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(By email only)

MMO Reference: DCO/2021/00004
Planning Inspectorate Reference: TR030007

05 September 2023

Dear Mr Gould,

Planning Act 2008, Immingham Eastern Ro-Ro Terminal

On 09 March 2023, 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 Associated British Ports (the "Applicant") for the determination of a development consent order (DCO) for the construction, maintenance and operation of the Immingham Eastern Ro-Ro Terminal (the "DCO Application") (MMO ref: DCO/2021/00004; PINS ref: TR030007).

The DCO Application seeks authorisation for the construction, of a new 3-berth Roll-On/Roll-Off (Ro-Ro) terminal facility within the Port of Immingham ("the "Project"). This includes one Deemed Marine Licence (DML) under Schedule 3.

This document comprises the MMO comments in respect of the DCO Application submitted in response to Deadline 1.

The MMO submits the following:

1. MMO responses to ExQ1

2. MMO Response to comments on Relevant Representations

3. MMO Written Representation

4. Update on Statement of Common Ground (SoCG) and Principal Areas of Disagreement (PAD)

5. MMO comments on Deadline 1 submissions

This written representation is submitted without prejudice to any future representation the MMO may make about the DCO Application throughout the Examination process. This representation is also submitted without prejudice to any decision the MMO may make on any associated applications 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 sincerely,

[redacted]

Jack Coe
Marine Licensing Case Officer

D [redacted]
E [redacted]

Contents

1. MMO Responses to ExQ1

The MMO notes that the ExA had two questions to put to the MMO at this stage of the Examination. The MMO has provided it's comments below for the ExA's review.

ExQ1	Question	MMO Response
BGC.1.9	**Disposal at sea of dredged material** The CEMP [paragraph 1.3.9 in APP-111] states *"… it is considered that the dredge material is suitable for disposal at sea"*. Would the MMO confirm whether it does or does not agree with that statement.	Following our review, the MMO has the following comments to provide on the quality of the sediments: The levels of trace heavy metals observed indicate levels to be around or below their respective Action Level 1 (AL1) and are not of concern when considering the quality of the material for disposal to sea from this area. The levels of organotins (di and tri-butyl tin) indicated are predominantly below the limit of detection, or, where detected, are below the AL1 for these contaminants and would not preclude the material from disposal to sea. Levels of polybrominated diphenyl ethers (PBDE), were seen to be high for BDE 209 and BDE99 at sites 1, 5 and 6 at the surface and 1m depth. At sample site 9 the levels were observed to be high to a depth of 2m. Using a pre-industrial baseline, levels of these man-made contaminants would be anticipated to be zero (i.e., there are no background levels of these contaminants in the marine environment), With the exception of area 9 to a depth of 2m these sediments would be considered acceptable for disposal to sea. It should be noted that for the assessment of these results an average estimate of 2.5% organic carbon was used to normalise the data as per best practice under OSPAR (Dr J Barber, *pers comm*). If the Applicant has results for organic carbon data for these samples, then the normalised levels could be different to the raw data and thus our conclusions could change. Currently there are no agreed ALs in England for PBDEs, and so consequently the best available information has been used to determine whether levels are high or low and for reference have considered the proposed ALs as described by Mason *et. Al.* (2020). Polychlorinated biphenyls (PBC) levels for the ICES 7 and sum of 25 congeners were observed to be above AL1 for sample 1 and at 1m depth for sample 2 (samples at sites 1, 6 and 7 also contain levels of contaminants above AL1 however

		these samples are described as outside of the indicative dredge area). The remaining samples indicated levels below their AL1. Therefore, the material with regard to this type of contamination would be acceptable for disposal to sea. In summary, assessment of the proposed dredge material indicates with the exception of the area around sample site 9 from surface to 2m depth that show what is considered to be high levels of brominated flame retardants, the material is acceptable for disposal to sea. However, there are no current agreed levels in England for action with regard to brominated flame retardants and therefore these comments are advisory only (i.e., not mandated under signatory obligations).
BNE.1.19	**Mitigation of suspended sediment impacts on fish species** Applicant to clarify whether further assessment and mitigation relating to suspended sediment impacts for fish is proposed, and, if not, why not? What is the MMO's position on this?	Our concerns regarding potential impacts to fish from dredging primarily relate to increased suspended sediment concentrations (SSC) at the dredge site within the confines of the estuary, because high SSC can cause effects in fish such as clogging of gill rakers and filaments, erosion of the mucus coating and abrasion of tissue, increases in respiration and heart rate, as well as reduce dissolved oxygen levels in water, all of which can result in an increase in energy expenditure and reserves and are likely to inhibit migration activities for species such as sea trout and river lamprey as they attempt to negotiate estuarine environments on their upstream migrations. The Applicant has advised that peak SSC of 20,000mg/l can occur naturally in the Humber Estuary, and that the highest SSCs associated with the IERRT dredging and disposal are associated with the disposal activities rather than the dredging and have a predicted peak SSC of 600 to 800 mg/l above background. Given that the predicted peak falls well below the naturally occurring peak (of 20,000mg/l) and is situated at the disposal site, rather than the dredging site within the confines of the river, we are generally satisfied with the Applicant's response regarding effects of SSC from dredging and disposal. It is also accepted that with existing maintenance dredging already taking place in the Humber, coupled with natural fluctuations in SSC, that to some extent, fish migrating through the estuary will have a degree of tolerance to increased SSC. For these reasons, the MMO would not expect the Applicant to carry out any further assessment, as, based on the predicted peak SSCs from dredging, versus naturally

		occurring peak SSCs, we would not expect significant adverse effects to occur to fishes. As no significant impacts are expected to occur as a direct result of the dredging, the requirement to undertake monitoring is difficult to justify. However, it would be welcomed if the Applicant were to carry out water quality monitoring during dredging operations to support the conclusions made within the EIA. However, we would defer to the Environment Agency for further comments on water quality monitoring.

2. MMO Response to comments on Relevant Representations

The MMO has reviewed the Applicants comments on its Relevant Representations in the associated document they submitted into Examination (REP1-013). The MMO has provided comments to the Applicants points in the below table:

Reference	Relevant Representation	Applicant Response	MMO Response (Deadline 2)
4.1.1- Benthic ecology	The MMO broadly agree with the conclusions reached by the Applicant relating to this section of the ES. Regarding the scoping out of impacts to the benthic assemblage associated with the effects of piling we agree that the impact of temporary sediment suspension is extremely localised and of such a small scale that is unlikely to have significant negative effects on any benthic receptors present within the area.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO has no further comments on this point and considers the matter closed.
4.1.3 - Benthic ecology	The MMO agree with the proposed mitigation measures which include following biosecurity management procedures to reduce the risk of introduction of Invasive Non-Native Species (INNS), environmental management best practice (to reduce the risk and consequences of accidental spillages) and the targeted disposal of dredged material (to avoid depth reductions). Regarding impacts to Benthic Ecology, the MMO has no further comments to offer on this mitigation.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO has no further comments on this point and considers the matter closed.
4.2.2 - Fish and shellfish ecology	It is the MMO's view that the potential impacts to fish from piling, capital dredging and dredge/disposal	The MMO's position is noted, and, on that basis, no further response is required.	The MMO has no further comments on this point and considers the matter closed.

	activities have been appropriately characterised in Table 9.21 of Section 9.8, and the Applicant has identified the following impact pathways which the MMO consider to be appropriate: ▪ Direct loss or changes to fish populations and habitat as a direct result of dredging and dredge disposal ▪ Changes in water and sediment quality as a result of dredging and dredge disposal ▪ Underwater noise and vibration during piling, capital dredging and dredge disposal		
4.2.3 – fish and shellfish ecology	However, it is noted that the Applicant is yet to assess the potential impacts to fish 'during operation' (i.e., changes to fish populations and fish habitat, changes in water and sediment quality and underwater noise and vibration) as these impacts are considered to be equivalent or lower in magnitude than those from the construction phase and existing maintenance dredging and vessel movements in the river. In reviewing previous advice given for this case it was recommended that "habitat loss and disturbance as well as underwater noise impacts on fish during operation should be further assessed within the ES, taking into account other developments in the area (cumulative effects)". This recommendation was made during the initial review of the Preliminary	Operational impacts on fish have been assessed in Table 9.25 of Chapter 9 of the ES (APP-045). The following impact pathways associated with maintenance dredging/disposal and vessel movements were considered: ▪ Changes to fish populations and habitat; ▪ Changes in water and sediment quality; ▪ Underwater noise; and ▪ Lighting. Potential effects associated with these impact pathways have been assessed as insignificant and the justification to support	Regarding the potential impacts associated with maintenance dredge and disposal, in the previous response, the Applicant advised that peak SSC of 20,000mg/l can occur naturally in the Humber Estuary, and that the highest SSCs associated with the IERRT dredging and disposal are associated with the disposal activities rather than the dredging and have a predicted peak SSC of 600 to 800 mg/l above background. Given that the predicted peak falls well below the naturally occurring peak (of 20,000mg/l) and is situated at the disposal site, rather than the dredging site within the confines of the river, we are generally satisfied with the Applicant's response regarding effects of SSC from dredging and disposal, including during the operational phase. It is also accepted that with existing maintenance dredging already taking place in the Humber, coupled with natural fluctuations in SSC, that to some extent, fish migrating through the estuary will have a degree of tolerance to increased SSC. As per the MMO's most recent advice, regarding any potential impacts to fish from increased vessel traffic, we are content that

	Environmental Information Report (PEIR), and in a further, additional review of the PEIR. The Applicant should acknowledge that even maintenance dredging activities, although arguably less impactful than the construction-phase dredging campaign, still have the potential to cause habitat loss and disturbance to fish, as well as generate additional noise within the river.	this conclusion has been provided. It should be noted, as stated in paragraph 9.8.254 of Chapter 9 of the ES, that maintenance dredging required for the IERRT project already falls within the consent granted by the current marine licence for the disposal of maintenance dredge material from the Port of Immingham (L/2014/00429/2). Maintenance dredging is a near constant activity at Port of Immingham and Humber Estuary. The changes brought about as a result of the maintenance dredge and disposal of maintenance dredge material during operation of the IERRT will be comparable to that which already arises from the ongoing maintenance of the existing Immingham berths. Furthermore, as stated in Table 9.25 of Chapter 9 of the ES, the additional operational vessel movements resulting from the proposed development will only constitute a small increase in vessel traffic in the area on a typical day. The vessel movements constitute up to six additional Ro-Ro vessel movements per day at the Port of Immingham, as well as tugs, which represents an	the additional six Ro-Ro vessel movements per day is a small increase overall when compared to the existing volume of marine traffic at the Port of Immingham and the Humber estuary, so we are content that this would not result in significant disturbance to fish. Regarding the potential impacts of artificial light during the operational phase, it is recommended that, where possible, artificial light sources at the site should be directed away from the water to avoid disturbance effects to fish, such as attraction to light caused by light spill. However, the MMO recognise that lighting must comply with the relevant health and safety regulations for navigation as a priority.

