

REPORT

Boston Alternative Energy Facility

Response to the Marine Management Organisation and Natural England's queries regarding Marine Mammals and Fish

Client: Alternative Use Boston Projects Ltd

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Note

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From: Alternative Use Boston Projects Limited
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Subject: Boston Alternative Energy Facility: Deadline 4 – Response to the Marine Management Organisation and Natural England’s queries regarding Marine Mammals and Fish

1 Introduction

This document has been produced in response to both Natural England’s (REP2-043) and the Marine Management Organisation’s (MMO) (REP2-040) responses to Deadline 2 of the Boston Alternative Energy Facility (the Facility) examination process with respect to both marine mammal and fish receptors.

2 Proposed Mitigation

Comments from both Natural England and the MMO were received in relation to the proposed mitigation measures in the Outline Marine Mammal Mitigation Protocol (MMMP) (document reference 9.12, REP1-025). The comments from both Natural England and the MMO are provided in **Table 1**, with further information from the Applicant.

Table 1 Responses to comments from Natural England and the MMO on proposed mitigation

Interested Party's Comment	Further information from the Applicant
<p>MMO comments in REP2-040 Marine Management Organisation (MMO) Deadline 2 Submission In relation to Outline Marine Mammal Mitigation Protocol (MMMP) (document reference 9.12, REP1-025)</p>	
<p>1.8 The MMO agree that low water levels will limit noise propagation, however it is recommended that soft start / ramp up should be undertaken for all piling taking place within the water, unless piling is undertaken in the dry. If piling is undertaken in the complete dry, then soft start procedures will not be necessary.</p>	<p>As outlined in the Outline Marine Mammal Mitigation Protocol (MMMP) (document reference 9.12, REP1-025), due to the low water levels at the Facility during low water (or within three hours of Low Water, noise levels are not expected to propagate at distance from the sound source. Therefore, there is not expected to be any significant levels of underwater noise from piling undertaken around this low water period, and, as a result, the mitigation measures provided in the Outline MMMP are currently for piling during periods of deeper water or high water (or within three hours of High Water).</p> <p>However, where it is technically possible taking into account the relatively low hammer energies (see response to 1.11 below), soft-start and ramp-up will be undertaken prior to all piling.</p> <p>It is important to note that the final MMMP will be developed in the post-consent period, once final piling design and methodologies are known, including the requirements for soft-start and ramp-up prior to piling. If required, site specific underwater noise modelling may be undertaken for the final MMMP. The final MMMP will be developed and finalised in consultation with the MMO. It is proposed to submit an updated Outline MMMP at Deadline 6 to address the recent comments from the MMO and Natural England.</p> <p>In order to further minimise impacts on fish the Applicant agreed to amend the restriction on wharf piling from June to September in the next iteration of the DCO submitted to the examination. This period is identified for wharf piling in the Indicative Construction programme (document reference 9.18, REP1-031).</p>

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<p>1.10 The MMO expect to see the below mitigation, proposed by the Applicant, secured within conditions on the DML:</p> <ul style="list-style-type: none"> • Piling (which will be from June to September) would only take place during the daytime, with a restriction of between 8am and 8pm. Piling is likely to be continuous but not simultaneous. This will reduce the risk of impact on species that migrate at night such as the European eel, and river lamprey. • Avoidance of key fish migration periods for dredging activities; dredging will not take place during the migration periods for either juvenile smelt or sea trout, or adult smelt migration periods (from March to June). • Piling mitigation such as soft start and ramp up procedures for piling at high tide; such measures may help to reduce the total number of dangerous exposures in terms of auditory injury. • Piling at low tide unless otherwise impossible – This mitigation would not be enforceable as it stands, 'low tide' is not specific enough and 'unless otherwise impossible' is open to interpretation. Therefore the MMO recommend the Applicant should suggest alternative wording here. An example of this is 'Piling will be undertaken within a 2 hour window either side of low tide, unless otherwise agreed by the MMO.' 	<p>Construction activities would take place six days a week (Monday to Saturday) between 8am and 8pm (with an option of 7am to 7pm), with no bank holiday or public holiday working. These construction hours are secured by Requirement 12 in Schedule 2 to the draft DCO (document reference 2.1(2), REP3-004). The time restriction on piling throughout the year is already included in condition 13(2)(c) being May to September. In order to further minimise impacts on fish the Applicant agreed to amend the restriction on piling from June to September in the next iteration of the DCO submitted to the examination.</p> <p>The Applicant amended the draft Deemed Marine Licence (DML) at Deadline 3 to require under condition 12 the Construction Environmental Management Plan to include "<i>the detailed methodology for the excavation and subsequent management of any dredged material removed including— ... (ii) details on the timing of dredging activities throughout the year to ensure they are undertaken during non-sensitive periods for juvenile fish (being July – February inclusive)</i>".</p> <p>See response to 1.11 on soft-start and ramp up procedures below. Where it is technically possible taking into account the relatively low hammer energies, soft-start and ramp-up will be undertaken prior to all piling.</p> <p>The DML does not use the phrase "piling at low tide unless otherwise impossible" nor does the Outline MMMP. The Outline MMMP refers to "low water (or within three hours of low water)".</p>
<p>1.11 The MMO recommend that soft start / ramp up should be undertaken for all piling taking place within the water, unless piling is undertaken in the dry. This is to ensure incremental increase in pile power over a set time period until full operational power is achieved.</p>	<p>Due to the design of the piles, and anticipated method of installation and maximum hammer energy that may be required to install the piles, a full soft-start and ramp-up procedure of not less than 20 minutes, as suggested, may not be possible. However, where it is technically possible taking into account the relatively low hammer energies, soft-start and ramp-up will be undertaken prior to all piling.</p>

