of the construction phase. There doesn't appear to be any indication in the Benthic Ecology chapter of how long this period would be. The MMO requests the Applicant

to provide additional, quantitative details about the duration of exposure if these potential indirect impacts are to be discounted.

3.2.1.7 The MMO notes that the Applicant has not addressed our previous advice that the Hamon grab is not suitable for the collection of contaminant samples. The action of the Hamon grab mixes the sediment, which could result in the release of adsorbed contaminants and cause the sample to be unrepresentative of the actual contaminant load. We recommend that contaminant samples are collected from an intact sediment surface, which can be done using a Day grab in soft sediments or a Shipek grab in coarse sediments (Whomersley, 2014). If Hamon grabs are to be used for contaminant sampling, then we recommend that the Applicant provides evidence to demonstrate that this approach is reliable.

3.2.1.8 Given the structure of section 9.5, it seems that the heading for section 9.5.2 should be corrected to “Infaunal communities” (not “Faunal communities”), and that the heading for section 9.5.2.1 should only include infauna (not epifauna). We presume the reason for this may be that some epifauna (e.g. *Sabellaria spinulosa)* were found in grab samples. We recommend that this is clarified in the text and/or the heading amended, as appropriate.

3.2.1.9 The MMO notes that there appears to have been an error in writing the final sentence of paragraph 202, and the sentence may need rewording.

3.2.1.10 The final sentence of paragraph 222 (section 9.6.1.5) appears to be mixing sensitivity (i.e. the recoverability of benthic habitats and species) with impact magnitude. We advise that this is reworded for clarity.

3.2.1.11 We note that paragraph 223 reads “*the zone of effects from the proposed East Anglia ONE North project are small resulting in changes in baseline wave height of less than ±1% and therefore not significant and would not affect these sandbanks*”. This seems to be claiming that the activity will result in small changes to wave height, which the MMO believe is not the actual claim being made. We suggest that “*resulting in changes*…” is replaced with “*as a result of variability*…” or something similar.

3.2.1.12 While we agree with the conclusions regarding impact significance for some of the assessments, additional information/clarification is needed for other assessments. The information required is summarised in the following paragraphs (3.2.1.13 – 3.2.1.20).

3.2.1.13 Regarding sediment suspension and deposition during the construction phase, the final sentence in paragraph 205 (section 9.6.1.2.2) states that the receptors have low sensitivity to smothering, whereas Table 9.13 indicates that if smothering is heavy then *Sabellaria spinulosa* has medium sensitivity. The MMO presumes that a low sensitivity was assigned because sediment deposition associated with cable corridor activities will not exceed 5cm thickness. However, this isn’t clear from the text and should be clarified. Also, see our paragraph 3.2.1.6 above regarding potential indirect impacts of suspended sediments during the construction phase.

3.2.1.14 Additionally, the MMO advises that the Applicant includes in section 9.6.1.2 an indication of how long smothering of *Sabellaria spinulosa* is likely to last. *Sabellaria*

spinulosa is thought to be able to tolerate smothering for several weeks (Jackson & Hiscock 2008; cited elsewhere in the ES), so if deposited sediments would be dispersed within this period we would have greater confidence that *Sabellaria* reef would not be significantly adversely affected by this pressure. We note that it is indicated later in the ES that spoil heaps would take years to disperse (section 9.6.1.6, paragraph 230).

3.2.1.15 Regarding underwater noise and vibration during the construction phase (section 9.6.1.4), sensitivity is assessed as "medium" and impact magnitude as "negligible". From this, an impact of negligible significance is concluded. However, according to the impact significance table (Table 9.10), an impact of minor adverse significance should have been concluded. Therefore, the MMO recommends that the assessment is corrected.

3.2.1.16 Similarly, regarding direct and indirect impacts on sites of marine conservation importance during the construction phase (section 9.6.1.5), sensitivity and impact magnitude are both assessed as "low". From this, negligible adverse impacts are concluded (paragraphs 219-220 and 224-225). However, again, according to the impact significance table (Table 9.10), an impact of minor adverse significance should have been concluded, and we recommend that this is corrected.

3.2.1.17 Regarding impacts of habitat change during the operation phase, paragraph 239 (section 9.6.2.1.1) concludes that the impact of habitat loss during the operation phase will be of minor adverse significance, but does so without stating the sensitivity of the receptor. Similarly, paragraph 240 states that because impact magnitude is negligible, the overall impact significance is negligible. This is not necessarily the case according to the assessment method used (see Table 9.10). The MMO recommends that sensitivity is clearly stated and justified in both cases.