		approximately 3% increase in vessel traffic to the Port of Immingham (and even less in comparison to shipping movements in the Humber Estuary). There will also be maintenance dredger movements but that is estimated to only be necessary approximately three to four times a year.	
4.2.4 – fish and shellfish ecology	The Applicant has recognised that salmonids and migratory fish species can be sensitive to elevated SSCs, however, they state that "*Atlantic salmon and sea trout are both known to migrate through estuaries with high SSC to get to spawning areas (including the Humber Estuary which is considered one of the estuaries in the UK with the highest levels of SSCs)".* Whilst salmonids, and migratory species which inhabit estuarine environments, do have some tolerance to moderately elevated levels of SSC, given the natural fluctuations in SSC expected within estuarine environments, this does not preclude a significant impact and should be amended by the Applicant.	The text set out in ES paragraph 9.8.134 "*Atlantic salmon and sea trout are both known to migrate through estuaries with high SSC to get to spawning areas (including the Humber Estuary which is considered one of the estuaries in the UK with the highest levels of SSCs)"* is a statement of fact. It does not preclude the assessment of impacts on migratory fish and the impact pathway has been assessed in Chapter 9 of the ES **[APP-045]** and the HRA report **[APP-115]**. No update is considered necessary.	As above, the highest SSCs associated with IERRT dredging and disposal will be those associated with the disposal activities rather than the dredging and have a predicted peak SSC of 600 to 800 mg/l above background. Given that the predicted peak falls well below the naturally occurring peak (of 20,000mg/l) that occurs in the estuary, and is situated at the disposal site, rather than the dredging site within the confines of the river, the MMO is generally satisfied that significant impacts to migratory fishes arising from increased SSCs from dredging in the Humber are unlikely to occur.
4.2.5 – fish and shellfish ecology	The MMO also has some concerns with regard to the UWN assessment. We note that the Applicant has provided an assessment which appears to have modelled a worst case-scenario based on two piling rigs	Four piling rigs may be in operation concurrently but as noted by MMO/Cefas in MMO RR reference 4.4.11, it is highly unlikely that the piling hammers will strike in unison to create a	If land-based piling below the water has been considered within the underwater noise assessment and modelling, then the MMO has no further concerns.

	installing 4 piles per day. They consider that each pile will require 5 minutes of vibro-piling and 45 minutes of percussive piling (20 minutes of vibropiling and 180 minutes of impact piling per day in a 12-hour shift) to be successfully installed. The likely maximum impact piling scenario is for four tubular piles to be installed each day using up to four piling rigs. However, it is unclear whether all four rigs will be in operation concurrently. Conversely, the Applicants also state that 'Piling will be undertaken simultaneously using piling rigs. Adding two identical sources (i.e., doubling the signal).' It is therefore not clear why concurrent piling using two rigs has been modelled, if four rigs are going to be in operation concurrently. The Applicant should be specific in this regard. The Applicant also makes references to using 'land and water-based approaches' to piling, however it is unclear whether the 'land-based approach' refers to piling above MHWS, or refers to a land-based crane being used to pile into the water. If this is the case, land-based rigs which are piling into the water are still likely to have an effect and the Applicant will need to take these into account in the noise assessment. If four piling rigs are to be operating concurrently then this should be modelled as the worst-case scenario. It would also be helpful if the locations	cumulative effect. There is a slight possibility that two of the hammers may strike at the exact time in unison, and therefore the modelled source level has taken account of two piling sources as a reasonable worst case. The land-based approach refers to a land-based rig being used to pile into the water and these piles have been considered in the underwater noise assessment. The location of piles has been taken into consideration in the underwater noise assessment approach. The noise propagation modelling results have been applied to the most seaward point of the proposed development (and piling) to determine the furthest most point across the estuary that would be affected.	

	of the rigs used in the modelling were mapped/described to ascertain whether the worst-case scenario, in terms of impact range from concurrent piling, has been suitably modelled.		
4.2.6 – fish and shellfish ecology	The range of effect for mortal injury, recoverable injury and behavioural effects are presented in Tables 6 and 7 for percussive and vibro-piling, respectively, but the range of effect for Temporary Threshold Shift (TTS) has not been included. TTS should be modelled and presented for percussive and vibro- piling so that a range of effect can be determined.	The upper and lower boundary of effects (i.e., injury and behavioural thresholds) have been modelled and assessed in Appendix 9.2 of the ES (APP-088). The TTS threshold falls within the middle of those ranges. As the worst case has already been assessed, it is not considered necessary to model TTS, as this will not change the outcome of the significance assessment presented in ES. This was discussed with the MMO/Cefas in a meeting on 30 June 2023 and they were in agreement with the above points.	The range of effect for TTS in fish requires consideration in an assessment/modelling, so that the range of effect of all physical and behavioural impacts to fishes can be understood. However, the MMO agree that modelling the range of effect for TTS at this stage will not change the outcomes of the assessment.
4.2.7 – fish and shellfish ecology	The Applicant has also provided tables detailing the approximate distances (in metres) for fish response criteria during concurrent impact piling (Table 7) and concurrent vibro-piling (Table 8) based on two operational rigs. For impact piling, behavioural reactions are anticipated to occur across 67% width of the estuary at low water and 46% of the estuary at high water. For vibro-piling, behavioural reactions are anticipated to occur	The limitations of the modelling approach are set out in Appendix 9.2 in the ES (APP-088). We recognise that the simple logarithmic spreading modelling approach that was agreed to be used at the scoping stage may not always provide definitive ranges. Rounding the predicted ranges to the nearest order of magnitude will not, however, change the outcome of the	Please defer to the Underwater Noise section of this response for an answer to this point.

	across 48% width of the estuary at low water and 33% of the estuary at high water. Initially, it appears that a sufficient portion of the estuary would remain available as an area in which fish could migrate past the site relatively undisturbed, however, it is our understanding that the modelling approach used in the ES assessment can only be used to predict magnitude of risk, rather than to determine range of impact. In addition, the MMO understands that the range of impact may be considerably higher.	significance assessment presented in ES. Although it is recognised that simple models in complex environments can underestimate sound levels close to the source (i.e., within tens of metres), they can also substantially overestimate levels further from the source (i.e., beyond a few kilometres) (Farcas *et al*., 2016). The distance of behavioural impacts presented in ES (*circa* 1-2 km) fall within these two ranges and are therefore considered a reasonable representation of the impact range.	
4.2.8 and 4.2.9 – fish and shellfish ecology	The MMO note that the Applicant has proposed a series of 'best practice' mitigation measures in a bid to reduce the risk of significant impacts to fish receptors, and we agree that these are appropriate. i. 20-minute soft-start on commencement of piling, as per JNCC guidelines (JNCC 2010), which will allow marine receptors (e.g., marine mammals and fishes) to move away from the source of impact before full hammer levels are reached. ii. Vibro-piling will be used (where possible) to reduce the noise levels and thus exposure to marine receptors, when compared to percussive piling which typically uses a higher hammer energy.	Following previous advice from the MMO/Cefas, a similar approach to that taken by the Able Marine Energy Park (AMEP) development has been followed to the development of piling restrictions for IERRT. The rationale for the 140-hour and 196-hour periods of piling proposed for IERRT is based on the rationalisation and adaptation of the AMEP restrictions to take account of the specific location, nature and scale of effects associated with IERRT. IERRT will involve the use of smaller piles for a much shorter period of time, IERRT will only result in a partial acoustic barrier across the	The MMO will reiterate some of the comments made in its previous advice regarding the proposed 140-hour and 196 hour piling periods, as we do not believe the Applicant had sight of these comments before they responded to this question: The MMO is still not satisfied that suitable justification has been provided for the 140-hour and 196-hour piling timeframes over a 4-week period during June and August – October, proposed by the Applicant. According to the signposting document '*The rationale for the 140-hour and 196-hour periods of piling proposed for IERRT is set out in the Second Technical Note dated 13 June 2022. In summary, they are based on the rationalisation and adaptation of the AMEP restrictions to take account of the specific location, nature and scale of effects associated with IERRT*'. There are key issues that we will discuss in turn.

	Furthermore, the following seasonal piling restrictions are also proposed: iii. No percussive piling is to take place within the waterbody between 1 April and 31 May inclusive in any calendar year. This restriction does not apply to percussive piling that can be undertaken outside the waterbody at periods of low water. iv. The duration of percussive piling is to be restricted within the waterbody from 1 June to 30 June and 1 August to 31 October inclusive in any year to minimise the impacts on fish migrating through Humber Estuary during this period such as silver eels, river lamprey and returning adult Atlantic salmon. The maximum amount of percussive piling permitted within any 4week period must not exceed 140 hours where a single piling rig is in operation or a total of 196 hours where two or more rigs are in operation. v. No percussive piling within the waterbody will be undertaken at night between 1 March to 31 March, 1 June to 30 June	estuary compared to AMEP which will result in a complete barrier, and the fact that IERRT is located further downstream and in a slightly wider part of the outer estuary. Given these differences, it was not considered reasonable or proportionate to apply the AMEP restrictions in their entirety. Furthermore, the AMEP restrictions provide a precedent of what was considered acceptable by all relevant stakeholders, including the MMO, based on the evidence available at that time for that project. The Statement of Common Ground (SoCG) on the Shadow Habitats Regulations Assessment between Able Humber Ports Ltd (The Applicant for AMEP) and the MMO and Natural England states that the mitigation proposed for AMEP was considered sufficient to avoid an Adverse Effect on Integrity (AEOI) with respect to piling activities. No specific evidence or rationale was provided in support of this statement. Similarly, the Environment Agency's oral representation at the Issue Specific Hearings held on 11-13 September 2012 for the AMEP examination stated	The Applicant states in their Signposting document that '*Each tubular pile is anticipated to require approximately 5 minutes of vibro-piling and approximately 45 minutes of impact piling. The maximum impact piling scenario is for four tubular piles to be installed each day, therefore, the maximum impact pile driving scenario would involve approximately 20 minutes of vibro-piling and 180 minutes of impact piling per day in a 12-hour shift*'. If the 'worst-case' scenario for piling is 20 minutes of vibro-piling and 180 minutes of impact piling per day, over a 4-week period this equates to: i. 20 minutes x 28 days = 560 minutes / 9 hours and 20 mins of vibro-piling in a 4-week period. ii. 180 minutes x 28 days = 5040 minutes / 84 hours of percussive piling in a 4-week period. iii. A total maximum duration for piling of 94 hours of piling over a 4-week period. 94 hours of piling is considerably lower than the 140-hour and 196-hour piling timeframes proposed. It is therefore unclear why the Applicant is suggesting using the piling limits used for AMEP when they need considerably less time than this, even under their worst-case scenario of 4 piling rigs. Mitigation should be targeted to the nature of the activities proposed and it is not appropriate to make direct comparisons with mitigation applied to other projects without taking into account the nature and scale of the works, the number and size of piles used, and the specific details of the noise modelling undertaken for each project. Mitigation should be applied on a project-specific basis. We have also looked back at the Second Technical Note dated 13 June 2022 but there is no reasonable justification given as to why the AMEP restrictions are suitable for the IERRT project.