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<p>The soft-start duration must be a period of not less than 20 minutes. Should piling cease for a period greater than 10 minutes, then the soft-start procedure must be repeated. If piling is undertaken in the complete dry, then soft start procedures will not be necessary.</p>	<p>In the event that the soft-start and ramp-up procedure is not possible, the following procedure would be used instead (as stated in paragraph 3.2.5 of the Outline MMMP (document reference 9.12, REP1-025):</p> <p><i>“Each piling event will commence with a hammer energy at as low as is reasonably practical, followed by a gradual ramp-up to full hammer energy. Note that, due to the very short expected piling times of five minutes or 15 minutes per pile (dependent on pile type), the full soft-start procedure as stated within the JNCC Piling Protocol (JNCC, 2010) may not be possible. However, the piling, where possible, would commence with hammer energies as low as is reasonably practical, with a ramp-up to full hammer energy for as long a period as is possible.”</i></p> <p>As outlined in the MMMP, monitoring for marine mammals will be undertaken prior to all piling and until the marine mammal is outside of the mitigation zone for 20 minutes, and the full 30 minute pre-piling watch has been completed.</p>
<p>Natural England comments in REP2-043 Natural England Deadline 2 Submission In relation to Outline Marine Mammal Mitigation Protocol (document reference 9.12, REP1-025)</p>	
<p><u>3. Suitability of marine mammal mitigation measures</u></p> <p>i) Soft Start (Section 3.1.2 and 3.2.5)</p> <p>Natural England advises that the JNCC 2010 guidance was developed to mitigate the impacts from undertaking large scale piling operations associated with monopile foundations at offshore windfarm arrays. The diameter of the foundations to be piled at an offshore windfarm array is >5m which is significantly larger than the pin piles proposed for this project. Therefore, a) the pile is likely to be installed before the completion of 20mins of soft start set out in the guidance, and b) the maximum hammer energy is likely to be reach almost immediately for the pin piles with no ability to ramp</p>	<p>See response to 1.11 above.</p> <p>The proposed approach that each piling event will commence with a hammer energy at as low as is reasonably practical, followed by a gradual ramp-up to full hammer energy, as outlined above, is same approach for similar scale pile driving for wharf/harbour developments.</p>

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<p>up. Therefore, we do not consider this to be appropriate mitigation for this project.</p>	
<p>3(ii) Marine Mammal Observers (MMOs) at the wharf location (Section 3.2.4)</p> <p>Natural England advises that whilst the JNCC 2010 guidance hasn't been updated the advice on using MMOs as mitigation has. The Statutory Nature Conservations Advisers are in agreement that project specific underwater noise modelling should be undertaken to determine the Permanent Threshold Shift (PTS) Zone for this project rather than adopting the 500m observational zone. We note that the Applicant highlights that, due to a bend in the river, observations to the North will only be at a distance of 110m and state because it is greater than the Permanent Threshold Shift range for seals (90m) this is unlikely to cause concern. Natural England is unable to support this conclusion and advises that further modelling and evidence is presented</p>	<p>The final MMMP will be developed in the post-consent period, once final piling design and methodologies are known. If required, this will include any site specific underwater noise modelling to determine the maximum impact range for PTS and the range over which monitoring by the Marine Mammal Observers (MMObs) will need to be conducted, including suitable vantage points, to reduce the risk of PTS in marine mammals that could be present in the area during piling operations.</p> <p>The final MMMP will be developed in consultation with the MMO and Natural England. It is proposed to submit an updated Outline MMMP at Deadline 6 to address the recent comments from the MMO and Natural England.</p>
<p>iii) Use of Passive Acoustic Modelling (PAMs) (Section 3.2.3)</p> <p>Natural England is unable to support the use of PAMs on this project as mitigation during times of poor visibility. PAMs are used to detect clicks and vocalisations of cetaceans. Pinnipeds and in particular Harbour Seals don't not vocalise the same as cetaceans and therefore the use of PAMs are not suitable for mitigation measures for this species. Therefore, Natural England advises that in times of poor visibility piling is not undertaken.</p>	<p>Piling (which will be from June to September (dates to be included in the next iteration of the draft DCO to be submitted– see response to 1.10 above)) would only take place during the daytime, with a restriction of 7am and 7pm or 8am and 8pm only.</p> <p>The limitations of using PAM, especially for seal species has been taken into consideration. PAM has been included in the MMMP as a precautionary approach. However, it is unlikely to be relied upon.</p> <p>Where possible, piling will not commence in conditions of poor visibility or at night in which the MMObs cannot monitor the area required to reduce the risk of PTS in seals.</p>