3.2.1.18 Regarding impacts of physical disturbance during the operation phase (section 9.6.2.2), it says in paragraph 250 that a minor adverse impact is concluded, in part, because of the ability of benthic ecology receptors to recover rapidly. However, it is stated earlier in the ES that it would take two years for *Sabellaria spinulosa* abundance to recover (paragraph 188), while a mature *Sabellaria spinulosa* reef would take up to five years to recover (paragraph 189). According to paragraph 247 in the ES, it is expected that jack-up barges could be used at each wind turbine every two years and that repair and reburial of cables could occur every five years. The MMO advises that the possibility of these activities preventing recovery or establishment of *Sabellaria spinulosa* reef are considered and, if necessary, the impact significance adjusted.

3.2.1.19 As noted for the construction phrase (see paragraph 3.2.1.13 above), sensitivity to smothering is said to be low in the assessment for sediment suspension and subsequent deposition during the operation phase (section 9.6.2.3). Again, Table 9.13 indicates that if smothering is heavy then *Sabellaria spinulosa* has medium sensitivity, so we presume it is known that this receptor will not be subjected to heavy deposition during the operation phase. This seems plausible given what is written about the sediment plume in section 9.6.2.3, however the MMO recommends that this is clarified.

3.2.1.20 Regarding the colonisation of infrastructure during the operation phase, the first sentence of paragraph 265 (section 9.6.2.4) states that there would be a change in habitat across an area of up to 341km^2. We presume this means that the area of new colonisable substrate (1.88km^2; see paragraph 260) would be confined to an area of 341km^2. The MMO also recommends that this is clarified.

3.2.1.21 Generally, the MMO agrees with the impacts scoped in and out of the cumulative impact assessment (CIA) (Table 9.15), but see paragraph 3.2.1.22 below. We agree with the conclusions regarding the significance of all cumulative impacts assessed in the CIA (sections 9.7.1.1–9.7.2.5). However, if the significance of impact is changed for any activities associated with EA1N (e.g. in response to paragraphs 3.2.1.13 – 3.2.1.20 above), then we advise that this should be reflected in the Cumulative Impact Assessment (CIA).

3.2.1.22 We recognise that colonisation of foundations and cable protection is scoped out of the CIA because of the localised nature of the pressure (Table 9.15). However, it is the MMO's view that the many structures associated with various windfarms in the area could together enhance the dispersal of fouling organisms in the region, possibly also facilitating the spread of non-native species. Therefore, unless there is a good reason to discount this possibility, we advise that this potential impact should be included in the CIA.

3.2.1.23 The MMO agrees that generally the activities within the operation and maintenance plan are adequately covered in the Benthic Ecology section of ES. However, the ES often mentions the possibility of benthic species such as *Sabellaria spinulosa* colonising the infrastructure (e.g. paragraph 257 in section 9.6.2.4). However, in the Offshore Operations and Maintenance Plan, it is stated that marine growth that accumulates on the offshore infrastructure would be regularly removed to protect the exterior parts of the wind turbines. If the removal of growth would involve the removal of colonising benthic organisms, then we advise that this should be reflected in the ES.

3.3 Fish ecology

3.3.1 Comments on the Chapter 10 – Fish and Shellfish Ecology

3.3.1.1 A number of mitigation and good practice measures have been proposed for fish which the MMO agree are appropriate. However, further evidence is needed to determine if we require additional mitigation measures in respect of the Downs herring stock. The MMO has outstanding concerns from the Preliminary Environmental Information Report (PEIR) process regarding the use and interpretation of International Herring Larvae Survey (IHLS) data, and the parameters used to inform the modelling of impacts from piling noise on spawning herring. We advise that clarifications and/or revisions of the modelled data is needed, before we can comment on the need for any additional mitigation measures for herring.

3.3.1.2 According to Chapter 10, paragraph 46; "*The values for larval abundance presented refer to the number of herring larvae in the smallest reported size*

category (<11mm total length) caught per square metre at each site sampled per fortnight in the 3rd quarter in each year between 2004 and 2017 (International Council for Exploration at Sea (ICES) 2018)". IHLS surveys of the southern North Sea are conducted as three surveys; one in the 3rd quarter of each year undertaken by the Netherlands between 16-31 December, and two in the 1st quarter of each year; between 1-15 January undertaken by Germany, and between 16-31 January undertaken by the Netherlands. Based on the information in paragraph 46, it seems that only data from the surveys undertaken in December has been used to provide information on larval abundance for the Downs herring stock. The MMO recommends that the Applicant clarifies whether the IHLS data for the Downs population presented in Figures 10.15, 10.16 and 10.17 includes data for all three surveys. Please also see our comments below in paragraph 3.3.1.5 in which we have made further recommendations regarding the presentation of IHLS data.