	and 1 August to 31 October, inclusive, after sunset and before sunrise on any day. This will provide a quiet 'window' which is likely to be of benefit to those species that undertaken nocturnal migrations e.g., European eel. The MMO is generally content that the periods covered by restrictions on percussive piling activity cover the greatest number of different migratory fish in the Humber Estuary. However, we have concerns regarding the restriction described in 4.2.10 iv, as justification for the 140-hour and 196-hour timeframes has not been provided, the MMO consider that this restriction is very flexible and somewhat vague. Firstly, it remains unclear how the Applicant has determined that 140 hours of piling from a single rig, or 196 hours of piling by two or more rigs is a suitable period of activity. It has been previously highlighted that, within every 4 week-period, a 140-hour operational timeframe (taking into account daytimeonly working) "could mean potentially allowing up to 11 consecutive days of piling to occur during the migratory period of fecund salmon looking to migrate upstream to	that the piling conditions "*are appropriate for this application*". There has been no new evidence since the restrictions for AMEP were agreed and, therefore, these restrictions are still considered to be acceptable. The restriction would not mean that there would be 11 consecutive days of piling for 12 hours each day during the migratory period of fecund salmon (in June and August to October). As explained in the ES, there would be significant periods of downtime, pile positioning and set up each day. The underwater noise assessment is based on the likely timeframes for piling that are anticipated to be required. Each tubular pile is anticipated to require approximately 5 minutes of vibro-piling and approximately 45 minutes of impact piling. The maximum impact piling scenario is for four tubular piles to be installed each day, therefore, the maximum impact pile driving scenario would involve approximately 20 minutes of vibro-piling and 180 minutes of impact piling per day in a 12-hour shift. It is important to understand that the proposed restrictions for migratory fish sit within a much	It is possible that the Applicant requires more than 94 hours of piling time in a 4-week period to take into account soft-start procedures, which we recommend would be for a period of not less than 20 minutes. However, the Applicant has not stated whether this is the case. We would expect that soft-start procedures are conditioned on the marine licence to ensure incremental increase in pile power over a set time period until full operational power is achieved. Should piling cease for a period greater than 10 minutes, then the soft start procedure must be repeated. The reason for this is to allow mobile sensitive receptors to move away from the noise source and reduce the likelihood of exposing the animal to sounds which can cause injury. If the Applicant intended to include their soft-start period within their piling time frame, then this should be explained in detail. For example, based on a 20-minute soft start procedure for vibro-piling and for percussive piling, for each of the four rigs, this would add an additional 160 mins per day to the timescale, or 4480 mins / 74 hours and 40 minutes over a 4-week period. Adding the 96 hours of piling as calculated in 16i-iii to the maximum soft-start duration for 4 rigs gives a total of 169 hours (approximately) which is still below the 196 hours being sought for a four piling rig arrangement. In our view, given the Applicant's stated worst-case scenario of a maximum of 20 minutes of vibro-piling and 180 minutes of impact piling per day (3 hours 20 minutes total), coupled with a maximum total of 120 minutes / 2 hours for soft-start procedures for 4 vibro-piling rigs and 4 percussive piling rigs as an absolute worst-case, it would likely make more sense to apply a daily restriction to the number of hours of piling. We maintain our support for the <u>timing</u> of the proposed piling restrictions within the waterbody of; *between 1 April and 31 May*

	spawn". We note that justification for these time periods has been requested in prior advice. Limited justification has been provided in Table 9.7, which bases the rationale for this restriction on similar restrictions in place at the Able Marine Energy Park (AMEP), however, as far as we can reasonably determine, justification of how the 140hour and 196-hour timeframes were decided has not been provided. It is also not clear within the wording of the restriction how the 196 operational hours will be divided between what number of rigs. For example, will two rigs operating for a total 196-hours, be operating for 98hours each? The Applicant should seek to amend this and provide the MMO with clarity on this matter.	wider package of mitigation measures for other receptors, including overwintering coastal waterbirds that are located near to the proposed development and are sensitive to noise and visual disturbance. To address this issue, the Applicant has committed to avoiding construction activities on or close (within approximately 200 m) to the intertidal mudflats where the overwintering bird features are located for six months of the year (October to March inclusive). This restriction applies until an acoustic barrier/visual screen has been installed on both sides of the approach jetty – construction activity can then be undertaken on the approach jetty itself, behind the screens. Together with the restrictions that are currently proposed for fish, the construction of IERRT is already highly constrained. Any further seasonal or timing restrictions could extend the overall construction period for the project. Given the complex and comprehensive nature of the overall mitigation measures, the addition of further restrictions is likely to have a disproportionate effect on the overall construction programme.	*inclusive*, which covers part of the smolt downstream migration and from *1 June to 30 June and 1 August to 31 October inclusive*, which will minimise the impacts to silver eels, river lamprey and adult Atlantic salmon. In respect of salmon smolts which migrate downstream during April to June (inclusive), we note that it is already proposed that piling will not be carried out during April and May but that the Applicant seeks permission to pile during June. Salmon smolts are considered to use selective ebb-tide stream transport and move within the upper water column and in the fastest moving section of the water channel (*Moore et al., 1995; Lacroix et al., 2004*). Thus, smolts migrating downstream during June are likely to be in the main channel and vulnerable to the effects of underwater noise. With this in mind, an alternative method of implementing a piling restriction during June could be the achieved through a restriction on percussive piling during ebbing tides. We recognise that this approach is likely to have pros and cons. If the tides during daylight hours are flooding, then permitted piling hours could be longer. Conversely, if tides are ebbing during daylight hours, this may be more restrictive. Would the Applicant be willing to consider this alternative mitigation? For example, a restriction might be worded as follows: '*no percussive piling should take place for the first 5-hours of the ebbing tide to allow migration of juvenile salmon and sea trout'*. In respect of elvers which migrate upstream during June, we are content that as their migration is generally nocturnal, the night-time piling restriction will afford adequate mitigation. Concerning the piling restriction period of August to October (inclusive) the species of concern are silver eels which are migrating downstream, and river lamprey and adult Atlantic salmon which are migrating upstream. European eels possess

		Overall, therefore, the proposed hourly piling restrictions are considered appropriate and acceptable for the IERRT project. The proposed restriction would mean that over every 4 week period (in June and August to October), up to 196 hours of piling could be undertaken by either 2 rigs, 3 rigs or 4 rigs. In other words, the limit and temporal exposure over these periods would always remain 196 hours, independent of the number of rigs that are used.	a swim bladder making them vulnerable to underwater noise. However, the downstream migration run for silver eels typically occurs at night and during heavy rainfall (*Bertin*, 1951, from *Bruijs and Durif*, 2009), so the night-time piling restriction will likely afford adequate mitigation for silver eels. River lamprey do not possess a swim bladder so are considered less vulnerable to the impacts of underwater noise. They also migrate upstream at night (*Maitland*, 2003) so the night-time piling restriction will also afford adequate mitigation for river lamprey. Adult Atlantic salmon possess a swim bladder so are sensitive to underwater noise. Movement by adult salmon through estuaries is influenced by tidal state (*Potter, 1988*, and *Potter et al., 1992*) with the salmon using the upstream currents on flooding tides to move up estuaries (*Moore and Potter, 2014*). With this in mind, an alternative way of implementing a piling restriction between August and October could be achieved through a restriction on percussive piling during flooding tides. Naturally, the same pros and cons are likely to arise, but this may be an option the Applicant could consider as an alternative mitigation strategy? For example, a restriction might be worded as follows: '*no percussive piling should take place for 3 hours following low water to allow migration of adult salmon and sea trout on the flooding tide.*
4.2.10 – fish and shellfish ecology	Secondly, and on this point, the use of "two or more" percussive piling rigs is very vague and creates too much flexibility for the Applicant to operate as many rigs as they see necessary, which would undermine the purpose of this restriction. The Applicant should commit to a defined number of rigs in operation at once and set an appropriate defined number of operational hours per rig, in order to make this restriction meaningful and enforceable. The Applicant should	These proposed restrictions are considered meaningful as they would limit the total hours of piling, and thus the temporal exposure of migratory fish, over certain periods of the year when there is considered to be a moderate level of risk to migratory fish in the Humber Estuary (in June and August to October). If two piling rigs are used, the limit will be 196 hours over every 4-week period, if	See MMO responses to 4.2.8 and 4.2.9 above.

	provide transparent justification and supporting calculations for the defined number of operational hours per rig.	three piling rigs are used the limit will still be 196 hours and if four piling rigs are used the limit will again still be 196 hours so there will be no increased temporal effect to fish by increasing the number of piling rigs. The restrictions are considered clear and straight forward for contractors to implement and therefore will be enforceable.	
4.2.11 – fish and shellfish ecology	In addition, the restriction stating that no percussive piling will take place "after sunset and before sunrise on any day", leaves considerable flexibility given that point of sunrise and sunset is somewhat subjective and dependent upon season (i.e., longer hours of daylight in the summer months). As such, we recommend that the restriction be amended to state that No percussive piling within the waterbody will be undertaken between 1900 and 0700 on any day, between 1 March to 31 March, 1 June to 30 June and 1 August to 31 October, inclusive. Finally, in our most recent advice, the MMO stated that "it is unclear why the proposed restriction periods are only applied to percussive piling and not vibro piling, and why restrictions are only applicable at night". It was requested that the Applicant provide clear justification for the proposed dates of each restriction, together with an explanation of why the piling restrictions should only be applied at night and why only applied to	We recognise that the specific timings of sunrise and sunset will vary depending on the season, but these are not subjective and can be set out in advance using recognised data sources (e.g., UK Hydrographic Office (HO) tide tables). The application of the proposed night-time restriction will mean that fish that undertake nocturnal migrations are less exposed compared to a set daily timing restriction. The proposed restriction is therefore considered reasonable and appropriate for IERRT. The rationale for the piling restrictions are based on the outcomes of the underwater noise assessment presented in Appendix 9.2 of the ES (APP-088), there is a risk of a behavioural response in fish within around 1 km from the source of vibro piling which equates to less than half the	We are satisfied that a restriction on piling at night can be implemented and achieved using appropriate reference data on sunrise and sunset times. However, please be aware of the following MMO advice as related to the predicted range of effects from vibro-piling: *With regard to Comment 4.2.11 – fish and shellfish ecology in Table 3.2 (as the underwater noise team raised similar concerns), the applicant has provided a rational as to why the piling restrictions should only be applied to percussive piling. The applicant is of the opinion that the effects of vibro-piling from IERRT on migratory fish are not considered to be significant and do not need to be mitigated: "Based on the outcomes of the underwater noise assessment, there is a risk of a behavioural response in fish within around 1 km from the source of vibro piling which equates to less than half the width of the Humber Estuary at both low water and high water".* *Unfortunately, the evidence (i.e., the predicted effect ranges) presented to support such conclusions is subject to several uncertainties. A threshold of 157 dB SPLpeak has been used to predict behavioural effects (converted from a threshold of 163 dB peak-to-peak). As previously advised, Cefas recommend a*

	percussive piling in respect of each species they are intended to protect. This information has not been provided within the ES and we recommend the required information be presented for review by the MMO before the ES is accepted. Without this justification, it will be necessary to recommend a precautionary approach and avoid all forms of piling (i.e., vibro and percussive) for the period of 1 April and 31 May, inclusive, and for the period of 1 June to 30 June and 1 August to 31 October, inclusive. This is consistent with recommendations made in previous advice based on remaining uncertainties.	width of the Humber Estuary at both low water and high water. In other words, more than half the width of the estuary will be undisturbed and available for fish to continue their migration during periods of vibro piling. Furthermore, as noted above, the vibro piling will only take place up to 20 minutes each day (5 minutes per pile) which equates to up to 1% of the time and is therefore only taking place intermittently for very short periods each day. Overall, therefore, the effects of vibro-piling from IEERT on migratory fish are not considered to be significant and do not need to be mitigated. Furthermore, it is worth noting that the AMEP piling restrictions only applied to percussive piling and there is no known precedent on the Humber Estuary for setting a blanket seasonal restriction on all forms of piling. In fact, the use of vibro-piling as much as possible has previously been accepted by the MMO and the Environment Agency as a form of mitigation on marine projects elsewhere in the UK, for example, the Lowestoft Eastern Energy Facility (LEEF) Project, and Thunderer Jetty Refurbishment at Stolthaven in Dagenham. ABPmer are not	*(conservative) threshold of 135 dB SELss for assessing behavioural effects from impact piling. Secondly, the propagation loss of 17.91 is not necessarily precautionary. While this may be plausible, there may be more favourable propagation conditions at the site.* *Much larger (behavioural) effects are predicted when assuming a threshold of 135 dB SELss, and a propagation loss of 17.91. It is reasonable to expect behavioural effects across the full width of the estuary / river during impact piling. We cannot say for certain to what extent vibro-piling may affect behaviour (and we cannot definitively conclude that more than half the width of the estuary will be undisturbed and available for fish to continue their migration during periods of vibro piling). However, we would expect smaller effects for vibro-piling, given that vibro-piling has a lower source level than impact piling, and generally introduces less impact noise into the marine environment.* *Even if we assumed that some of the estuary was undisturbed, as highlighted previously, it is not known for certain how fish species will respond and whether receptors would be able to continue moving past the site during piling operations utilising certain (i.e., lesser disturbed) parts of the estuary, or whether they would be affected. A significant impact would be if noise from piling operations causes fish to change their migratory behaviour. We do acknowledge however that vibro-piling will be undertaken for limited periods only (20 minutes of vibro-piling per 24 hours).*

		aware of any new evidence to support a deviation from the proposed approach to mitigation which has been applied to date for other projects on the Humber Estuary. Based on the available evidence, the proposed restrictions are only considered necessary or reasonable to apply to the percussive piling activities (and not the vibro piling activities).	
4.2.15 – fish and shellfish ecology	In its review of the PEIR in February 2022, the MMO noted that all potential impacts during operation (i.e., changes to fish populations and fish habitat, changes in water and sediment quality and underwater noise and vibration) have been scoped out for further assessment as these impacts are considered to be equivalent or lower in magnitude than those from the existing maintenance dredging and vessel movements. We maintain our recommendation that habitat loss and disturbance as well as underwater noise impacts on fish during operation should be further assessed within the ES, taking into account other developments in the area (cumulative effects).	See above response to MMO reference 4.2.3.	The MMO is satisfied that significant adverse impacts to fish are unlikely to occur during the operational phase of IERRT. However, please note that for future reports/assessments, even if the outcomes of the assessment for the operational phase are predicted to be equivalent or lower in magnitude than those of existing operations or that of construction phase impacts, we would expect to see potential impacts from all stages of development, i.e., construction, operation and decommissioning (where applicable) to be suitably assessed within the ES.
4.2.16 – fish and shellfish ecology	The Applicant states in Chapter 3 of the ES, that piles will initially be driven into the ground using vibro-piling and	The Applicant considers that vibro piling will still be possible in the absence of percussive piling.	Please look at the MMO response to Section 4.2.11 in answer to this query.