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	As outlined above, the final MMMP will be developed and agreed with the MMO and Natural England in post-consent / pre-construction period. It is proposed to submit an updated Outline MMMP at Deadline 6 to address the recent comments from the MMO and Natural England.
<p>3(iv) Use of non-dedicated MMO (section 3.3.8 and 3.3.9)</p> <p>Whilst, Natural England acknowledges that crew members have the necessary training to be a Marine Mammal Observer (MMO); we are unable to support having a non-dedicated MMO as a mitigation measure for the following reasons:</p> <ul style="list-style-type: none"> • They are to undertake this duty when not undertaking other work • Due to the size of the vessel, they will not be able to have 360-degree views looking away from the vessel and vertical views downwards checking adjacent to the vessel • The cargo is likely to be in the way to scan across the vessel <p>Therefore, checks prior to restarting the vessel engines anchorage areas is unlikely to be accurate and the same will be true whilst in transit, especially if only one MMO.</p> <p>This also, puts into question the ability to detect seals in front of the vessels to slightly alter course as suggested in the documents. It should also be noted that there would be insufficient space in the Haven to do anything other than keep on a direct route along the deepest part of the river.</p>	<p>As outlined in the MMMP, a non-dedicated MMO on a vessel relates to a fully trained MMO (by an JNCC accredited course), who may undertake other vessel duties while not required on watch or when the vessel is outside of The Wash or The Haven. Therefore, they would be dedicated to conducting the marine mammal monitoring when required, such as when entering The Haven.</p> <p>The MMO would be positioned to ensure the best and uninterrupted view, if required for some vessels, the option for more than one MMO will be considered.</p> <p>The approach to avoiding any vessel collisions, as outlined in the MMMP, is for vessels to maintain a steady speed and same course to allow marine mammals to move out of the way.</p>
<p>3(v) Vessel speeds (section 3.3.8)</p> <p>Natural England advises that further justification is presented to ensure that no further mitigation can be provided in the form of reducing vessel speeds. Presently there is no evidence to</p>	<p>A reduction in vessel speed is one of the key measures that can be put in place in order to reduce the risk of collision to marine mammal species.</p>

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<p>demonstrate committing to vessel speeds of 6 knots is in fact mitigation, or merely the agreed vessel speed limit within The Haven.</p>	<p>There is a higher risk of collision to fatally injure mammals from vessels travelling at higher speeds, due to the increased level of impact¹. This relationship between vessels speeds and lethality of collision is species dependant, as is strongly related to body size.</p> <p>As well as reducing the potential for lethal injury, a reduction in vessel speeds also reduces the number of collision events², as individuals are more likely to have the ability and time to move out of the way with vessels travelling at lower speeds³. Seals are very agile, giving them a good opportunity to move out of the way, and therefore reducing the potential for collision with vessels.</p> <p>Where there is a presence of vessels, the reduction in vessel speed is a preferred method for reducing collision risk, as stated by the International Whaling Commission⁴ and the International Maritime Organisation⁵. It is also the only method that has been recommended for smaller marine mammal species A study into the impact of ice-breaking vessels on phocid seals found that the predicted probability of collision was significantly increased with increasing vessel speed; at a speed of 4 knots or less, the potential for</p>

¹ Wang, C., Lyons, S. B., Corbett, J. J., and Firestone, J. (2007). Using ship Speed and Mass do Describe Potential Collision Severity with Whales: an Application of the Ship Traffic, Energy and Environment Model (STEEM) [Report by the University of Delaware].

² Vanderlaan, A. S. M., and Taggart, C. T. (2007). Vessel collisions with whales: the probability of lethal injury based on vessel speed. *Mar. Mamm. Sci.* 23, 144–156. doi: 10.1111/j.1748-7692.2006.00098.x

Conn, P. B., and Silber, G. K. (2013). Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. *Ecosphere* 4:43. doi: 10.1890/ES13-00004.1

³ Hazel, J., Lawler, I. R., Marsh, H., and Robson, S. (2007). Vessel speed increases collision risk for the green turtle *Chelonia mydas*. *Endanger. Species Res.* 3, 105–113. doi: 10.3354/esr003105;

Gende, S. M., Hendrix, A. N., Harris, K. R., Eichenlaub, B., Nielsen, J., and Pyare, S. (2011). A Bayesian approach for understanding the role of ship speed in whale-ship encounters. *Ecol. Applic.* 21, 2232–2240. doi: 10.1890/10-1965.1

⁴ International Whaling Commission (2014). Report of the Joint IWC-SPAW Workshop to Address Collisions Between Marine Mammals and Ships With a Focus on the Wider Caribbean. Report IWC/65/CCrep01 discussed at the 14th Meeting of the Western Gray Whale Advisory Panel. Cambridge, UK: International Whaling Commission.

⁵ International Maritime Organization (2016). Identification and Protection of Special Areas and PSSAs: Information on Recent Outcomes Regarding Minimizing Ship Strikes to Cetaceans. International Maritime Organization Marine Environment Protection Committee document MEPC 69/10/3. London: International Maritime Organization.

