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Dogger Bank Teesside A and B Case Team
Planning Inspectorate
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Planning Inspectorate reference:
MMO reference: DCO/2013/00010

11 February 2021

Dear Sir or Madam,

Non-Material Change Application to the Dogger Bank Creyke Back Offshore Wind Farm Development Consent Order 2015 (as amended)

On 21 December 2021 the Marine Management Organisation (MMO) received notice that Dogger Bank Creyke Back Offshore Wind Farm have submitted a non-material change application to The Department for Business, Energy and Industrial Strategy (BEIS) to make changes to the Dogger Bank Creyke Back Offshore Wind Farm Development Consent Order. This document comprises the MMO's comments in respect of this non-material change application.

The non-material changes being sought are as follows:

- An increase in the maximum hammer energy used for monopole installation for the wind turbine generator foundation structure from 3,000 kilojoules (kJ) to 4,000kJ;

- An increase in the maximum hammer energy used for pin-pile installation for the offshore platform foundation structure from 1,900kJ to 3,000kJ;

The MMO has assessed this Non-Material Change application along with its scientific advisor and does have some concerns that it wishes to raise.

Fish Receptors

1. The MMO notes that the Applicant has presented results of the underwater noise (UWN) modelling and a discussion in which the proximity of the Banks Herring spawning ground has been considered in relation to noise propagation from piling based on the increased hammer energies. The MMO considers that this modelling itself appears to be appropriate.

2. The Applicant has stated that the Projects are located '*approximately 80km from the high-density spawning grounds'* for Herring, however, it is unclear what data or maps have been used to support a distance of 80km and no supporting information has been provided to contextualise the definition of '*high-density'*. Herring do not exhibit spawning site fidelity and the locations of Herring spawning activity are known to vary year on year (see Annex 1 for ICES plots which demonstrate this point), therefore the distance between the Banks Herring spawning ground and the project will also vary inter-annually. The MMO would have expected the Applicant to have used International Herring Larval Survey (IHLS) data to support their assessment, for example, by providing a visual representation of Herring larval densities for the Banks Herring stock over a 10-year period, typically the data are presented in the form of a 'heat map'. The heatmap can then be overlaid with the piling noise contours from the modelling, to show the range of effect from noise in relation to larval densities. IHLS data can be downloaded from Eggs and larvae (ices.dk).

3. The MMO considers that the Applicant should also undertake noise modelling for the received levels of the Single Strike Sound exposure levels (SEL_{ss}) at the Herring spawning grounds based on 135dB. The use of the 135dB is based on startle responses observed in sprat by Hawkins *et al.* (2014). Sprat is considered a suitable proxy species for Herring for the purpose of modelling likely behavioural responses in gravid Herring at the spawning ground. It would be useful if the 135dB noise contour was presented in mapped form, i.e., as an additional contour (additional to the 186dB, 203dB and 207dB that have already been modelled.

4. The Underwater Noise (UWN) Model has used appropriate thresholds as described in Popper *et al.* (2014) based on the hearing capabilities of fishes with/without swim bladders, and whether the swim bladder is / is not involved in hearing. Modelling has been based on a fleeing and a stationary receptor. The MMO supports the use of a stationary receptor in UWN modelling for making predictions on noise propagation at fish spawning and nursery grounds. The MMO does not support the use of a fleeing animal model for fish for the following reasons;

    - The MMO knows that fish will respond to loud noise and vibration, through observed reactions including; schooling more closely; moving to the bottom of the water column; swimming away, and; burying in substrate (Popper *et al.* 2014). However, this is not the same as fleeing, which would require a fish to flee directly away from the source over the distance shown in the modelling. The MMO is not aware of scientific or empirical evidence to support the assumption that fish will flee in this manner.

- The assumption that a fish will flee from the source of noise is overly simplistic as it overlooks factors such as fish size and mobility, biological drivers, and philopatric behaviour which may cause an animal to remain/return to the area of impact. This is of particular relevance to Herring, as they are benthic spawners which spawn in a specific location due to its substrate composition.