3.3.1.3 Regarding the modelled noise contours for herring, Figures 10.34 -10.44 present the Temporary Threshold Shift (TTS) noise contour for fish species that have spawning and nursery grounds overlapping, or near, to the EA1N site. The modelling used to inform these outputs is based on a fleeing receptor model and pin pile. The title on each of these figures is given as: "…*Spawning and Nursery Grounds in Relation to Worst Case Noise Impact Contour (Fleeing Model)".* However*,* for the reasons provided in our Section 42 response (dated 21 March 2019) and for the reasons provided below, the MMO is of the opinion that the figures presented do not represent the worst-case scenario;

a) Use of fleeing receptor; In points 6.2.1 – 6.2.3 of our Section 42 response the MMO raised major comments on why we did not support the use of a fleeing receptor model for fish and provided recommendations for how best to present the modelled data for noise, using monopiles and a stationary receptor as the worst-case scenario.

b) Use of pin pile hammer energy for the modelling; pin piling using a hammer energy of 2400kJ has been presented in Figures 10.34-10.44. The MMO notes that monopiles are expected to require a hammer energy of 4000kJ, and the modelled noise contours for this higher energy level have not been included in the figures, therefore the worst-case scenario in terms of noise propagation has not been presented, especially considering the type of wind turbine and installation methods to be used at EA1N have not yet been determined.

c) The use of Coull *et al. (*1998) to define herring spawning grounds; The data provides broad scale information on known herring spawning grounds but does not account for the spatial variations in spawning locations than can be seen between years, as demonstrated by IHLS data in Figures 10.15 – 10.17.

3.3.1.4 The MMO acknowledges that the Applicant has provided a summary of the impact ranges in Tables 5-61 to 5-72 including those based on a 4000kJ monopile and a stationary receptor. However, these have not been presented in the format requested in our advice at PEIR stage (Section 42 response). The MMO also recognises that an effort has been made to present the TTS noise

contour over IHLS data showing larval abundance for all UK herring stocks including the Downs (Figure 10.45). However, this figure is based on a fleeing model and pin pile so again, is not the worst-case scenario.

3.3.1.5 Therefore, the MMO recommends that the noise modelling is revised using the following approach:

a) There is potential for an overlap of noise and vibration with the Downs herring spawning ground, although to what extent is unclear. Accordingly, based on the evidence presented it is also unclear whether a seasonal piling restriction is necessary to mitigate noise impacts for spawning herring. In consideration of our comments above regarding the IHLS data (paragraph 4.5.1.2) and appropriate noise modelling (paragraphs 4.5.1.3 and 4.5.1.4), we recommend that the revised noise modelling is undertaken based on a 4000kJ monopile and a stationary receptor, for a more accurate worst-case scenario.

b) It is understood that Downs herring spawning activity in northern parts of the spawning grounds occurs later in the season compared to those grounds further south in the English Channel, please see Annex 1 for examples of this taken from ICES (2014 and 2016) which demonstrate the variations in larval abundance according to the periods in which surveys were carried out.

c) With this in mind, the MMO recommends that mapped noise contours should be overlain over 10 years of IHLS data which have been consolidated by IHLS survey period (i.e. 16-31st December 2008-2018, 1-15th January 2008-2018 and 16-31st January 2008-2018).

d) Presenting the data in this way will enable identification of the periods when peak larval densities typically occur in the vicinity of the EA1N site. Based on previous reviews of IHLS data for the Downs herring stock, the MMO would typically expect to see high larval densities further south in the English Channel in December, but lower in the vicinity of EA1N, followed by a more even distribution of larval densities towards the EA1N area throughout January. In the event that revised modelling indicates an overlap of noise with areas of herring larval abundance then presenting IHLS data in this way may also assist in refining the duration of a seasonal piling restriction.