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	<p>collision was very low, with the potential for collision increasing significantly from 6 knots or higher⁶.</p> <p>While the mitigation originally put forward to reduce the potential for collision risk was to reduce vessel speeds to 4 knots, further information has been received which means that this restriction would not be possible to undertake safely for all vessels at all times. This is due to the need for larger vessels to navigate at a speed of up to 6 knots in order to have sufficient engine power to navigate safely through The Wash and The Haven.</p> <p>While it is not possible for some vessels to travel at a speed of as low as 4 knots (due to vessel manoeuvrability and safety concerns, as noted above), there is no indication that a further reduction to 4 knots would result in further reduction to that risk, as the evidence suggests that at any speed of below 6 knots, the potential for collision is significantly decreased.</p>
<p>5 (iii) Natural England queries if piling can be restricted to low tide only negating the need for MMOs.</p>	<p>Construction activities would take place six days a week (Monday to Saturday) between 8am and 8pm (with an option of 7am to 7pm), with no bank holiday or public holiday working, with piling occurring between June to September inclusive. Restricting the piling to around low water would require the piling period to be extended from the currently defined period. This would potentially introduce impacts to ornithological and fish receptors and therefore, it is not possible to commit to only piling at low tide.</p> <p>However, it is considered that the mitigation measures in the Outline MMMP would reduce the risk to marine mammals during piling to an acceptably low level.</p>

⁶ As shown on Figure 5 from of Wilson, S.C., Trukhanova, I., Dmitrieva, L., Dolgova, E., Crawford, I., Baimukanov, M., Baimukanov, T., Ismagambetov, B., Pazyzbekov, M., Jüssi, M. and Goodman, S.J., 2017. Assessment of impacts and potential mitigation for icebreaking vessels transiting pupping areas of an ice-breeding seal. *Biological Conservation*, 214, pp.213-222. <https://eprints.whiterose.ac.uk/117227/35/1-s2.0-S0006320717301672-main.pdf>

3 Marine Mammal Assessments

Comments from both Natural England and the MMO were received in relation to the marine mammal assessments in the Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027). The comments from both Natural England and the MMO are provided in **Table 2**, with further information from the Applicant.

Table 2 Responses to comments from Natural England and the MMO on Marine Mammal Assessments

Interested Party's Comment	Further information from the Applicant
<p>MMO comments in REP2-040 Marine Management Organisation (MMO) Deadline 2 Submission In relation to Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027)</p>	
<p>1.12 The MMO note that section 4.2 of REP1-027 considers the impacts of underwater noise on Harbour Seal due to an increase in vessel presence during construction and operation. Para 4.2.2 states that “...it is highly unlikely that underwater noise from vessels could result in disturbance to the entire area at any one time. Any disturbance is likely to be limited to the immediate vicinity around the actual vessel (for example, less than 10 m) at any one time” but there is no evidence presented to support this statement.</p>	<p>The reference to 10m of disturbance around each vessel is based on the presented underwater noise impact ranges for Temporary Threshold Shift (TTS) / fleeing response to pinniped species, due to dredging noise, as provided in Table 4-1 of the Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027). Further information on the applicability of using the desk-based modelling ranges for both fish and marine mammal species is provided in Section 4.1 of the Addendum to Chapter 17 and Appendix 17.1 - Benthic Ecology, Fish and Habitats (document reference 9.15, REP1-028) document.</p>
<p>1.13 The MMO note the low-frequency sounds produced by dredging overlap with the hearing range of marine mammal species, which may pose a risk for auditory masking and behavioural effects (McQueen <i>et al.</i>, 2019).</p>	<p>There is currently no agreed thresholds or criteria for modelling the potential effects of disturbance on marine mammals from underwater noise.</p> <p>As outlined in Southall <i>et al.</i> (2021)⁷ thresholds that attempt to relate noise exposure parameters (e.g. received noise level) and behavioural response across broad taxonomic grouping and sound types can lead to severe errors in predicting effects. Differences between species, individuals, exposure situational context, the temporal and spatial scales over which they occur, and the potential interacting effects of multiple stressors can lead to inherent variability in the probability and severity of behavioural responses.</p>

⁷ Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, V., Bejder, L. and Tyack, P.L., 2021. Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioral responses to human noise. *Aquatic Mammals*, 47(5), pp.421-464. DOI 10.1578/AM.47.5.2021.421.