- Eggs and larvae have little to no mobility, which makes them vulnerable to barotrauma and developmental effects. Accordingly, they should also be assessed and modelled as a stationary receptor, as per the Popper *et al.* (2014) guidelines.

5. The MMO notes that the modelling assumes that foundation piles are installed consecutively, but not simultaneously, with a maximum of two monopiles or four pin piles being installed in a 24-hour period. The MMO has sought clarification from the Applicant as to whether they propose to undertake simultaneous/concurrent piling for pin piles or monopiles and has been made aware that the piling is set to take place simultaneously and not concurrently. This is important as simultaneous piling would result in a different 'worst case' and must be modelled accordingly. The MMO is content with this.

Underwater Noise

6. For reference, please note that MMO was consulted in 2018 regarding the increase in hammer energy for monopile foundations (from 3,000 kJ to 4,000 kJ for Dogger Bank Creyke Beck). The underwater noise propagation modelling for the original assessments in the Environmental Statement (ES) was carried out by the National Physical Laboratory (NPL) in 2012. However, updated modelling was undertaken by Subacoustech Environmental Ltd. Initially Subacoustech's modelling was run to verify that results closely matched the NPL predicted ranges under the original scenarios. INSIRE was also used to model the greater hammer energy scenarios at Dogger Bank, whilst adopting the same metrics and thresholds used in the ES. This allowed a like-for-like comparison in an open and transparent way. Results were then re-analysed to produce new ranges based on the up-to-date criteria.

7. The MMO notes that, for this consultation, the Developer has presented a similar assessment, although the Environmental Report states that it is not possible to make a direct comparison of impact ranges with the original assessments in the ES, due to differences in the underwater modelling and noise exposure criteria[1]. Thus, the noise modelling by Subacoustech includes the original consented maximum hammer energy for Offshore substation platform (OSP) pin-piles and monopiles of 1,900kJ and 3,000kJ respectively, as well as the new proposed maximum hammer energies (to enable a comparison), based on updated noise exposure criteria. Comparison with the impact significance and overall outcomes of the original assessments for the ES have been made in relation the impact significance and overall outcomes of the updated assessments for the increase in hammer energy.

[1] Since the underwater noise modelling was completed for the ES, new noise thresholds and criteria have been published by Southall *et al*. (2019) for both Permanent Threshold Shift (PTS) where unrecoverable changes to hearing sensitivity may occur, and Temporary Threshold Shift (TTS) where a temporary reduction in hearing sensitivity may occur.

8. Overall, the MMO consider the modelling presented to be sufficient/reasonable in respect of Underwater Noise and its associated impacts. The predicted effect ranges under the stated modelling assumptions (including source levels) look plausible. The MMO also notes that a stationary receptor (in addition to a fleeing receptor) has been considered for fish species, which is appropriate.

9. The MMO has noted that the assessment concludes that there are no new or materially different significant effects in relation to marine mammals between using the proposed maximum hammer energy of 3,000 kJ for OSP pin-piles and 4,000 kJ for monopiles compared to the currently consented maximum hammer energy of 1,900 kJ for OSP pin-piles and 3,000 kJ for monopiles. The MMO considers that these conclusions are reasonable. However, there are some differences in the predicted effect ranges, for example, there is an increase of 6 km for cumulative Temporary Threshold Shift (TTS) in minke whale (11 km for 3,000 kJ hammer energy compared to 17 km for 4,000 kJ) at the SW location.

10. The MMO is aware that the largest impact ranges using the Southall et al. (2019) criteria are predicted to be for the low-frequency cetacean group, with maximum Permanent Threshold Shift (PTS) SEL_{cum} (cumulative Sound Exposure Level) ranges of up to 4.1 km for Scenario 1 (absolute worst case monopile) at the NW location of Dogger Bank B. Significant PTS ranges are also predicted for very high frequency cetaceans with maximum ranges of up to 2.3 km predicted for the same piling scenario and location. Larger ranges of up to 28 km for low-frequency cetaceans and 20 km for very high frequency cetaceans are predicted for TTS injury (SEL_{cum} criteria).