	when resistance is reached, percussive piling will be used to reach the required depth. It seems then, that for a pile to be safely and completely installed, both vibro- and percussive piling is needed. The piling restrictions provided by the Applicant in Chapter 9 have been worded to apply to percussive piling only, however, it seems impractical to carry out 5 minutes of vibro-piling during periods when percussive piling is not permitted (i.e., between 1 April and 31 May, inclusive, and at night between 1 March to 31 March, 1 June to 30 June and 1 August to 31 October, inclusive). It therefore seems somewhat redundant to exclude vibro-piling from these restrictions. It would be helpful to understand what works the Applicant hopes to achieve using vibro-piling only during these restricted periods.	This will be dependent on ground conditions, penetration and pile stability.	
4.2.17 – fish and shellfish ecology	The Applicant has scoped out commercial shellfish species and insufficient evidence has been provided to support this decision. The MMO are satisfied with the evidence provided showing there are no commercial shellfish bivalve beds in the Humber Estuary, however, would expect to see a reference to support the statement that the IERRT and the disposal site do not support other shellfish (crab, lobster, or whelk).	As reported by Environmental Resources Management (2011) as part of the Able Marine Energy Park DCO application, a small fishery exists which targets lobster, brown (edible) crabs and whelk on the north bank in the outer estuary. A small-scale seasonal winter fishery also targets brown shrimp which extends along the Lincolnshire coast and down to the Wash, typically not taking place in the Humber Estuary (Environmental	The MMO has no further comments to raise on this point.

		Resources Management, 2011; Walmsley and Pawson, 2007). These fisheries are not known to operate in or around the Port of Immingham area or in the vicinity of the proposed disposal sites. This would be expected given the navigational safety issues of operating fishing vessels in these areas and likely limited catch potential as a result of sub-optimal habitat conditions for these species compared to other fishing grounds in the region.	
4.3.1 – coastal processes	Paragraph 7.1.2 of Chapter 7 identifies receptors as Hydrodynamics, Sediment transport, Plume dispersion and Waves. It is not strictly clear what 'plume dispersion' means when defined as a receptor, but this is not a significant concern - in general the approach is one the MMO supports as the Applicant does not define a specific geomorphic entity and so the assessment is broad enough to capture all impacts i.e., as stated in paragraph 7.1.3, consequent impacts to specific features (e.g., port infrastructure, drainage outfalls and the adjacent foreshore) are then also considered.	Plume dispersion would generally be more accurately described as an impact pathway – i.e., a mechanism by which impacts could be passed on to other receptors (i.e., beaches and other sedimentary features within the physical processes chapter or within other topic assessments, such as benthic ecology, water and sediment quality etc.). It is listed in paragraph 7.1.2 Chapter 7 (APP-043) mainly to highlight that sediment plumes from proposed dredging and disposal activities have been assessed.	The MMO agrees with the Applicant in terms of the response that they have provided to this point. The MMO refers the Applicant back to its initial assessment on Coastal Processes matters as raised in REP1-020.
4.4.1 – underwater noise	The MMO notes fish and marine mammal receptors have been considered as part of the assessment. It is appropriate that the potential	The MMO's position is noted, and, on that basis, no further response is required.	The MMO would add that this comment was an observation only and that no specific action is required from the Applicant in response to this point. The MMO consider this point resolved.

	impact pathway of underwater noise during piling operations, and capital dredging has been considered in the assessment for marine invertebrates, fish and marine mammals – see Table 9.21 in Chapter 9. Maintenance dredge and dredge disposal, and vessel operations (during the operational phase) have been scoped out from further assessment.		
4.4.2 – underwater noise	Table 9.1 in Chapter 9: Nature Conservation and Marine Ecology states that the marine mammal species in the study area are considered to have a moderate sensitivity to the anticipated level of underwater noise generated by the IERRT project from piling and a low sensitivity to noise due to dredging activities, although the MMO do not believe this 'low sensitivity' is justified.	An evidence-based approach to the application of sensitivity levels has been applied and presented in the ES. Based on the literature review of the observed responses of marine mammals to different underwater noise activities (e.g., pile driving, seismic surveys, dredging etc.) in Section 7.4 of the underwater noise assessment (Appendix 9.2 of the ES – APP-088), the overall sensitivity of marine mammals to underwater noise from dredging activities is considered to be low. There is no known evidence to suggest that they have a greater sensitivity to dredging than has been assigned.	Regarding the sensitivity of marine mammals to underwater noise from dredging activities, the MMO does not consider sufficient evidence has been presented to support a rating of 'low sensitivity'. However, the sensitivity rating will not alter the assessment conclusions as such, so this is a point to consider for future assessments. *McQueen et al.* (2019) highlight that although there are gaps of exposure-response data for dredging-induced sounds, in general there is no direct evidence of lethal effects to aquatic biota and limited observations of non-lethal effects (e.g., behavioural responses). Nevertheless, low-frequency sounds produced by dredging overlap with the hearing frequency ranges of many marine mammal species, which may pose risk for auditory temporary threshold shifts, auditory masking, and behavioural responses depending on dredge type and local conditions. The Applicant should be aware of this.
4.4.3 – underwater noise	Table 1 in Appendix 9.2 Underwater Noise Assessment helpfully provides the consultee responses to date, and how comments (raised at PEIR) have been addressed in the ES. The MMO thanks the applicant for their responses, however, does have some further comments specifically on	The MMO's position is noted, and, on that basis, no further response is required.	The MMO would add that this comment was an observation only and that no specific action is required from the Applicant in response to this point.

	Appendix 9.2 which can be seen in later in this section.		
4.4.4 – Underwater Noise	It is recognised that Chapter 20 Cumulative and In-combination effects, provides an assessment of the potential cumulative effects. There is a lot of other development occurring in the Humber including Immingham Green Energy Terminal development, which is in close spatial proximity to this Project, and there is the potential for the two construction programmes to overlap. The MMO encourages the Applicant to ensure any potential cumulative impacts are assessed and submitted when possible as the project continues.	Chapter 20 of the ES [APP-056] includes a comprehensive cumulative and in-combination assessment. This assessment was based on the information available at the time of submission of the IERRT DCO application, including in respect of the IGET project. At the time of writing, the IGET project DCO application is yet to be submitted, meaning that key information in relation to that project is still at an inchoate stage. Cumulative and in-combination effects will also be assessed (with mitigation proposed if necessary) in the IGET DCO application documentation for which all information will be available. On this basis, the assessment of cumulative and incombination effects is considered robust and remains as set out in the IERRT DCO application documentation, in that cumulative and in-combination effects between IERRT and IGET are assessed	The MMO reminds the Applicant that having appropriate mitigation in place for both projects will help to reduce the risk of potential impact in terms of cumulative and in-combination effects. The MMO consider this point resolved.

		as insignificant and do not require further mitigation.	
4.4.5 – underwater noise	The MMO is aware that the proposed mitigation is set out in section 10.1.3 of Appendix 9.2 and welcome that soft start procedures will be employed. Such measures may help to reduce the total number of dangerous exposures in terms of auditory injury. As previously advised, agreement on the proposed restrictions and way forward (especially in terms of what would be an acceptable limit of percussive piling and vibro-piling per day during the sensitive seasons if piling is allowed) will need to be sought. We welcome the proposed restriction that no percussive piling is to take place within the waterbody between 1 April and 31 May inclusive to reduce the risk of potential impact on migratory fish species within the Humber Estuary. The table submitted highlights the migratory periods of key fish species in the Humber.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO would add that this comment was an observation only and that no specific action is required from the Applicant in response to this point. The MMO consider this point resolved.
4.4.6 – underwater noise	The MMO notes the Applicant also proposes that percussive piling is to be restricted within the waterbody from 1 June to 30 June and 1 August to 31 October inclusive in any year. 'The maximum amount of percussive piling permitted within any 4-week period must not exceed 140 hours where a single piling rig is in operation; or a total of 196 hours where two or more rigs are in operation'. The MMO would again reiterate that it is unsure	See above response to MMO reference 4.2.8 and 4.2.9.	The proposed restriction provided by the Applicant would mean that over every 4-week period (in June and August to October), up to 196 hours of piling could be undertaken by either 2 rigs, 3 rigs or 4 rigs. In other words, the limit and temporal exposure over these periods would always remain 196 hours, independent of the number of rigs that are used. The MMO disagree with the Applicant that the AMEP restrictions provide a precedent of what was considered acceptable by all relevant stakeholders, including the MMO, based on the evidence available at that time for that project. It

	as to where the '140' and '196 hours' have been derived from, and it would be helpful if the Applicant could please provide clarification on this point.		is important to note that each project is considered on a case-by-case basis.
4.4.7 – underwater noise	The species potentially affected during August – October are Atlantic salmon (adults), river lamprey and Silver eel. The MMO noted in previous advice that the Humber is a recovering salmon river and two of the main tributaries for the Humber, the rivers Ouse and Trent are also recovering salmon rivers, and it is recognised that protecting migrating salmon smolts is fundamental to conserving salmon stock. In summer/early autumn adult salmonids are known to aggregate within estuaries, especially during periods of low flow and high temperatures. It is during these months of aggregation when the adult salmonids are most fecund, that they are most exposed to anthropogenic impacts for longer durations. Assuming piling operations take place between 0700 and 1900 (acknowledging that piling will not be continuous for 12 hours), this equates to over 11 days per 4- week period of percussive piling. Thus, we are not content that the risks to migratory species have been appropriately mitigated during the summer and autumn months.	See above response to MMO reference 4.2.8 and 4.2.9.	Please see the MMO response to 4.4.6 for a response to this point.
4.4.8 –	Further, it is proposed that no percussive piling is to take place within	As set out in Appendix 9.2 of the ES (APP-088) and Chapter 9 of	Please see the MMO response to 4.4.6 for a response to this point.

underwater noise	the waterbody between 1 March to 31 March, 1 June to 30 June and 1 August to 31 October inclusive after sunset and before sunrise on any day. The MMO considers that no percussive piling at night will be of benefit to those species that generally undergo nocturnal migration, such as river lamprey, (notwithstanding the fact that presumably there may still be some vibro-piling during the hours of darkness; therefore, the implications of this need to be considered). If there are some species that generally migrate during the day, then it is a question of what the potential risks and implications are, of allowing up to 3 hours 20 minutes of piling (3 hours of percussive and 20 minutes of vibro-piling; worst case assumption) per day during these months.	the ES (APP-045) (see paragraph 9.8.162), the potential risks to fish that migrate during the day will be temporary and intermittent. They will be exposed a maximum of up to 13% of the time during percussive piling (and up to 1% of the time during vibro piling), based on four piles a day being driven. It should also be noted that in terms of potential disturbance, four piles a day is very much a worst-case scenario.	
4.4.9 – underwater noise	The MMO further note that the Applicant is proposing to use vibro-piling as much as possible (recognising that impact piling may still be required to drive the piles to the required design level) throughout these works. Assuming that only part of the estuary (width) is affected by the vibro-piling operations, it is not known for certain how fish species will respond and whether receptors would be able to continue moving past the site during piling operations utilising certain (i.e., lesser disturbed) parts of the estuary, or whether they would be affected. A significant impact would be if noise from piling operations causes	It will be possible to pile approximately four pile bents (groups of piles) within the intertidal area at the top of the foreshore in the dry.	The MMO thanks the Applicant for providing this information. The MMO has no further comments at this stage.