3.3.1.6 The MMO notes that for the assessment of impacts of construction on fish, a calculation of total spawning habitat has been used in an effort to quantify the percentage of spawning area affected. It should be recognised that the MMO do not support the calculation of total spawning habitat, as this approach can over- or under-represent spawning grounds and is solely based on substrate suitability. The reasons for this are summarised below:

a) Spawning areas can change over time or become recolonised.

b) Whilst spawning and nursery ground maps are used to provide the most recent and appropriate information to identify spawning areas, they do not fully define/consider/identify the following;
    - All potential areas of spawning.
    - Any habituation that may occur i.e. identify areas where higher densities of spawning are present.
    - Specific substrate requirements e.g. substrates which are more suitable within wider broad scale sediments.
    - More suitable topography e.g. ridges/edges of sandbanks where sole may spawn or furrows where herring may spawn.
    - Environmental factors that may influence spawning intensity such as temperature, oxygenation, natural disturbance, anthropogenic disturbance etc.
    - Calculations of specific spawning areas are based on peak spawning times i.e. the number of days of a spawning period rather than considering the entire spawning season.

c) Consequently, it is not possible to delineate spawning and nursery areas using the mapped boundaries.

d) Specifically, in relation to herring, the calculated habitat approach does not take into account recent IHLS larval density data (the best representation of recent spawning activity) as well as water quality, topography etc. which are also factors in areas where herring spawn.

e) Furthermore, herring do not display spawning bed site fidelity i.e. they do not return to the exact same location within a spawning ground to spawn. This lack of site fidelity can be seen upon reviewing different years of IHLS data in which variability in the larval density both spatially and temporally can be understood.

3.3.1.7 The MMO notes that paragraph 130 recognises sandeel as benthic spawners, however table 10.18 contradicts this by classifying sandeel as pelagic spawners. We advise that this is corrected.

3.3.1.8 The MMO are largely in agreement with the conclusions for the assessment of cumulative impacts to fish ecology. However, we have the following comments and recommendations regarding the potential for cumulative impacts to sandeel.

3.3.1.9 For the EIA for fish ecology, no impact was greater than minor adverse for the project alone or cumulatively for the proposed EA1N project, therefore no monitoring or surveys are proposed. However, the MMO recommend that pre- and post-construction monitoring of sediments across the EA1N site is undertaken to inform the assessment of cumulative impacts to sandeel arising disturbance to, and loss of, 'preferred' sediments for the following reasons;

a) Three species of sandeel were recorded in the site-specific scientific beam trawl surveys undertaken in the East Anglia wind farms zone: Raitt's sandeel, small sandeel, greater sandeel and smooth sandeel. Smooth sandeel, greater sandeel and lesser sandeel have also been recorded in the study area by the International Bottom Trawl Survey

(IBTS). Within the study area, the catch per unit effort (CPUE) of greater sandeel was particularly high in ICES rectangle 33F2, where the EA1N site is to be located. However, analysis of IBTS data in the wider North Sea suggests that sandeel is found in the offshore development area in relatively low numbers.

b) The trawling method (Grande Overture Verticale trawl) used in the IBTS surveys is not specifically designed to target sandeel and therefore does not provide accurate information on sandeel abundance. Nonetheless, the presence of sandeel in high numbers within ICES rectangle 33F2 using this gear type does suggest that the area is well suited to sandeel and is actively inhabited by sandeel in reasonably high numbers. This is further supported by the particle size analysis (PSA) data in Figure 10.2.4 which shows the vast majority of samples within the array site consisted of 'preferred' habitat sediment types, with the cable corridor consisting of a mix of preferred, marginal and unsuitable habitats. Whilst the area of sandeel habitat within the EA1N site is small compared to some sites further north in the central North Sea that are targeted by commercial fisheries (e.g. Dogger Bank), it does form part of a patchy habitat which extends across multiple areas within the southern part of the North Sea.

c) Sandeel are demersal fish which spawn in the areas which they inhabit. They have specific habitat requirements in terms of resident substrate, 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 can be further enhanced, should the activities (e.g. construction, dredging etc.) be undertaken during the winter hibernation period when sandeel are most vulnerable.

d) The MMO acknowledge the findings of Stenberg *et al.* (2015) (Chapter 10, paragraph 284) that localised habitat losses as a result of OWFs may be considered too low to influence the abundance of sandeels. However, the wider habitat availability (or lack of) for sandeel resulting from multiple habitat losses from wind farm development across the North Sea has not currently been accounted for or monitored.

e) 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 e.g. the former Hornsea zone, Dogger Bank Teesside A and B (Sofia), Dogger Bank Creyke Beck A & B; Norfolk Boreas, Norfolk Vanguard, East Anglia One, East Anglia Two and East Anglia Three, to name but a few.

f) There is currently very little monitoring being undertaken to investigate the cumulative impacts on sandeel as a result of the construction and operation of offshore windfarms. This makes it difficult to ascertain whether the installation and presence of windfarms is having any effect on sandeel populations. In addition, a lack of post-construction monitoring makes it difficult for windfarm developers to validate ES predictions concerning impacts on sandeel.