11. Provided that appropriate/adequate mitigation is put in place to reduce the risk of potential impact, the MMO has no major objections to the hammer energy being increased to a maximum of 4,000 kJ for monopiles, and 3,000 kJ for pin piles in respect of Underwater Noise impacts. The MMO notes on page 12 and 17 of the Environmental Report that the mitigation in the Marine Mammal Mitigation Protocols (MMMPs) would be the same for both the OSP pin-piles and WTG monopiles as consented and the proposed hammer energies. The MMO recommend revisiting the proposed mitigation and latest versions of the MMMPs, to ensure that the existing measures are adequate.

12. Regarding ***Appendix 2 – Underwater Noise Modelling Report, Table 3-5 (and Table 6 in Appendix 1 – Marine Mammal Technical Report), of the Environmental Report):*** The Applicant should note that for the full piling event of four pin-piles installed in a 24-hour period, the total number of strikes will be 23,280 strikes (and 17 hours 20 minutes), not 11,640 strikes as suggested in the reports.

13. In terms of the underwater noise modelling, for reference (including future reference), it would be helpful if Subacoustech could provide plots showing the unweighted single strike received level versus distance/range for the proposed maximum hammer energies (4,000 kJ for monopiles, and 3,000 kJ for pin piles).

14. Regarding Figure 3-1 in the Subacoustech noise assessment (Appendix 2 of the Environmental Report): It would also be useful to show a selection of measured versus INSPIRE outputs for the single strike SEL, in addition to the peak sound pressure level (SPL_{peak}), especially as the SPL_{peak} is not so relevant at far ranges.

Approach to Marine Mammal Mitigation Protocol (MMMP) and Site Integrity Plan (SIP)

15. Regarding the SIP, the MMO notes that the Applicant has stated that the SIP is based on Effective Deterrent Ranges (EDRs), rather than modelling impact ranges for the consented hammer energy. Therefore, the impact ranges in the SIP are regardless of the consented and actual hammer energies to be useful. The Applicant goes on to state that the increase in hammer energies would not result in any updates being required to the impact ranges and subsequent assessments in the SIP. As a result, the calculations and conclusions in the approved SIP would remain valid.

16. The MMO further notes that the Applicant has stated that in respect of the detail contained in the SIP, Only Tables 4-1 and 4-2, which provide the project design parameters and compares actual design parameters (including hammer energies) with the Review of Consents (RoC) parameters, would need to be updated to reflect what will be the new consented hammer energies (4,000 kJ for monopiles and 3,000 kJ for pin piles). Therefore, once the NMC is determined by BEIS and if approved, the Projects will make the consequential update to Tables 4-1 and 4-2 in the main SIP document, as a revision, which would be provided to the MMO (via MCMS) for information purposes rather than for a formal consultation and approval process, to ensure it reflects the latest project parameters. The MMO considers this course of action to be appropriate.

17. Regarding the DBA MMMP, the MMO can confirm that it has received this document from the Applicant, and it is currently out to consultation with our advisors. The MMO notes the Applicant position currently is that because the proposed increased hammer energies that are being applied for are not yet consented, these have not been reflected in the current version of the DBA MMMP. This is due to the potential for foundation installation to commence at DBA prior to the NMC for an increase in hammer energy being determined, as not all foundation locations will require the increase in hammer energy for pile installation to be achieved. The MMO notes that the Projects need to ensure that all management plans are in place prior to June 2022 to allow installation to commence regardless of whether the NMC application has been determined. Therefore, once the NMC is determined and if approved, the Projects have proposed that an addendum to the DBA MMMP (and DBB MMMP, if this is submitted to the MMO prior to the NMC being determined) is submitted to the MMO for approval, which will outline any changes in the mitigation measures first included in the MMMP(s) and seek approval of the revised MMMP(s). Whilst this is progressing, the existing approved DBA MMMP will still be in place to allow piling to continue, if it has commenced. Once the revised MMMP(s) is approved, the Projects would implement and comply with this revised MMMP when larger hammer energies are in use. Any increase in hammer energies

would not be utilised on the Project until the updated MMMP(s) has been approved. The MMO considers this proposition to be appropriate.