	fish to change their migratory behaviour. The MMO does acknowledge however that vibro-piling will be undertaken for limited periods only (20 minutes of vibro-piling per 24 hours). Piling in the dry will greatly minimise the risk of impact on local receptors, and we would encourage ABP to undertake as much piling in the dry as possible and it should be confirmed which areas will be possible to pile in the dry.		
4.4.10 – underwater noise	Section 6.2.8: "*The SL for the impact driving of tubular piles as part of the proposed development is assumed based on the loudest near-source (10 m from the source) sound pressure measurements (SEL, peak SPL and RMS) for the percussive piling installation of the nearest-sized 1.52 m Cast-in-Steel- Shell (CISS) steel pipe piles in a shallow water environment (Illinworth & Rodkin, Pommerenck, 2014). Backcalculating the sound pressure measurements to 1 m using the simple logarithmic spreading model (equation 1) provides an estimated SL of 203 dB re 1 µPa2 s (SEL metric), 228 dB re 1 µPa m (peak SPL metric) and 213 dB re 1 µPa m (RMS metric)"*. The 'SEL metric' should be clarified as it is not clear what this is. For impact piling, this should be the single strike sound exposure level (SELss). Furthermore, it is not clear why the RMS source level is 10 dB higher than the SEL source level. In any case, the RMS metric is generally	The peak, SEL and RMS levels are those that were measured directly in the field and published in the literature that is referenced in Appendix 9.2 of the ES (i.e., Illingworth & Rodkin, 2007; ICF Jones & Stokes and Illingworth and Rodkin, 2009; Rodkin and Pommerenck, 2014). The SEL that is quoted is the single strike SEL (SELss). The RMS value was quoted in the ES because it was from a published study that had provided measurements across all metrics (SEL, peak SPL and RMS). This value has not, however, specifically been used in the modelling. Only the SEL and peak SPL values were modelled against the cumulative SEL and peak SPL thresholds for impulsive sources to estimate	The MMO thanks the Applicant for providing this information. The MMO has no further comments at this stage.

	not appropriate for assessing impulsive sources such as impact piling, so the MMO would recommend removing this. The relevant metrics for assessing the impacts of impulsive activities are SELcum (calculated by the aggregation of SELss) and SPLpeak.	the potential effects of impact piling on fish.	
4.4.11 – underwater noise	Section 6.2.9: *"Piling will be undertaken simultaneously using piling rigs. Adding two identical sources (i.e. doubling the signal) will increase the received level by 3 dB. In other words, the unweighted peak SL of concurrent impact piling by more than one piling rig is assumed to be 206 dB re 1 µPa2 s (SEL metric), 231 dB re 1 µPa m (peak SPL metric) and 216 dB re 1 µPa m (RMS metric)*". It is not clear why the Applicant is adding two identical sources when they confirm earlier in the assessment (see section 6.2.2) that a total of four piling rigs may be used: *"The approach jetty will be built in the same way as above where there is sufficient water depth to enable barge access where barge access cannot be achieved due to shallow water depths, a land- based crane positioned on completed sections of the jetty will be used. The piling equipment and process will be the same as described above. Piling works will be undertaken simultaneously on two fronts (i.e., the land and water based approached described above) using up to four piling rigs and may result in cumulative*	As noted in the response to MMO reference 4.2.5, we agree that simultaneous piling is unlikely. The maximum number of pile strikes per day and cumulative SEL predictions have taken account of maximum number of piles that would be installed each day by up to four rigs and is therefore considered to already represent piling from multiple rigs.	As the MMO noted in a previous round of comments, from the perspective of a receiver, in general the pulses originating from different locations will not overlap, even if the respective hammers strike in unison, because the propagation of sound is not instantaneous (and as the propagation paths likely have different lengths, simultaneous strikes will produce pulses that arrive at different times). Therefore, in general there is no need to add the sources when assessing the peak pressure. If the piling locations are relatively close together, however, then from the perspective of a distant receiver it is possible to have more overlapping pulses. If the SELcum predictions have accounted for all the strikes from all four rigs within 24 hours, then the approach is correct. The MMO considers that no further action is required.

	piling noise". Furthermore, simultaneous piling from multiple rigs, would likely not increase the received peak pressure levels or the single strike SEL, as the individual pulses (and their peaks) originating from distinct rigs do not generally overlap (due to the distinct timing of the strikes and the propagation paths). However, piling from multiple rigs would increase the total number of strikes and thus the cumulative sound exposure level (SELcum) over 24 hours.		
4.4.12 – underwater noise	Table 3: 'Fish response criteria applied in this assessment': It is appropriate that the assessment refers to noise exposure criteria from Popper *et al.* (2014) for fish species. However, TTS is missing from this table for piling and the MMO would expect this to be included (in addition to mortality and potential mortal injury, and recoverable injury). Popper *et al.* provide a TTS threshold (based in the cumulative sound exposure level, SELcum) of 186 dB re 1 µPa2.s for piling, for all fish species.	See above response to MMO reference 4.2.6.	The MMO agrees that in this instance, modelling Temporary Threshold Shift (TTS) for fish species (as per the Popper et al., 2014 criteria) will not necessarily change the assessment conclusions. However, please note for future reports/assessments that we would expect to see TTS appropriately considered. Based on the predictions for mortality and recoverable injury for percussive piling, it would be reasonable to expect TTS ranges between 1 and 2km.
4.4.13 – underwater noise	Table 7 provides the modelled predictions for fish and impact piling. Having conducted an internal sense check of these predictions and based on the modelling assumptions provided in Table 6, the MMO believe that the predictions look plausible / reasonable for mortality and	The assumptions and model input values are set out in Table 6 in Appendix 9.2 of the ES (APP-088). When applying the simple model, which includes an absorption coefficient (α) to the behavioural threshold of 135 dB SELss and a source level of 203	The empirical absorption coefficient term (αR) accounts not only the attenuation in the water, but also for the effect of the seabed attenuation (especially when the sound propagation is in single mode regime, which is quite typical of very shallow environments). In itself, the attenuation in water at the relatively low frequencies of interest here (with the peak of the source spectra below 1 kHz), is usually a small fraction of 1 dB/km, while the empirical term used by the model implies a

	recoverable injury. We note that for behaviour, the predicted effect range is 1,554 m. The report states "behavioural reactions are anticipated to occur across 67 % width of the Humber Estuary at low water and 46 % of the estuary width at high water, therefore, potentially creating a partial temporary barrier to fish movements". The simple modelling approach can only provide approximations (i.e., an indication of the order of magnitude) of the potential effects, rather than definitive ranges and percentages. Furthermore, using the propagation assumptions detailed in the report (i.e., TL = 17.91 + αR), a behavioural threshold of 135 dB SELss (a conservative assumption from Hawkins *et al.,* 2014) and a source level of 203 dB (assuming that this is SELss), then we may expect effects out to ~ 6 km. Thus, it can be concluded that there is the risk of a temporary barrier effect across part or all of the estuary.	dB, effects are predicted out to ~ 2 km. When applying the simple model without the absorption coefficient term (+ αR) effects are predicted out to ~ 6 km. The inclusion of an absorption coefficient is considered more appropriate in constrained, shallow, and turbid water environments such as the Humber Estuary (NPL, 2014), and therefore the predictions presented in the IERRT ES are considered to be representative of the potential effects.	much larger value of 5.23 dB/km, which further suggests that this is largely due to the seabed effects. As noted in comment 4.4.16, these effects can be very complex and their leverage on propagation can be substantial and highly variable. It is also worth noting that the EA simple model specifies that the α coefficient has a rather large standard deviation, namely 3.77 dB/km, which means that, for example, one standard deviation away from the mean would reduce this attenuation from 5.23 dB/km to 1.46 dB/km, or a reduction of more than 3 times. This level of uncertainty should inform the confidence in the overall model predictions, which, as noted elsewhere, is more appropriate to give an indication of the order of magnitude of the potential effects rather than a precise prediction.
4.4.14 – underwater noise	As for percussive piling, 3 dB (assuming two identical sources) has been added to the estimated source levels for vibro-piling (which are 198 dB re 1 µPa2 s (SEL metric), 213 dB re 1 µPa m (peak SPL metric) and 198 dB re 1 µPa m (RMS metric)). This therefore provides source level values of 201 dB re 1 µPa2 s (SEL metric), 216 dB re 1 µPa m (peak SPL metric) and 201 dB re 1 µPa m (RMS metric). The SPLrms is the most	See above response to MMO reference 4.2.5.	Please see Section 4.4.11 for an answer to this point.

	relevant/appropriate metric for continuous sources. The SPLrms is additive when there are two or more continuous sources. Thus, given the piling rigs should be relatively close together (within the estuary), it is reasonable to add 3dB as Applicant has been done here, for two piling rigs. Nevertheless, the Applicant should confirm that there will only be two piling rigs operating simultaneously.		
4.4.15 – underwater noise	Section 9.1.10: "*The calculator developed by NMFS (2021) has been used to calculate the range at which the instantaneous peak and cumulative SEL thresholds for vibro driving (Popper et al., 2014) are reached. The model input values and associatedassumptions for vibro piling are included in Table 8*". Presumably, the Popper *et al.* thresholds for impulsive noise have been used in this assessment of vibropiling for fish. Pulse sounds such as percussive pile driving are likely to have a greater effect on fish than continuous sources at the same level (Neo et al., 2014). Thus, it is reasonable that the Popper thresholds for percussive/impact piling have been applied in the assessment of sound exposure from continuous sources (this is a precautionary approach). However, please note that the instantaneous peak is not relevant for continuous sources	The Popper *et al.* thresholds for impulsive noise have been used in the assessment of vibro-piling as set out in Appendix 9.2 (APP-088). It is agreed that the instantaneous peak threshold is not necessarily relevant for continuous sources and can be disregarded from the assessment results. This does not modify the outcome of the significance assessment presented in ES.	The MMO thanks the Applicant for providing this information. The MMO has no further comments at this stage.