g) The current status quo for EIAs is to assume that because the North Sea is a 'large area', impacts to sandeel resulting from a particular development 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. However, in the MMO's opinion, such a conclusion overlooks two key issues;
    - There are many areas of the wider Southern North Sea area that are not suitable sandeel habitat, e.g. incompatible substrate composition, water depth.
    - 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.

h) For the aggregates industry, impacts to, and the continued monitoring of, sandeel habitat affected aggregate extraction sites, is currently informed through PSA data collected under the Regional Seabed Monitoring Plan (RSMP) (Cooper et al. 2017) and follows the method described by MarineSpace (2013). Collectively, the monitoring of all aggregate sites in this way can provide an indicative overview of impacts to all affected sites across a particular region.

3.3.1.10 Therefore, the MMO recommends that the Applicant undertakes pre- and post-construction sandeel habitat monitoring using the MarineSpace (2013) approach, based on the collection of seabed sediment samples for particle size analysis (PSA) in order to monitor the suitability of the EA1N site as sandeel habitat. This monitoring could be undertaken as part of a benthic grab sampling monitoring program.

3.3.1.11 The MMO notes that in Table 1.3 of the Outline Offshore Operations and Maintenance Plan, UXO clearance via detonation is listed as a potential offshore maintenance activity. The table signposts the reader to Chapter 11 of the ES for Marine Mammals, however, UXO detonation is not included or assessed in Chapter 10 of the ES in relation to impacts to fish. Notwithstanding comments in paragraph 1.2.1 above, the MMO recommends that the impacts of UXO detonation as a maintenance activity on fish is assessed within Chapter 10 of the ES.

3.4 Shellfish ecology

3.4.1 Comments on Chapter 10 – Fish and Shellfish Ecology

3.4.1.1 The MMO agrees that the shellfish species present in the area and all potential impacts upon them have been correctly identified. However, not all of the identified potential impacts have been assessed fully. Specifically, regarding suspended sediment concentrations (SSC), detail has been given to the effects of this impact on Brown crab (*Cancer pagurus*) and European lobster (*Homarus gammarus*) only. In the concluding paragraph on SSC, medium sensitivity has been assigned to shellfish including whelk (*Buccinum undatum*) however the impact of SSC on

whelk has not been assessed. As whelk are a valuable commercial species present in the proposed project area we advise that they should be included. Similarly, King scallops (*Pecten maximus*) have been identified as present in the proposed area and are of commercial importance but have not been assessed for the impacts of SSC. Overall, we recommend that further detail is required regarding the impacts of SSC on shellfish species.

3.5 Commercial Fisheries

3.5.1 Comments on Chapter 6 – Project Description

3.5.1.1 The MMO notes that the cable export route will pass through active fishing grounds, which is likely to cause disruption to the local inshore fleet during cable laying and could be contentious due to the number of export cables already passing through local inshore waters.

3.5.1.2 The use of concrete mattresses and other methods to cover unburied cables or cable crossing points is also likely to be controversial as this presents a snagging risk to trawling vessels. These mattresses will be in addition to those in place along cable routes for other windfarms within the area.

3.5.2 Comments on Chapter 13 – Commercial Fisheries

3.5.2.1 While the generating assets of the windfarm will be erected well outside the local inshore fishing area, the MMO notes that there are some larger trawling vessels active in the proposed construction zone. These larger vessels are highly mobile, and as such, individual works are unlikely to significantly impact fishing operations. However, wind farms are often constructed in areas favourable to trawling, and given the number of wind farms in operation, under development and under construction off the East Anglian coast, the cumulative impact on such vessels may be more significant than it initially appears.

3.5.2.2 Although the report indicates that the impacts are considered low to medium, it should be noted that many of the vessels impacted are single crewed and reliant on established fishing grounds. Therefore disruption and restriction to those grounds may cause more of an impact than expected.

3.5.2.3 The assessment of fishing activities is largely reliant on MMO data. This can be considered to be relatively reliable for large offshore vessels due to the reporting mechanisms in place. However, for the under 10m inshore fleet, at the time of this response, the requirement for reporting is limited. Due to the business model under which they operate such vessels are not currently required to submit landings data, therefore the fishing effort along the cable corridor is likely to be greater than is indicated by the data available.

3.5.2.4 Along with a Fisheries Liaison Officer (FLO), the MMO advise that it would be appropriate to additionally appoint an independent Fishing Industry Representative (FIR).