Interested Party's Comment	Further information from the Applicant
	The assessments for TTS / fleeing response have therefore been used for assessing the potential disturbance.
REP2-043 Natural England Deadline 2 Submission In relation to Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027)	
<p><u>1. Decline in Harbour seal numbers nationally (including within The Wash and North Norfolk Coast SAC)</u></p> <p>Natural England welcomes the consideration by the Applicant of the most recent Sea Mammal Research Unit report (SMRU 2020). However, the significance of the impacts has increased due to the decline in numbers of The Wash harbour seal colony. There is currently no evidence to suggest that the decline has plateaued. Therefore, Natural England is in the process of updating our conservation advice package to change the conservation objective for this feature to 'restore'. Therefore, we advise that a more precautionary approach must be taken and impacts which could further hinder the restore objective to the site should be avoided, reduced or mitigated. Please see our advice under point 3 in relation to the effectiveness of the proposed mitigations measures.</p>	<p>While the percentage of the populations of harbour seal that could be affected has increased in some cases (due to reduction in overall population levels), the overall impact assessments have not changed from the Environmental Statement (Environmental Statement - Chapter 17 - Marine and Coastal Ecology (document reference 6.2.17, APP-055)) or Habitats Regulation Assessment (Environmental Statement - Appendix 17.1 – Habitats Regulations Assessment (document reference 6.4.18, APP-111)), as shown in Table 4-2 and Table 5-2 of the Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027).</p> <p>With regard to the proposed change in the Conservation Objectives of The Wash and North Norfolk Coast SAC, there is no publicly available information on this change, and all relevant documents have the current target to 'maintain', as was assessed against in the Habitats Regulation Assessment Environmental Statement - Appendix 17.1 – Habitats Regulations Assessment (document reference 6.4.18, APP-111).</p> <p>A precautionary approach based on worst-case scenarios has been undertaken all assessments. In addition, the mitigation measures proposed will minimise impacts to marine mammals.</p>
<p><u>2. Use of at sea harbour seal density numbers from Russell <i>et al.</i> 2017</u></p> <p>Natural England advised in our relevant/written representations that reference to Russell <i>et al.</i> 2017 was now incorrect. However, we note that throughout both the addendum and MMMP the density estimate</p>	<p>It is not currently possible to obtain absolute density data from the Carter <i>et al.</i>, 2020 report for seals. This is due to the updated seal density shapefiles being based on relative density estimates, not absolute density, as previous versions (e.g. Russell <i>et al.</i>, 2017). The Carter <i>et al.</i> (2020) report states that:</p>

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<p>used is from Russell <i>et al.</i> 2017 rather than Carter <i>et al.</i> 2020. Natural England advises that the impact assessment is therefore updated accordingly.</p>	<p><i>“The predicted distribution maps presented here provide a relative index of seal density at-sea (i.e. percentage of at-sea population present in each 5 km x 5 km grid cell at any one time). Previous seal distribution maps (usage maps (Jones <i>et al.</i> 2013, 2015, Jones and Russell 2016, Russell <i>et al.</i> 2017)) have provided estimates of seal distribution as absolute density (i.e. number of seals per cell). Whilst the relative density estimates presented here are perhaps less readily usable in an applied context, they have the advantage that they are independent of scalars relating to the proportion of the population available for counting during August surveys, and the proportion of time individuals spend at-sea during the main foraging season. These relative density estimates can be readily converted to absolute density estimates as more accurate scaling factors become available. As mentioned above (Section 3.2.4c), the population scalar for grey seals is currently under review (Russell <i>et al.</i> 2016b), thus the absolute density values given in the case study (Appendix 2) should be treated as rough estimates. Relative density provides an index that is robust to any future changes in population scaling methodology.”</i></p> <p>Based on the currently available information within the Carter <i>et al.</i> (2020) report, it would be possible, as outlined in Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027), to obtain absolute density estimates of which to base the assessments on. Therefore, the assessments using the Rusell <i>et al.</i> (2017) data is the best currently information, as has been used in all assessments.</p>
<p><u>4. Potential Impacts to seals within the anchorage area</u></p> <p>Natural England agrees that there is unlikely to be a significant effect if Dynamic Positioning is not used in favour of anchorage. Therefore, we advise that there is a condition that only permits the use of anchors within the Boston Anchorage Area whilst waiting for optimum tidal windows to enter The Haven. Any use of DP will require ducted propellers.</p>	<p>Dynamic Positioning is an accurate method of maintaining and checking vessels' positions, and is used only on specialist vessels (e.g. cable and pipe layers, drill ships, rock dumping and some passenger vessels). Dynamic Positioning is used by these vessels in order to hold their position in carrying out their work; where the Dynamic Positioning system automatically maintains the vessel's position and heading using specialist propellers and thrusters to counter the forces of wind, tide and current.</p> <p>Dynamic Positioning systems are not generally fitted to cargo vessels, and the harbour master for the Port of Boston has confirmed that no vessels calling at the port have these systems onboard.</p>