Conclusion

18. In respect of Underwater Noise impacts, the MMO considers that the Applicants conclusion there are no new or materially different significant effects in relation to marine mammals between using the proposed maximum hammer energy of 3,000 kJ for OSP pin-piles and 4,000 kJ for monopiles compared to the currently consented maximum hammer energy of 1,900 kJ for OSP pin-piles and 3,000 kJ for monopiles is reasonable.

19. In respect of Fish receptors, the MMO has outlined a number of concerns with the data presented by the Applicant and would welcome additional discussions with them regarding the information presented.

20. The MMO is also aware that a variation will be required to the DMLs should this non-material change be approved. The MMO has reviewed the proposed changes to the DML provided by the Applicant and considers them to be appropriate. The MMO is currently processing this and PINS will be made aware of any changes made to the DML.

Yours Sincerely

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Annex 1 – Bubble plots showing inter-annual variations in larval densities.

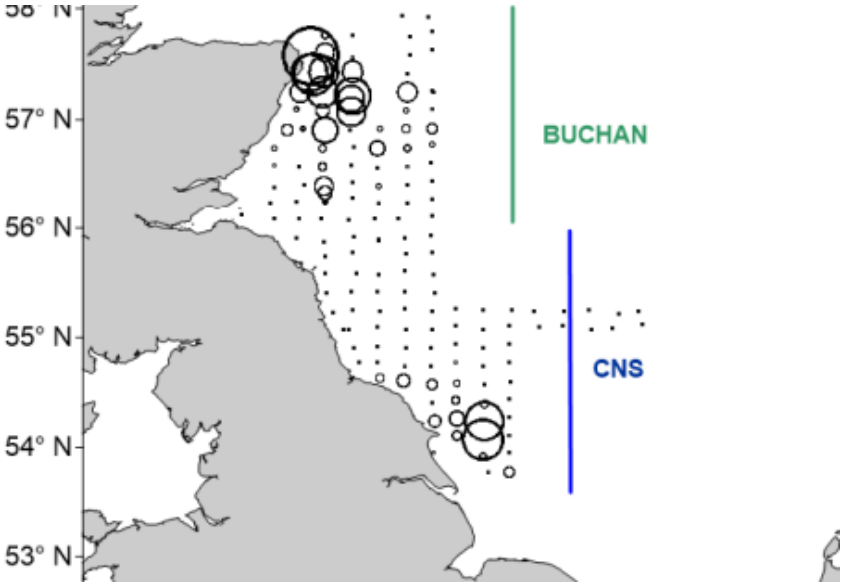

Figure 1. ICES bubble plots showing abundance of larvae <10 mm (n/m^2) for the Buchan and central North Sea area (Banks stock) in September 2018 (maximum circle size = 4579 n/m^2) taken from ICES (2019).