3.6 Underwater Noise

3.6.1 Comments on Appendix 11.4 - Underwater Noise Assessment

3.6.1.1 In our Section 42 response, the MMO raised that the underwater noise modelling should consider a stationary animal receptor for fish. We recognise that modelling based on a stationary receptor has been included in a separate appendix (Appendix 10.3) to the main underwater noise assessment, and stationary receptor results are also provided in the main noise assessment. Thus, the MMO are content that this issue has been addressed in the ES in some respects. However, we still have comments on noise modelling in relation to herring spawning grounds that we advise are addressed.

3.6.1.2 We raised during the PEIR review that for the cumulative sound exposure level (SEL) assessment, the cumulative exposure over a 24-hour period should be assessed, as per the National Marine Fisheries Service (NMFS) (2018) guidance[1]. The current assessment only considers the installation of a single monopile or pin pile in a 24-hour period (as per Tables 4-2 and 4-3). It is reasonable to expect that more than one pile will be installed per 24 hours, which would not be accounted for under the current (cumulative exposure) assessment. The Applicant has confirmed (in Appendix 11.1 Marine Mammal Consultation Responses) that there is the potential for more than one pile to be installed in a 24-hour period. Therefore, we advise that this should be reflected in the cumulative exposure assessment.

3.6.1.3 Additionally, we previously recommended that the underwater noise assessment should provide a plot showing the predicted received sound levels with range, for the single strike SEL. This would facilitate and streamline the process of comparing predictions with any future construction noise monitoring data collected for compliance purposes. We welcome that this has now been provided – Figure 5-10 shows the level against range plots showing the unweighted SPLpeak and SELss noise levels from the worst-case locations for monopiles and pin piles at EA1N for a deep transect (190°). However, we recommend that the Applicant states what hammer energy has been used here (please confirm the assumption that the maximum hammer energy has been used for the assessment), or what is assumed for the source.

3.6.1.4 Following on from this, the MMO advises that the peak sound pressure level (peak SPL) is the most appropriate metric to assess potential impacts (as per Table 6-3 in Appendix 11.4), rather than the single strike sound exposure level. This is because the risk of auditory damage depends on how high peak pressures get (and how rapidly they rise), which – out of the standard metrics available – is best reflected by the peak SPL.

3.6.1.5 The largest SPLpeak impact ranges for permanent threshold shift (PTS) (as per the National Oceanic and Atmospheric Administration (2018) guidance for impulsive sources) are for harbour porpoise, ranging from 7.8 km to 11 km

[1] NMFS intends for the SELcum metric to account for the accumulated exposure (i.e., SELcum cumulative exposure over the duration of the activity within a 24-h period.

depending on the charge weight. TTS impact ranges for harbour porpoise are 13 km to 18 km (Table 6-3). For fish, impact ranges are less than 1 km (Table 6-10).

3.6.1.6 The MMO advises that the most direct and comprehensive way to mitigate the risk of acoustic impact on marine species is to reduce the amount of noise pollution emitted at source. For pile driving (and clearance of UXOs), there are now noise reduction technologies available, such as big bubble curtains and acoustic barriers that are integrated into the piling rig (e.g. IHC Noise Mitigation System), which are being routinely deployed in German waters. Such source mitigation should be considered as a primary means of reducing the potential acoustic impact of pile driving operations.

3.6.1.7 For our comments on underwater noise in relation to the draft Marine Mammal Mitigation Protocol see section 2.3 above.

3.6.2 Comments on Appendix 10.3 - Stationary Modelling Appendix

3.6.2.1 The MMO recognises that the Applicant has provided the stationary animal noise modelling as requested. We note that paragraph 225 in Chapter 10 (Fish and Shellfish Ecology) states the following: "*Whilst there are herring spawning grounds inshore to the west and offshore to the southeast, neither extend over the East Anglia ONE North windfarm site* (*Figure 10.14). The Downs Stock spawning ground is located 25.5km away from the closest point of the East Anglia ONE North windfarm site (using Coull et al. 1998), Figure 10.39 shows that the impact ranges associated with the potential for TTS onset do not overlap with the Downs spawning ground to the southeast, nor inshore to the west*". However, looking at the noise modelling based on a stationary receptor (see Figure 10.3.6 of Appendix 10.3), there is a slight overlap of the TTS (186 dB) noise contour with the spawning ground to the west. This figure does not, however show the IHLS data. Please see our comments above in paragraphs 3.3.1.1, 3.3.1.2, and 3.3.1.5 on what spawning data should be presented. The MMO recommends that noise contours based on a stationary receptor (for the maximum hammer energy for monopiles and pin piles) should be overlaid onto the relevant spawning data.