4.4.16 – underwater noise	Section 9.1.13: "*Behavioural reactions are anticipated to occur across 48% of the width of the Humber Estuary at low water and 33% of the estuary width at high water*". A simple modelling approach can only provide an order of magnitude of the potential effects, rather than definitive ranges and percentages.	See above response to MMO reference 4.2.7.	While *Farcas et al.* (2016) does indeed conclude that simple spreading law models can underestimate sound levels close to the source (i.e., within tens of metres), and overestimate levels further from the source, the exercise in that paper was based on a (conservative) propagation loss of 15 log R. Simply changing / varying the model parameters can derive very different results. For example, if using a propagation loss of 17.91 (as is the case for this assessment), then one may underestimate the 'Received Level' compared to using a different propagation loss of 16 or 17 Log R. Shallow water environments are complex, variable environments and the sensitivity of received levels to environmental properties such as bathymetry and seabed acoustic parameters can be very substantial (compared to deeper water). The Applicant should consider this.
4.4.17 – underwater noise	The Popper criteria only provide limited quantitative thresholds for continuous sources of noise, such as dredging and vessel noise (i.e., recoverable injury: 170 dB rms for 48 hours and TTS: 158 dB rms for 12 hours). These thresholds are reached at 10 m and 46 m for recoverable injury and TTS respectively, as per Table 10 in Appendix 9.2. We agree with the Applicant that instantaneous effects are unlikely.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO reminds the Applicant that this comment was an observation only and that no specific action is required. However, please see further comments under 4.4.18 below for additional detail.
4.4.18 – underwater noise	As noted above, dredging operations will be undertaken for 24 hours and therefore, the cumulative sound exposure (over 24 hours) should be considered, although the MMO appreciate that there are no defined SELcum thresholds at present for continuous sources and fish. As noted above, given that pulse sounds such	All the assumptions, model input values and published thresholds that have been used are set out in Section 6 and Table 3 in Appendix 9.2 of the ES (APP-088). It is worth noting that the source level that was applied for dredging is considered very much a worst case as it is based on the published levels for a	The MMO notes that the Applicant has responded stating that they do not consider it appropriate to apply impulsive noise thresholds to the continuous source as the thresholds were not developed for this purpose and are therefore unlikely to be realistic. This, however, contradicts the statement by the Applicant who confirms that "the Popper et al. thresholds for impulsive noise have been used in the assessment of vibro-piling as set out in Appendix 9.2 (APP-088)". It is the case that vibro-piling and dredging are both continuous noise sources.

	as percussive piling noise are likely to have a greater effect on fish than continuous sources at the same level (Neo *et al.,* 2014), the Popper thresholds for impact piling could be applied in the assessment of cumulative sound exposure from continuous sources as a precautionary approach (as has presumably been done within this assessment for vibro-piling). The MMO agrees with the Applicant that the level of exposure will depend on the position of the fish with respect to the source, the propagation conditions and the individual's behaviour over time. Nevertheless, given the 240-hour dredging operations, we would expect larger effects than what has been presented.	large trailing suction hopper dredger (TSHD) undertaking aggregate dredging of coarser (sand/gravel) material which is likely to generate higher RMS SPLs than a backhoe dredger or a TSHD removing softer siltier material as is the case on the Humber Estuary. It is not considered appropriate to apply impulsive noise thresholds to the continuous source as the thresholds were not developed for this purpose and are therefore unlikely to be realistic. The Popper *et al.* (2014) qualitative guidelines for continuous noise sources that were applied and presented in the ES to assess the effects of dredging activities consider that the relative risk of mortality and potential mortal injury in all fish is low in the near, intermediate and far-field. Applying the Popper *et al.* (2014) SEL_{cum} thresholds for piling to the model and assumptions set out in the ES, as has been suggested by the MMO/Cefas, indicate that there is a risk of mortality/ potential mortal injury within 50 m in fish with a swim bladder involved in hearing, within approximately 30 m in fish with a swim bladder	Nevertheless, the Applicant has considered the SELcum thresholds for impulsive sources (piling) on page 9 of the Signposting document. These thresholds indicate that there is a risk of mortality/potential mortal injury within 50m in fish with a swim bladder involved in hearing, within approximately 30m in fish with a swim bladder that is not involved in hearing and approximately 10 m for fish with no swim bladder. There is a risk of recoverable injury within approximately 80 m in fish with a swim bladder and approximately 20 m for fish with no swim bladder. Further, there is a risk of TTS occurring within approximately 700 m in all fish. We have no major concerns with the updated ranges considered. Overall, no further action required on this point.

		that is not involved in hearing and approximately10 m for fish with no swim bladder. These results align with the qualitative guidelines for continuous noise sources whereby effects are limited to within tens of metres from the source. According to the Popper *et al.* (2014) qualitative guidelines presented in the ES, the relative risk of recoverable injury is also considered to be low in the near, intermediate and far-field for fish with no swim bladder and fish with a swim bladder that is not involved in hearing, and slightly greater for fish where the swim bladder is involved in hearing (e.g., herring). Applying the SEL_{cum} thresholds for piling as advised by MMO/Cefas, indicate that there is a risk of recoverable injury within approximately 80 m in fish with a swim bladder and approximately 20 m for fish with no swim bladder. These results again align with qualitative guidelines already presented in the ES which consider effects are primarily limited to within tens of metres from the source. The qualitative guidelines presented in the ES consider there to be a moderate risk of a TTS occurring in the nearfield in fish with no swim bladder and	

		fish with a swim bladder that is not involved in hearing and a low risk in the intermediate and far-field. There is a slightly greater risk of TTS in fish where the swim bladder is involved in hearing (e.g., herring). Applying the SEL_{cum} thresholds for piling, as recommended by the MMO/Cefas, indicate that there is a risk of TTS occurring within approximately 700 m in all fish, which broadly correlates with the qualitative guidelines. Overall, the use of the Popper *et al.* (2014) quantitative guidelines for piling does not change the conclusions of the assessment presented in the ES. There is still considered to be a low risk of any injury in fish as a result of the underwater noise generated by dredging. TTS and behavioural responses are anticipated to be relatively localised in scale and, in the context of the estuary width and the unconstrained nature of the location, fish will be able to move away and avoid the source of the noise as required. In summary, the impacts of dredging on fish are still not considered to be significant.	
4.4.19 –	As noted, the MMO has no major concerns with the predictions for marine mammals for	As explained in paragraph 9.2.25 in ES Appendix 9.2 (APP088), the freely available online	The MMO had no concerns or reservations with the predictions for marine mammals for percussive/impact and vibro-piling. However, we maintain that the TTS ranges for dredging are

underwater noise	percussive/impact and vibro-piling. In general, the predictions appear to be relatively conservative in most cases. However, the predictions in Table 16 for dredging and vessel movements look smaller than expected and we recommend checking whether the SELcum over 24 hours has been appropriately assessed. Even if we assume a fleeing receptor then we would still expect larger TTS effect rangers (over part of the estuary) for harbour porpoise, based on a 24-hour exposure period.	spreadsheet tool developed by the United States' regulatory body, the National Oceanic and Atmospheric Administration (NOAA), has been used to predict the range which the weighted NOAA (2018) cumulative SEL acoustic thresholds for PTS and TTS (which are considered the industry standard in the UK) are reached during the proposed dredging and vessel movements associated with the construction and operation of the proposed development. In accordance with the guidance provided in NOAA's user manual (NOAA, 2021) and the instructions included within the user spreadsheet, 'Tab C: Mobile source, non-impulsive, continuous ("safe distance" methodology)' was selected as the most appropriate method to apply for the dredging and vessel activity associated with IERRT. The assumptions and input values to this spreadsheet are set out in Table 15 of Appendix 9.2 of the ES. These have been revisited and checked and the outputs that are reported in the ES are considered to be correct.	small, especially for high-frequency cetaceans. One could argue that in this instance, it may not be appropriate to consider dredging as a moving (mobile) source, given that the dredging activity will be localised. In other words, although the dredging vessel will be moving, it will not travel away from the area (e.g., with 1 m/s or 3.6 km/s as assumed by the model). The MMO do acknowledge however, that animals would not be expected to remain stationary for extended periods of time. Using a different methodology (i.e., a more complex modelling approach) and fleeing animal assumptions, the MMO would predict that there is a very low risk of Permanent Threshold Shift (PTS), but TTS is plausible. We could expect TTS to be in the order of up to 1 km.
4.5.1 – dredge and disposal	A range of conclusions are made in Chapter 8 Water and Sediment Quality. Of the impact pathways identified, all are assessed as either	The MMO's position is noted, and, on that basis, no further response is required.	The Applicant has noted the MMO position that whilst the levels appear sufficiently low for polyaromatic hydrocarbons (PAHs), the 'Gorham-Test *et al*.' (1999; also, in Long et al. 1995; 1998) approach would have provided a better understanding of the

	insignificant or minor adverse, due to the Applicant's conclusion that levels of contaminants within the material to be dredged are sufficiently low. The argument is largely logical, and based on bespoke sediment sampling, though the Applicant could have used the effectsrange approach from Gorham-Test *et al.* (1999; also in Long *et al.* 1995; 1998) to obtain a better understanding of the levels of polycyclic aromatic hydrocarbons (PAHs) within the sediment. The Gorham-Test approach is also part of the proposed Action Levels (pALs) for PAHs as detailed in Mason *et al.,* (2020) to allow interpretation of PAH concentrations in sediments. As such, this approach is not an agreed AL.		levels of these contaminants within the proposed dredge material. This is not an agreed AL and no further response was provided. However as stated in 4.5.2, the MMO disagreed that the levels for PAHs were low or marginally exceeding AL1 when some congeners were up to ten times the AL1. The applicant had also failed to provide data in the MMO excel template for Cefas to be able to extract the data appropriately and accurately for assessment, as only copies of some tabs were captured into a pdf. The applicant response was that the data were provided in Chapter 8 of the ES (App-044), and that the levels of PAHs were compared to the existing AL1 as there is no agreed AL2**.** In the absence of agreed ALs for any determinand Cefas seek to use the best available information to provide a level of risk for the MMO to be able to make a defensible evidenced decision. The recent review of ALs in England undertaken by *Mason et al* (2020) outlines the use of the 'Gorham-Test ***et al****'* to provide an indication of the risk of the levels where AL1 is exceeded.
4.5.2 – dredge and disposal	The ES refers to contaminants as being "relatively low" with samples being below or marginally exceeding their respective action level 1 (AL1) values. The MMO disagree that the levels of PAH are either low or marginally exceed AL1, with various PAH congeners being up to ten times over the AL1. Whilst the applicant has, as previously requested, provided the results in the MMO Results Template, this only comprises a picture copy of each tab of the template pasted into a PDF document. As such, the data must be manually transcribed to be extracted, which is laborious and increases the chance of human error. Due to time constraints for this review,	In Chapter 8 of the Environmental Statement (ES) (APP044), sediment sample concentrations were compared to established Cefas Guideline Action Levels (ALs). However, there is no defined Cefas AL2 for Polycyclic Aromatic Hydrocarbons (PAHs). In accordance with the MMO's comment in their relevant representation, the Gorham-Test has been applied to all sediment samples to analyse PAHs, the results of which are explained below. However, it is important to note that the	See above answer.

	it has not been possible to transcribe all of the PAH data, but, for sample 1, which has been transcribed, see the following results of the Gorham-Test approach in Table 1.	GorhamTest is not an established Cefas AL. For the sum of High Molecular Weight (HMW) PAHs, no samples exceed the Effects Range Median (ERM), and most samples (70%) are below the Effects Range Low (ERL). In considering the sum of Low Molecular Weight (LMW) PAHs, only Sample 1 (at 3 m, 4 m and 4.7 m depth), Sample 6 (2 m depth) and Sample 7 (2 m depth) exceed the ERM. All other samples are below the ERM (90% of samples), and 41% of samples are also below the ERL. It should also be noted that Sample 1, Sample 6 and Sample 7 are located outside of the indicative dredge area[5]. Sediment at these sampling locations will not be dredged and disposed of. Therefore, whilst some isolated areas of sediment contain elevated concentrations of PAHs, this sediment will not be disturbed by the proposed development. Sediment samples within the dredge area contain relatively low concentrations of PAHs with samples being below or	