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	Therefore, there is no risk to seals as a result of vessels being present in the anchorage area, and there is no requirement to update the marine mammal addendum.
<p><u>4. Potential Impacts to seals within the anchorage area</u></p> <p>Whilst the Applicant has quoted Onoufriou <i>et al.</i> 2016 (section 4.5.20) to demonstrate that seals are not attracted to vessels in open seas, Natural England staff have observed seals and seal pups approaching several vessels associated with the Lincs OWF cable installation within The Wash. In addition, fishing vessels often have regular interactions with seals. Therefore, it would be helpful if further evidence from The Wash colony could be presented to demonstrate if seals do avoid interactions with vessels within this designated site, thus reducing collision risk.</p>	<p>An extensive review of the literature on harbour seal and vessel co-existence has not found any information or evidence to support seals being attracted to vessels (or not) specifically within The Wash – we would therefore be grateful if Natural England could provide any such reports / papers on this to inform any further response required. It is plausible that the seals are attracted to the cable installation vessels and the fishing vessels due to the potential for such vessels to provide a source of food for the seals. For the cable installation vessels, through stirring up of organic matter on the seabed which would thereby attract fish and for the fishing vessels through release of any organic matter from the vessel. Thus, it could be reasonably expected that this is the reason why Natural England staff have observed such occurrences. This is not the case with the cargo vessels who would not be associated with potential sources of food.</p>
5(i) Natural England advises that further consideration of non-impact piling is considered as mitigation such as vibro piling.	A full review of the potential pile and installation techniques would be completed once the final project design is confirmed and geotechnical information compiled. If alternative piling options are possible, they will be investigated further. This will be confirmed in the final MMMP, to be completed in consultation with Natural England (in accordance with the DML 17.1).
5(ii) Natural England queries how many days of piling will occur as part of the proposals and what is considered a 'day' e.g. just during daylight hours or 24hr	<p>Due to the piling restrictions, of between 7am and 7pm or 8am and 8pm only, the maximum piling that can be undertaken in any one day would be 12 hours. This restriction is included in Requirement 12 in Schedule 2 to the draft DCO (document reference 2.1(2), REP3-004). The time restriction on piling throughout the year is already included in condition 13(2)(c) being May to September. In order to further minimise impacts on fish the Applicant agreed to amend the restriction on piling from June to September in the next iteration of the DCO submitted to the examination.</p> <p>A total of up to 83.5 piling days will be required for the wharf.</p>

Interested Party's Comment	Further information from the Applicant
<p>5(iv) Natural England queries how the 'Lincs Coast population' of Harbour Seals has been determined/defined</p>	<p>As outlined in Table 3-1 of the Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (document reference 9.14, REP1-027), updated counts (SCOS, 2020) of harbour seal in The Wash and at Blakeney Point and for South-East England Management Unit (MU) have been used in the assessments. There is no reference to a 'Lincs Coast population' of harbour seals, please could Natural England clarify what further information they require?</p>

4 Fish Assessments

Comments from the MMO were received in relation to the Addendum to Chapter 17 and Appendix 17.1 - Benthic Ecology, Fish and Habitats (document reference 9.15, REP1-028). The comments from the MMO are provided in **Table 3**, with further information from the Applicant.

Table 3 Responses to comments from the MMO on Fish Assessments

Comment	Further information from the Applicant
<p>MMO comments in REP2-040 Marine Management Organisation (MMO) Deadline 2 Submission In relation to <u>fish and underwater noise assessments</u> in Addendum to Chapter 17 and Appendix 17.1 - Benthic Ecology, Fish and Habitats (document reference 9.15, REP1-028)</p>	
<p>1.19 The underwater noise assessment originally presented was not directly comparable with the location of the proposed development, and concerns were raised regarding the potential for an acoustic ‘barrier’ to occur during migratory seasons for the key sensitive fish species. As such, the MMO requested further information on the timing and duration of the proposed works, the piling methods and clarification on whether simultaneous piling would need to be undertaken.</p>	<p>Further information on the proposed piling works has been provided in response to marine mammal comments above.</p> <p>Construction activities would take place six days a week (Monday to Saturday) between 8am and 8pm (with an option of 7am to 7pm), with no bank holiday or public holiday working. These construction hours are secured by Requirement 12 in Schedule 2 to the draft DCO (document reference 2.1(2), REP3-004). The time restriction on piling throughout the year is already included in condition 13(2)(c) being May to September. In order to further minimise impacts on fish the Applicant agreed to amend the restriction on piling from June to September in the next iteration of the DCO submitted to the examination.</p> <p>The final MMMP will be developed in the post-consent period, once final piling design and methodologies are known. If required, site specific underwater noise modelling may be undertaken for the final MMMP. The final MMMP will be completed in consultation with the MMO. The mitigation to reduce the impacts on marine mammals from underwater noise during piling would also reduce the potential impact on fish species.</p>

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<p>1.20 The MMO note that further information has been provided in order to inform an assessment of the potential for a barrier to fish migration as a result of underwater noise from both piling and dredging activities. In relation to the fish migration and timing of the proposed working activities conclusions, generally, there is a high likelihood for potential impacts on fish receptors to occur as a result of increased suspended sediment concentrations, and poor water quality from dredging works and underwater noise from piling causing an acoustic ‘barrier’ to fish movement, impeding travel/migration during the time the works are undertaken.</p> <p>1.21 However, the MMO agrees that, due to the mitigation measures proposed (i.e., piling works undertaken from June to September exclusively and dredging work not to be undertaken from March to June), the migration patterns of the key sensitive species at this location (i.e., avoiding dredging at night will allow eels, sea trout and lamprey to migrate upstream and downstream during hours of darkness), impacts to fish receptors are going to be minor.</p> <p>1.22 Nonetheless, should the Applicant be able to get piling works completed, the MMO would recommend the works to start in July, to avoid smelt end migratory season. In this regard, the MMO recommend the following restrictions to be secured within the Deemed Marine Licence:</p> <p style="padding-left: 40px;">Dredging works will be avoided between March and June (inclusive). Piling works to be undertaken from July to September. All works below the water line (dredging and piling) will only take place in daytime (avoiding hours of darkness).</p> <p style="padding-left: 40px;"><i>Reason: to reduce impacts of noise and vibration and suspended sediment concentrations on these months are considered the most sensitive in terms of spawning and migratory activity (e.g., to protect smelt during their upstream migration to their spawning grounds).</i></p>	<p>The Applicant notes the MMO’s comments, especially the confirmation that, “impacts to fish receptors are going to be minor.”</p> <p>With regard to the piling programme for the wharf this is confined to the period from June to September in order to protect ornithological receptors. In order to further minimise impacts on fish the Applicant agreed to amend the restriction on piling from June to September in the next iteration of the DCO submitted to the examination. With regard to the suggested condition, please see the response to 1.10 in Table 1 above.</p> <p>The Applicant can confirm that piling will be undertaken during hours of daylight in this summer window (i.e. in line with the construction hours of 7am to 7pm or 8am to 8pm).</p>
<p>Piling activities:</p> <p>1.23 The MMO understand that water depths at the BAEF site will be relatively shallow (-3.4 to -3.8 m OD). The piles to be installed at BAEF will be smaller than those installed at the Port of Cromarty Firth, and the hammer energy is also anticipated to be much lower.</p>	<p>The source noise levels in Table 4-2 of Addendum to Chapter 17 and Appendix 17.1 - Benthic Ecology, Fish and Habitats (document reference 9.15, REP1-028) were taken from the details of the modelling undertaken at the Port of Cromarty Firth (Port of Cromarty Firth, 2018).</p>