3.6.2.2 The MMO's Section 42 response recommended that the received levels of the single strike sound exposure level at the spawning grounds should be modelled and presented in addition to enable a more thorough assessment of the risk of potential impact. This has not been addressed and the MMO again recommends that this is revised.

3.7 Marine Plans

3.7.1 Comments on Chapter 3 – Policy and Legislative Context

3.7.1.1 The MMO stated the following in our Section 42 response (21 March 2019): *'The MMO has attached an example template to use when considering the Marine Plans (See Appendix A). We would advise using something similar when you*

submit future documents in support of your application to demonstrate how you have considered the relevant marine plans and policies. These can be found using the MIS and policy information on the following website: http://mis.marinemanagement.org.uk.'

3.7.1.2 The Applicant has considered the Marine Policy Statement (MPS), the East Marine Plan and the shared template in Development Consent and Planning Statement (document reference 8.2).

3.7.1.3 In November 2019, MIS was replaced with Explore Marine Plans (EMP), which is available here: https://www.gov.uk/guidance/explore-marine-plans

3.7.1.4 The MMO has used EMP to identify the East Marine Plan policies that are in scope. Table 1 identifies the policies that have been scoped in but do not appear to have been considered by the applicant.

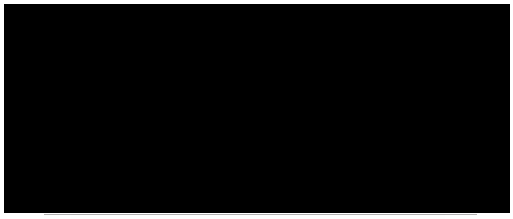
3.7.1.5 The MMO recommends that the Applicant demonstrates in document 8.2 that all East Marine Plan policies, which have been scoped in via EMP, have been considered.

Table 1: East Marine Plan policies that are in scope

East Marine Plan Policy	Policy screened in from EMP assessment	Consideration in document 8.2
Policy AQ1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy BIO1	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy BIO2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy CAB1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy CC1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy CC2	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy CCS2	IN- Policy scoped into assessment through EMP policy search	N/A - not CCS
Policy EC1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy EC2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy EC3	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES

Policy ECO1	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy ECO2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy FISH1	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy FISH2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy GOV1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy GOV2	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy GOV3	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy MPA1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy OG1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy OG2	IN- Policy scoped into assessment through EMP policy search	N/A - not O&G proposal
Policy PS3	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy SOC1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy SOC2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES
Policy SOC3	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy TR1	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy TR2	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy TR3	IN- Policy scoped into assessment through EMP policy search	Not considered in Document 8.2 Development Consent and Planning Statement
Policy WIND2	IN- Policy scoped into assessment through EMP policy search	Applicant has considered in ES

Yours faithfully,



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Annex 1

Herring larval abundances in the Southern North Sea during each of the three IHLS surveys (ICES 2014)

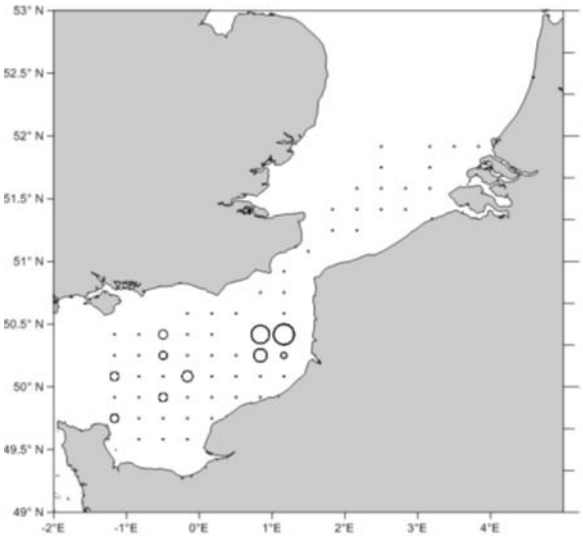

Figure 1. North Sea herring - Abundance of larvae < 11 mm (n/m²) in the Southern North Sea (16-31 December 2013, maximum= 10 n/m²).