		marginally exceeding the ERL concentrations.	
4.5.3 – dredge and disposal	In the absence of an agreed AL2 value for PAHs, the Gorham-Test approach has been used, which calculates the sum total of low- (LMW) and highmolecular weight (HMW) PAH content in each sample, then compares these values to observed effect-ranges. If a sum total value is below or around the effects-range low (ERL), then the risk is likely low, whilst if a sum total value is above the effects-range medium (ERM), then the risk is higher. These can, to an extent, be interpreted similarly to Cefas Action levels, but these are not officially agreed ALs.	As above	For PAHs, in the absence of an agreed Cefas AL2, Cefas utilise the Gorham-Test approach (1999; also, in *Long et al*. 1995 and *Long et al*. 1998), which calculates the sum total of low- (LMW) and high- (HMW) molecular weight PAHs and compares these to observed effect-ranges. Total values of the LMW PAHS and total values of the HMW PAHS are calculated and then compared to threshold values. If a total value (for either LMW or HMW selection of PAHs) does not exceed the effects-range low (ERL), the indication is that the sediment in the sample can be considered low risk. If a total value exceeds the effects-range median (ERM) for either the LMW or the HMW total values, it can be considered higher risk, with more likelihood of harm occurring. LMW PAH tend to be acutely toxic and more long term or carcinogenic effects are observed for the HMW PAHs. For this assessment of the chemical contamination the MMO have provided data on two templates. The applicant has argued that this method of assessment is not an established Cefas AL, but that when they applied the Gorham-Test approach to sediment, samples the sum of the HMW PAHs did not exceed the ERM and 70% of samples contained levels of PAHs below the ERL. They noted that samples 1, 6 and 7 were outside of the dredge area and material from these areas would not be included for disposal. The conclusion was that sediment samples within the dredge area therefore contained relatively low concentrations of PAHs as the levels were below or marginally exceeding the ERL threshold. The applicant assessment concluded for LMW PAHs, that only Sample 1 (at 3 m, 4 m and 4.7 m depth), Sample 6 (2 m depth) and Sample 7 (2 m depth) exceed the ERM with all other samples below the ERM (90% of samples), and 41% of samples below the ERL. From figure 1 when sample sites 1, 5 and 6 are excluded there

			are still levels of contaminants which are between the ERL threshold (particularly sit 2 and site 9) and above the ERM threshold (sample site 7 at 2m). As this indicates that some impact may be observed that this type of risk is better described as a moderate or medium risk. However, given the average level of contamination this precludes the disposal of the dredge material to sea. Results plotted for the sum of the HMW PAHs against the ERL and ERM indicate levels of PAHs mostly below the ERL, excluding samples at sites 1, 6 and 7 (which are located outside of the indicative dredge area). indicate on the whole a low risk to the marine environment would be anticipated from the disposal of the dredge material containing these LMW PAHs. We agree with the applicants estimate therefore that the risk from disposal to the material in regard to contamination from LMW PAHs (excluding sites 1, 5 and 6) would likely be low.
4.5.4 – dredge and disposal	Table 1 shows that all but one sample (1m) exceed the ERL for both LMW and HMW PAHs. The results depict a fairly consistent increasing trend as the depth of the samples increases, with sample 3m, 4m and 4.7m exceeding the ERM for LMW PAHs, and becoming closer to the ERM than the ERL for HMW PAHs. This indicates that the deeper material to be dredged (not including the geological material which the corer is unable to penetrate) may hold unacceptable levels of PAHs for disposal at sea. As per previous comments, we have not been able to manually transcribe all of the PAH data for this assessment, however, would be happy to if the Applicant can	As above	See above answer.

	provide the data in an extractable excel format. Without the ability to conduct this assessment, the MMO are unable to agree with the Applicant's conclusions that the levels observed are "low".		
4.5.5 – dredge and disposal	For the other contaminants, the MMO do not hold the same level of concern, and broadly agree that levels of trace metals, organotins, polychlorinated biphenyls, polybrominated diphenyl eithers and organochlorine pesticides are either below or marginally above the AL1 (or, where there is no existing AL1 (such as for PBDEs) that they are below or marginally above their respective pAL1).	The MMO's position is noted, and, on that basis, no further response is required.	The MMO considers that no further action is required.
4.7.1 – marine archaeology	The MMO defers to the Historic England on matters of shipping and navigation. The MMO will continue to be part of the discussions relating to securing any mitigation, monitoring or other conditions.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO agrees that no additional response is required.
4.8.1 – seascape, landscape and visual resources	The MMO defers to Natural England as the SNCB on matters of Seascape, Landscape and Visual Resources. The MMO will continue to be part of the discussions relating to securing any mitigation and monitoring or development of any plans/conditions on this matter. The MMO would also remind the Applicant that the National Association for Areas of Outstanding Natural Beauty should be included in conversations regarding potential	The MMO's position is noted, and, on that basis, no further response is required.	The MMO agrees that no additional response is required.

	impacts to Areas of Outstanding Natural Beauty (AONBs) as they are the Non-Governmental Organisation responsible for them.		
4.9.1 – commercial fisheries	The MMO defers to IFCA as the principle contact on matters related to commercial fishing operation. The MMO will continue to be part of the discussions relating to securing any mitigation related to this field.	The MMO's position is noted, and, on that basis, no further response is required.	The MMO agrees that no additional response is required.
5 – summary	We strongly recommend that the Applicant engage with the MMO throughout the process in order to ensure the assessment is as smooth as possible and agreements can be reached through a Statement of Common Ground.	The Applicant and the MMO continue to engage closely on a Statement of Common Ground.	The MMO look forward to further engagement regarding the Statement of Common Ground.

Table 2: The MMO's response to comments regarding cumulative impacts

Reference	Relevant Representation	Applicant's Response	MMO Response
4.3.2 – coastal processes	The cumulative assessments consider each development pairwise with the IERRT and there is no consideration of the whole system with every development acting together as an ensemble. Entry 1 in Table 20.5 of Chapter 20 identifies the impact of the development on frequency of excess SSC - "requirements for the IERRT indicates an increase of 3-6% on the	As detailed in their application, disposal of capital and maintenance material from Able Marine Energy Park (AMEP) is proposed to use the HU080, HU081, HU082 and HU083 disposal sites, which are around 9-12 km downestuary from the HU056 and HU060 disposal sites planned for IERRT. The modelling undertaken for the IERRT development (Chapter 7 of the Environmental Statement (ES) (APP-043)) shows that any disposal plume from IERRT is not predicted to	The Applicant's interpretation of cumulative assessment differs to the MMOs' and the response reviewed here has made no new assessment. This also seems to be the case for responses on similar comments raised by Natural England on the consequential impacts on habitats and migratory species behaviour.

	existing average annual maintenance dredge (between 2004 and 2020) rate across the existing Immingham berths (or a 2-4% increase on the average annual disposal volume at the HU060 site since 2004)" – but the cumulative assessment simply considers that, since these dredge campaigns are unlikely to be simultaneous with other developments, there is no cumulative impact. The MMO also note that only entry 1 in Table 20.5 appears to discuss the dredge e.g., though a dredge requirement is detailed for the Able Marine Energy Park, the assessment of this development in Table 20.5 does not consider SSC, only the hydrodynamics impact	overlap with any of these other disposal sites, although there is a potential for disposal plumes from each site to overlap, particularly if disposals are undertaken on alternate flood/ebb tides at each site. However, the distance between the sites means that peak SSC increases (associated with the initial disposal activity) would not increase from either of the individually assessed schemes and, whilst some plume overlap could occur, in theory, the dispersal of the plume from the point of release means that the cumulative impact on excess SSC would likely remain below the peak values assessed. Furthermore, any in-combination impact would be shortlived (occurring only during concurrent disposal activities) highly temporary in nature (persisting for only a matter of hours until the peak of the subsequent tidal phase) and significantly smaller in magnitude than the peak SSC concentrations observed in the baseline (in excess of 20,000 mg/l in some cases).	Therefore, the MMO's response remains unchanged to that presented previously. The MMO also note that the related Natural England concerns regarding cumulative assessments on habitats and marine species migration may still require adoption of updated assessment methods and would include the impact of coastal process changes as a contributory factor. In this case, the more detailed assessment of cumulative coastal process impacts is likely to be appear more proportionate.
4.3.3 – coastal processes	Additionally, consideration of the marine process impacts of multiple development sites on hydrodynamics and sediment transport generally considers that that lack of direct overlap of impact zones indicates no potential for cumulative effects, but this neglects the systemic nature of the estuary and the temporal implication of 'cumulative'.		
4.3.4 – coastal processes	Figure 7.6 of Chapter 7 shows both sedimentation and SSC impacts extending several kilometres up and downstream, over and across the (implied) zone of influence of multiple other developments listed in Table 20.5. The overall estuary net sediment budget is estimated in the background information (Table 7.5) but this information is not used in the	As noted in the comments, the sediment budget of the estuary is discussed in Section 7.6 of Chapter 7 of the ES (APP-043) on the baseline characterisation. The assessment of impacts arising from the proposed dredge and disposal operations then identifies that 'the in-estuary disposal of capital and maintenance dredge material (at the HU056 and HU060 sites) thus maintains the sediment as part of the wider estuary sediment budget' (para. 7.8.63 and 7.8.88). In this	

	assessment - no assessment is made of how this budget is affected by the 3-6% increase in maintenance dredge due to this scheme; nor of the relative contribution of this change to the overall (i.e., cumulative) changes effected by the multitude of developments affecting the Humber. The applicant has not presented background data on typical exceedance of mean background suspended sediment concentrations within the estuary.	way, the overall sediment budget is unaffected by the proposed dredge and disposal, which essentially recycles material within the wider estuary system (i.e., no permanent removal of material or long-term loss from the wider system is predicted. A high-level summary of the background variation in SSC is provided in the baseline characterisation (para. 7.6.25). Further detail (in the form of a timeseries plot of measured SSC values from the project survey campaign) is also provided in the model calibration report Appendix 7.1, which shows the frequency of 'spikes' in the baseline concentrations in relation to the more general 'average' trend across the spring/neap period. It is also noted that there remains more than sufficient headroom in the existing (permitted) tonnages stipulated within the present maintenance dredge disposal licence (L/2014/00429/1).	
4.3.5 – coastal processes	The MMO considers that cumulative assessment requires the resulting gradual increase in temporal mean SSC of the estuary to be discussed and quantified. A version of Figure 20.1 should be produced indicating the extent of dredge disposal impacts, with an estimation of the temporal increase in SSC arising from the increased future dredge needs. This may be accompanied by an estimation of the possible sediment sinks arising from the proposed realignment schemes on the opposite bank.	Longer-terms trends in SSC across the wider estuary are uncertain, at best, and will be influenced over a range of temporal scales by a host of factors (including tidal forcing, meteorological effects, future sea-level rise, extreme storm conditions, etc.). The predicted impacts of dredging and disposal of capital and maintenance material at the HU056 and HU060 sites is shown (maximum change in SSC and sedimentation) in Figure 7.6 (of the ES). The excess material in suspension is generally held within a plume in the central channel of the estuary by the dominant ebb and flood flow vectors. As a result, the increased SSC plume remains around 2 km from the proposed Cherry Cobb Regulated Tidal Exchange (RTE) site and around 4 km from the Outstrays to Skeffling Managed Realignment Scheme (OtSMRS); given the anticipated localised hydrodynamic changes arising from each of these	

		schemes, it is considered unlikely that any material deposited at HU056 or HU060 would end up stored in sediment sinks in either of these realignment / RTE sites. Consequently, the proposed dredging and disposal activities from IERRT would have no impact on the wider estuary sediment budget. Placed in the wider estuary context, the combined MR / RTE schemes will not significantly increase the overall estuary tidal prism (	
4.3.6 – coastal processes	As outlined by the Applicant in paragraph 7.6.6 of Chapter 7, estuary processes are very dynamic and interconnected so the estuary is subject to natural morphological change – and a corollary of this is that any changes that might be due to the relatively minor physical process impacts will be very difficult to identify. By the same token, however, systemic change can be precipitated by minor changes amplified by systemic feedbacks. Thus, we consider it necessary for cumulative assessments to map and quantify the extent and magnitudes of impacts over time, as a record of potential impacted zones.	Predicting future change over even relatively short (5-10 years) periods is highly uncertain. As described in Chapter 20 of the ES (APP-056), overall, the predicted impacts from each of the proposed cumulative schemes (in isolation) are small in magnitude and extent. Associated changes to far-field sediment transport pathways are also predicted to be negligible. When considered incombination, the small-scale, localised impacts predicted from each scheme are still significantly smaller than those arising from the inter-annual and medium- to longer-term natural morphological changes across the wider estuary (i.e., those associated with natural migration of banks and channels, the 18.6-yr lunar nodal cycle, climate changeinduced sea level rise and the impact of extreme storm and surge events). The estuary is continuing to respond to the changes since the last glaciation, with the associated equilibrium point not yet reached. These are anticipated to be the drivers of change across the wider estuary over future periods. There is no evidence to suggest the proposed scheme (either alone or in combination with others) has the ability to change the wider morphology or function of the estuary as a whole. For added context to the predicted impacts, tidal exchange on a mean spring tide is in excess of 1.7	

		billion m3 , whilst freshwater input is also significant at around 250 m3 /s (average) up to >1,500 m3 /s during extreme flood events (equating to 22 to 134 million m3 /day).	
4.4.4 – underwater noise	It is recognised that Chapter 20 Cumulative and Incombination Effects, provides an assessment of the potential cumulative effects. There is a lot of other development occurring in the Humber including Immingham Green Energy Terminal development, which is in close spatial proximity to this Project, and there is the potential for the two construction programmes to overlap. The MMO encourages the Applicant to ensure any potential cumulative impacts are assessed and submitted when possible as the project continues.	Chapter 20 of the ES [APP-056] includes a comprehensive cumulative and in-combination assessment. This assessment was based on the information available at the time of submission of the IERRT DCO application, including in respect of the IGET project. At the time of writing, the IGET project DCO application is yet to be submitted, meaning that key information in relation to that project is still at an inchoate stage. Cumulative and in-combination effects will also be assessed (with mitigation proposed if necessary) in the IGET DCO application documentation for which all information will be available. On this basis, the assessment of cumulative and incombination effects is considered robust and remains as set out in the IERRT DCO application documentation, in that cumulative and in-combination effects between IERRT and IGET are assessed as insignificant and do not require further mitigation.	The MMO considers that having appropriate mitigation in place for both projects will help to reduce the risk of potential impacts in terms of cumulative and in-combination effects.