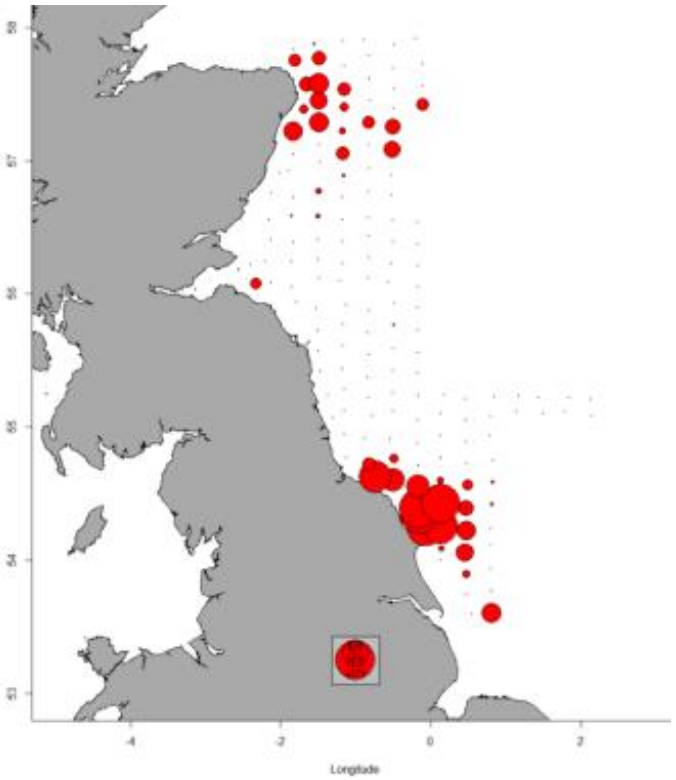

Figure 2. ICES bubble plots showing abundance of larvae <10 mm (n/m^2) for the Buchan and central North Sea area (Banks stock) in September 2019 (maximum circle size = 4579 n/m^2) taken from ICES (2020).

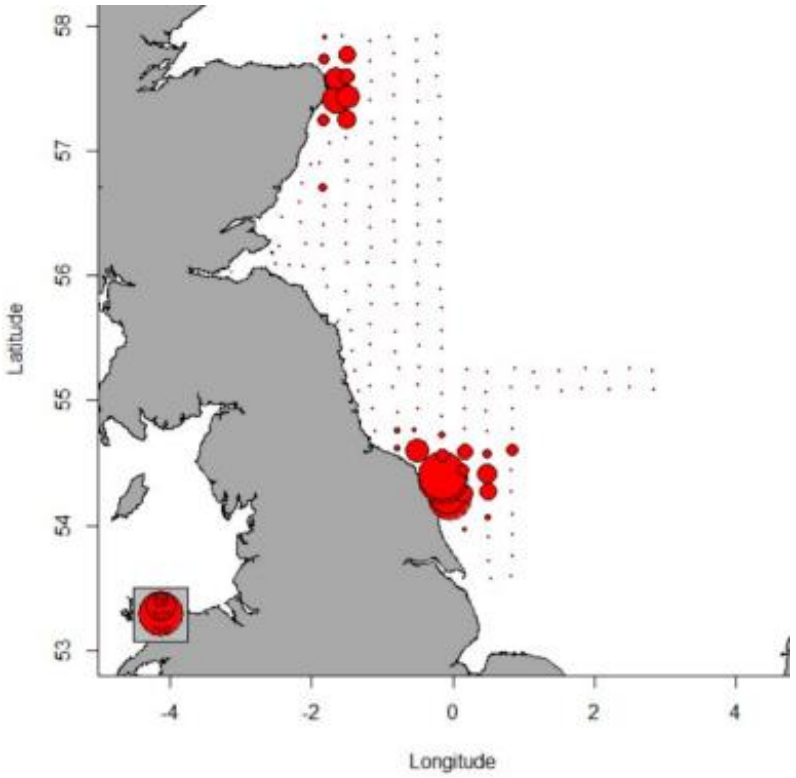

Figure 3. ICES bubble plots showing abundance of larvae <10 mm (n/m^2) for the Buchan and central North Sea area (Banks stock) in September 2020 (maximum circle size = 7100 n/m^2) taken from ICES (2021).

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References

Southall B L, Finneran J J, Reichmuth C, Nachtigall P E, Ketten D R, Bowles A E, Ellison W T, Nowacek D P, Tyack P L (2019). *Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects.* Aquatic Mammals 2019, 45 (20, 125-232) DOI 10.1578/AM.45.2.2019.125.