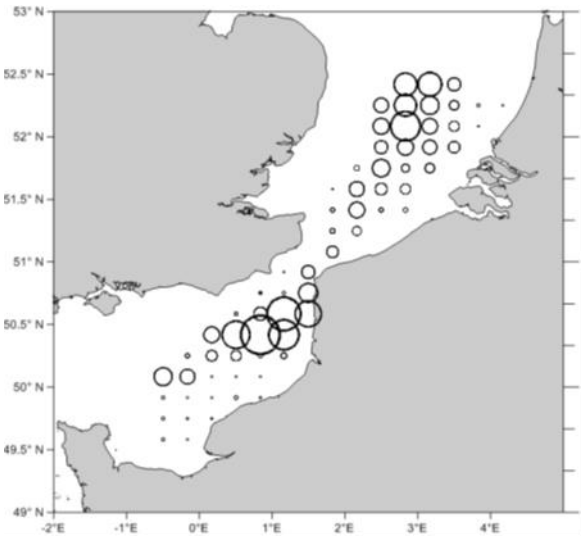

Figure 2. North Sea herring – Abundance of larvae < 11 mm (n/m²) in the Southern North Sea (01-15 January 2014, maximum = 2 800 n/m²).

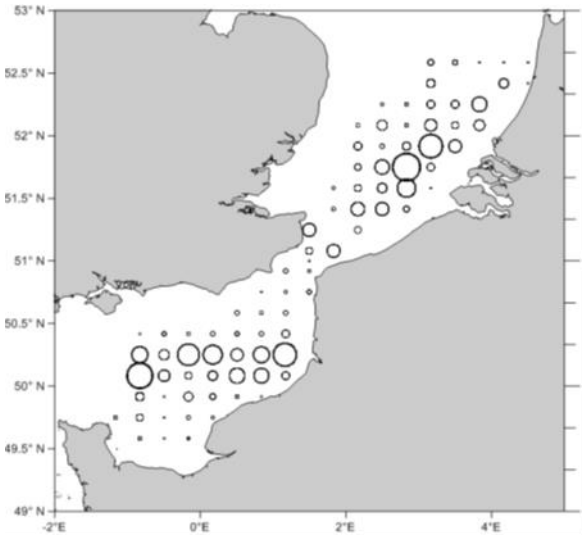

Figure 3. North Sea herring – Abundance of larvae < 11 mm (n/m²) in the Southern North Sea (16-31 January 2014, maximum = 1 200 n/m²).

Herring larval abundances in the Southern North Sea during each of the three IHLS surveys (ICES 2016)

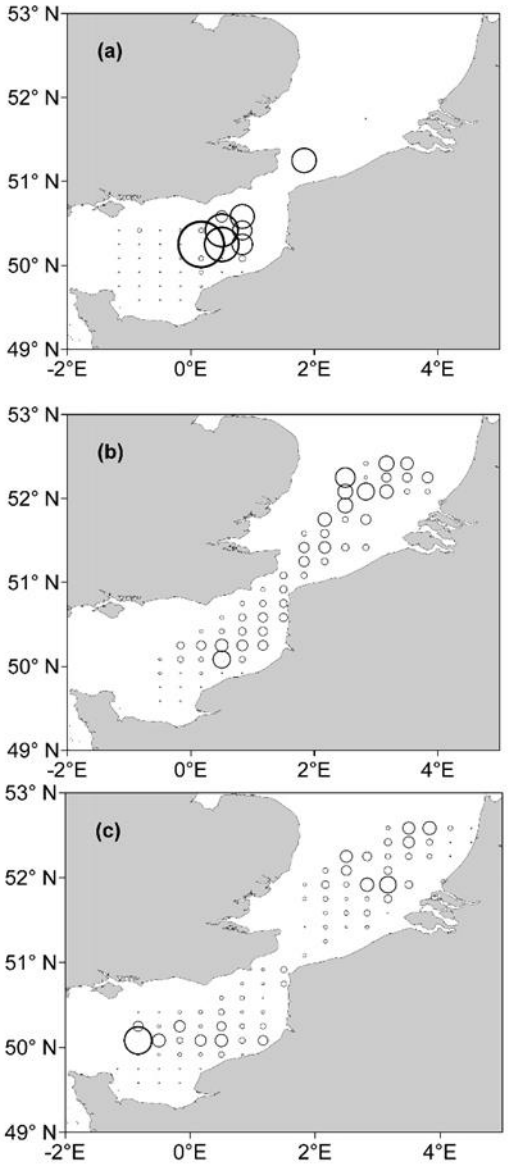

Figure 4. a-c: North Sea herring – Abundance of larvae < 11 mm (n/m²) in the southern North Sea as obtained from the International Herring Larvae Survey in the second half of December 2015 (a) and in the first (b) and the second half (c) of January 2016 (maximum circle size – 1600 n/m²).