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<p>1.24 However, the MMO have some reservations with the piling parameters and impact ranges presented for the Cromarty Firth assessment in Table 4-2. It is not clear where or how the source levels for piling have been derived. The source levels presented are much lower than expected. For example, for impact piling and a 500kJ hammer energy, we would expect a single strike SEL source level of around 208 dB re 1 $\mu\text{Pa}^2\text{s}$ (rather than 192.8 dB re 1 $\mu\text{Pa}^2\text{s}$ in Table 4-2). As a result, larger impact ranges than those presented in Table 4-2 are expected for mortality and recoverable injury in fish species.</p> <p>1.25 The MMO obtained advice from our technical advisors in the Centre for Environment, Fisheries and Aquaculture (Cefas) based on their in-house model for the same scenario of 500kJ, and one hour of piling and a stationary receptor. For shallower water (~ 5m depth), expected impact ranges are up to 100m from the source for mortality, and up to 200m for recoverable injury, for fish with swim bladders involved in hearing, and not involved in hearing. Mortality and recoverable injury impact ranges for fish with no swim bladder are restricted to tens of metres.</p> <p>1.26 There is also no consideration of Temporary Threshold Shift (TTS) for impulsive sources in Table 4-2. The MMO can expect TTS ranges of up to 1km for all fish species (based on a 500kJ hammer energy and one hour piling scenario), and potential behavioural effects (i.e. disturbance) at greater distances.</p>	<p>The example of the Cromarty Firth Piling Report was used as it was considered to be the best, most relevant example of similar piling at the time.</p> <p>However, as outlined above, the final MMMP will be developed in the post-consent period once final piling design and methodologies are known. This will be completed in consultation with the MMO. The mitigation to reduce the impacts on marine mammals from underwater noise during piling would also reduce the potential impact on fish species. If required, site specific underwater noise modelling may be undertaken for developing the final MMMP, which, if undertaken, could include fish species as well as marine mammals.</p>
<p>1.27 In paragraph 4.1.1 - the Addendum states that sheet piles would take up to five minutes each to install, while tubular piles would take up to 15 minutes. The MMO note that there is a discrepancy in Table 4-1 which states that sheet piles would take 15 minutes, and tubular piles would take 5 minutes to install.</p> <p>1.28 The Cromarty Firth assessment assumes only 1 hour of piling. As noted above, at BAEF, a piling time of 5 minutes per sheet pile is anticipated, and 15 minutes per tubular pile. However, more than one pile is expected to be installed on a given day. Paragraph 4.1.3 states that “<i>a number of piling rigs would be on site at any one time, allowing for the next pile to be placed in readiness for piling, while the previous pile is installed. It is likely that there would be <u>continuous piling</u>, as there would be sufficient rigs on site to allow for changeover times to occur while other piles are installed..... A maximum of 96 sheet piles could therefore be installed in any one day, and a maximum</i></p>	<p>As outlined above, construction activities would take place six days a week (Monday to Saturday) between 8am and 8pm (with an option of 7am to 7pm), a maximum of up to 12 hours per day.</p> <p>The Cromarty Firth assessment is based on one hour piling for each pile and a stationary animal model (i.e. the remains within close proximity to the pile for one hour during the pile being installed). This is assumed as worst-case as it is more likely that fish species would move away from the pile location as the noise levels increase and any risk would be during the initial stages of piling.</p>

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<p><i>of 48 tubular piles</i>". For clarity, this should be "a maximum of 96 sheet piles could be installed in any one day, or a maximum of 48 tubular piles". Nevertheless, this would equate to a total of 8 hours (for sheet piling) or 12 hours (for tubular piles) of continuous piling in any given day. The assessment should therefore be based on the worst-case scenario; and this is the total noise exposure in a 24-hour period (i.e. the maximum number of piles in a given day).</p>	<p>As outlined above, the final MMMP will be developed in the post-consent period, once final piling design and methodologies are known. This will be completed in consultation with the MMO. The mitigation to reduce the impacts on marine mammals from underwater noise during piling would also reduce the potential impact on fish species. If required, site specific underwater noise modelling may be undertaken for developing the final MMMP, which, if undertaken, could include fish species as well as marine mammals.</p>
<p>1.29 The MMO do not have confidence in the source levels and subsequent predictions presented in Table 4-2 for Cromarty Firth (they appear to be lower than expected for a hammer energy of 500kJ).</p> <p>1.30 Considering the piling parameters for BAEF, specifically a much lower hammer energy of 25kJ, then the predictions presented in Table 4-2 for impact piling are more within the order of magnitude expected expect for such a scenario. The worst-case ranges presented are: 100m for recoverable injury (for fish with swim bladders involved in hearing and not involved in hearing), and 50 m for mortality and potential mortal injury for fish with swim bladder involved in hearing.</p> <p>1.31 For the installation of a single pile (equivalent of up to 15 minutes exposure time), small impact ranges (<20m from the source) can be expected for mortality and recoverable injury for all species. TTS may be expected beyond 100 m from the source for all species. When considering the worst-case scenario of installing up to 48 tubular piles (equivalent to an exposure time of 12 hours), the MMO expect recoverable injury up to 100m, and mortality tens of metres for fish with swim bladder involved in hearing and not involved in hearing. For fish with no swim bladder, effects are restricted to <20m. TTS may be expected up to a few hundred metres (i.e. 500m) from the source for all species.</p>	<p>The example of the Cromarty Firth Piling Report was used as it was the best, most relevant example at the time.</p> <p>However, as outlined above, the final MMMP will be developed in the post-consent period, once final piling design and methodologies are known. This will be completed in consultation with the MMO. The mitigation to reduce the impacts on marine mammals from underwater noise during piling would also reduce the potential impact on fish species. If required, site specific underwater noise modelling may be required undertaken for developing the final MMMP, which, if undertaken, could include fish species as well as marine mammals.</p>
<p>1.32 Based on the predicted ranges and given that the Haven is only 100m wide at the Facility at high tide, and 40m at low tide, there is a potential risk of impact on migratory</p>	<p>The Applicant notes the MMO's conclusion that, "restricting piling to daytime hours will reduce the risk of a barrier</p>

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<p>species. Paragraph 4.1.12 and 4.1.13 recognises that for eels, sea trout and smelt, there is the potential for a barrier to migration but due to the low impact ranges for sheet piling, there would still be areas within the Haven that would not be impacted by noise, allowing eels and sea trout to travel past the Facility whilst sheet piling was occurring. Given that only mortality and recoverable injury have been considered, the MMO do not necessarily agree with this conclusion. As noted above, TTS and behavioural effects can be expected at greater distances. The <u>MMO do agree</u> that restricting piling to daytime hours will reduce the risk of a barrier effect for species that migrate at night, such as the European eel.</p>	<p>effect for species that migrate at night, such as the European eel.” No further mitigation is therefore proposed or required.</p>
<p>1.33 Tubular piling will also overlap with the migration periods of juvenile eel, river lamprey and sea trout. As above, the <u>MMO agree</u> that restricting piling to daytime hours will reduce the risk of a barrier effect for species that tend to migrate at night, such as the European eel and river lamprey.</p>	<p>The Applicant notes the conclusion that, “the <u>MMO agree</u> that restricting piling to daytime hours will reduce the risk of a barrier effect for species that tend to migrate at night, such as the European eel and river lamprey.” No further mitigation is therefore proposed or required.</p>
<p>Dredging activities: 1.34 The MMO notes that within paragraph 4.1.19 - the Addendum concludes that backhoe dredging will be undertaken at the BAEF. The exact timing of dredging activities is not yet known; once details have been finalised then this information should be provided. 1.35 However, the MMO note dredging will not take place during the migration periods for either juvenile smelt or sea trout, or adult smelt migration periods (from March to June). In addition, dredging would only take place during the daytime and therefore will not likely coincide with either eel or river lamprey migration.</p>	<p>The exact timing of the dredging works will be provided within the Construction Environmental Mitigation Plan submitted under condition 12 of the DML (document reference 2.1(2), REP3-004) and the restrictions on dredging stated with MMO’s point 1.35 will be adhered to.</p>
<p>1.36 Although there are many uncertainties regarding the effects of dredging noise on marine wildlife, the literature suggests that dredging noise is unlikely to cause direct mortality or instantaneous injury. However, the (predominantly) low frequency sounds produced by dredging overlap with the hearing range of many fish and marine mammal species, which may pose a risk for temporary threshold shifts, auditory masking, and behavioural effects (McQueen <i>et al.</i>, 2019), as well as increased stress-related cortisol</p>	<p>As outlined in the MMO comment 1.21 the MMO agrees that dredging should not be undertaken from March to June and that “<i>impacts to fish receptors are going to be minor.</i>” Therefore, no further mitigation is either required or proposed for underwater noise during dredging.</p>

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levels in fish species (Wenger <i>et al.</i> , 2017). Furthermore, it is important to note that the biological significance of such responses is largely unknown.	