3. MMO Written Representation

The MMO has provided it's written representation at Deadline 1. This constituted Section 5 of our response. The MMO looks forward to reviewing the Applicants and Interested Parties responses to this and will provide responses to any comments as soon as practicable.

4. Update on Statement of Common Ground (SoCG) and Principal Areas of Disagreement (PAD)

The MMO has reviewed the Applicants tracker documents regarding the SoCG (REP1-010) and PAD (REP1-011). The MMO offers the below responses in respect of these documents.

4.1. SoCG

4.1.1. The MMO notes the Applicants assertion that 'Positive discussions ongoing with MMO to settle comments in relevant representations, following which a SoCG will be settled'. The MMO agrees with this position and looks forward to reviewing a draft of the SoCG when the Applicant is in a position to provide us with such a document.

4.2. PAD

4.2.1. The MMO notes the Applicants assertion that 'Positive discussions are ongoing as between the MMO and the Applicant. MMO is confident that issues will be resolved during Examination'. The MMO agrees with this position and is confident that all outstanding matters will be resolved prior to the close of examination.

5. MMO comments on Deadline 1 Documents

The MMO has reviewed several documents submitted at Deadline 1 from the Applicant and Other Interested Parties. Our comments can be found below:

5.1. Written summary of the Applicants Oral submissions at Issue Specific Hearing 1 [REP1-008]

5.1.1. The MMO notes the Applicants point that the Applicants have had regard to the approved 'Tilbury 2' and 'Able Marine Park' DCOs when drafting the current iteration of this DCO. The MMO welcomes this action from the Applicant.

5.1.2. Furthermore, regarding Construction restrictions, the MMO remains in discussions with the Applicant on these matters and has provided its updated position on this matter in Section 2 of this response.

5.1.3. The MMO has provided its position on the current Deemed Marine Licence (DML) in Section 5.8 of this response.

5.2 Written summary of the Applicants Oral submissions at Issue Specific Hearing 2 [REP1-009]

5.2.1. The MMO notes that the Applicants have included the 'signposting document' that was submitted to the MMO for its review as a part of this document response. The MMO is aware that this is an action that was called for by several Interested Parties during the Second Issue Specific Hearing held on 27/07/2023. The MMO considers this action to be appropriate and reminds the ExA that is has already provided its comments on this document in its Deadline 1 submission (REP1-020).

5.2.2. Additionally, the MMO would confirm at this stage that, although it does have regular communications with the Maritime and Coastguard Agency (MCA), 'Navigation' does not technically fall within our statutory remit as an organisation and as such, we would defer to either the MCA or appropriate Harbour Authority as necessary throughout this examination.

5.3 Explanatory Memorandum to the Draft DCO [REP1-006]

5.2.3. The MMO notes that, regarding the DML, the Applicant has stated the following: 'Schedule 3 contains the details of the Deemed Marine Licence, including the conditions applying to the licensable activities, which has been agreed with the MMO'. The MMO would reiterate at this stage that although there have been several positive discussions with the Applicant regarding this document, the finalised DML has not been agreed at this stage. The MMO has provided its full comments on the DML in Section 5.8 of this response.

5.4 MCA Post-ISH1 and ISH2 submissions, including: written submissions of oral cases made during those hearings: and responses to any action points arising from those hearings [REP1-021]

5.4.1. The MMO notes the description of the MCA's role in regard to marine licensing and consenting is to provide advice and guidance to the relevant licensing and consenting regulator regarding the impact of the works and activities on shipping, safe navigation and emergency response for their decision-making purposes. The MMO is aware of this and will continue to seek MCA's advice where necessary.

5.4.2. We also note MCA's point that these works are being undertaken within a Statutory Harbour Authority (SHA) and that it is ABP Humber who have relevant powers under the Harbour Act 1964 (or other) and therefore have ultimate jurisdiction. ABP Humber are responsible for maintaining the safety of navigation during construction and operational phases of the development, and therefore the MCA would not approve a Navigation Risk Assessment (NRA) or undertake a full assessment of the NRA on behalf of a SHA. The MMO thanks MCA for this clarification.

5.4.3. We note that the MCA, within their Relevant Representation attempted to ensure that an agreed NRA would be in place using an appropriate risk assessment methodology, that suitable consultation would be undertaken with Relevant Interested Parties and that the proposals would be carried out in accordance with the Port Marine Safety Code (PMSC). We further note that the MCA is currently content that all of the above has occurred, the MMO welcomes this.

5.4.4. The MMO notes the concerns raised by the MCA regarding points made at ISH2 and urges the Applicant to engage with them to resolve matters prior to the end of Examination.

5.5 Natural England- Principal Areas of Disagreement Summary Statement [REP1-022].

5.5.1 The MMO notes that at this stage, Natural England has six principal areas of disagreement with the Applicants at this stage. The MMO defers to NE on all these matters but hopes they can be resolved prior to the end of examination.

5.6 TR030007-000594-Associated British Ports - Associated British Ports - Draft Development Consent Order 202 – Tracked Changes [REP1-006]

General Point on timeframes

The MMO strongly considers that it is inappropriate to put timeframes on complex technical decisions that the MMO needs to make in the post-consent phase of a DCO being discharged. The time it takes the MMO to make such determinations depends on the quality of the application made, and the complexity of the issues and the amount of consultation the MMO is required to undertake with other organisations to seek resolutions. The MMO's position is that it is inappropriate to apply a strict timeframe to the approvals the MMO is required to give under the conditions of the DML given this would create disparity between licences issued under the DCO process and those issued directly by the MMO, as marine licences issued by the MMO are not subject to set determination periods.

Whilst the MMO acknowledges that the Applicant may wish to create some certainty around when it can expect the MMO to determine any applications for an approval required under the conditions of a licence, and whilst the MMO acknowledges that delays can be problematic for developers and that they can have financial implications, the MMO stresses that it does not delay determining whether to grant or refuse such approvals unnecessarily. The MMO makes these determinations in as timely manner as it is able to do so. The MMO's view is that it is for the developer to ensure that it applies for any such approval in sufficient time as to allow the MMO to properly determine whether to grant or refuse the approval application.

The MMO has reviewed the most recent iteration of the DCO and has some additional comments to offer on the DML contained within Schedule 3. They are as follows:

Part 1- General

5.6.1. Regarding the 'Cold weather piling restriction strategy' condition currently included in the DML, this should be Condition 9, the Applicants currently have this numbered as Condition 8. This should be amended in the next iteration of the DML.

5.6.2. The MMO wishes to remind the Applicant that the MMO has transitioned from using the term 'Licence Holder' to the term 'Undertaker'. The MMO has noted that this phraseology is still being used throughout the document. The MMO urges the Applicant to amend the term 'Licence Holder' to the term 'Undertaker' throughout the DML going forward.

5.6.3. The MMO thank the Applicant for including the definition for 'Vessel', however notes that the definition of 'Named Vessel' has been removed from the DML. We would request clarification as to why this has been removed from the licence and would request that it is instead, retained in the licence.

5.6.4. Regarding the Sediment Sampling Plan (definitions, and amended condition 18-20), we are concerned that the amendments fail to retain the statutory role required by the MMO. We

recognise that a sediment sampling plan was agreed in 2021, however this plan will only remain valid for three years, after which point the Applicant will need to request a new sediment sampling plan from the MMO. The current drafting in conditions 18-20 removes the MMO's regulatory authority in this respect and therefore requires revision to ensure that the process can operate as agreed and in a manner that properly reflects the statutory process. We request that the recent amendments are therefore altered to make this process clear.

5.6.5. In addition, the inclusion of (b) is, as currently drafted, ambiguous. This could be read to indicate that further sediment sampling analyses will automatically be approved. This does not reflect the MMO's statutory role and agreed process. The amendment is not accepted and the Applicant is requested to redraft the provision to properly reflect the statutory process.

5.6.6. Following the above, since there are no additional lines after this definition, it is presumed that 'and' is a typo and the MMO request that this is removed.

5.6.7. Regarding the contact details for the MMO Beverley Office, the MMO can confirm that the new email address included by the Applicant is the correct address.

Part 2- Conditions

5.6.8. **Condition 6(5)-** In the letter of 19th April 2023, the MMO stated that 'we consider this article requires the insertion of a time limit for this notification, so that the MMO is aware of the appropriate agent, contractor or vessel engaging in the licensed activity in question. We suggest the below wording for the Applicant in response to this: *Any changes to details supplied under subparagraph (2) must be notified to the MMO in writing no less than 24 hours prior to the agent, contractor or vessel engaging in the licensed activity in question'.* The MMO notes that this has not been changed. The MMO is requesting again that the Applicant amends this condition in line with the MMO's request.

5.6.9. The MMO note the removal of the construction method statement (previously Condition 7). Therefore, the MMO request that all matters which would have been contained within this are contained within the final Construction Environmental Management Plan and the associated DML condition.

5.6.10. **Condition 12(b)-** The Applicant has concluded this sentence with a semi-colon. Given that this is the end of the condition, the MMO would expect the inclusion of a full stop here, the MMO recommends the Applicant amend this.

5.6.11. **Condition 12(11)(a)-** The Applicant has concluded this sentence with a semi-colon. Given that this is the end of the condition, the MMO would expect the inclusion of a full stop here, the MMO recommends the Applicant amend this.

5.6.12. **Condition 15-** Regarding this condition, the MMO would request that the Applicant revert to the wording of 'coatings or treatments' as opposed to 'coatings/treatments' in the interest of clarity.

5.6.13. **Condition 18(2)-** The MMO considers the wording of the first line of this paragraph to be unclear. Is the inclusion of the word 'as' a mistake, the MMO questions whether this should instead by the word 'is? If not, is there another intended meaning? The MMO would request that the Applicant provide clarity on this matter and amend the condition accordingly.

5.6.14. **Condition 20 (now deleted)-** The MMO understands that the Applicants have now deleted this condition, which prohibits the disposal of dredged material at sea until written approval has been provided by the MMO. The MMO is unsure if this is an appropriate action, can the Applicant please detail to the MMO why this condition was removed from the licence?

5.6.15. **Condition 21-** The MMO welcomes the amendments made to this condition in line with discussions held, however, we note the unusual capitalisation of 'Dropped Object Procedure'. The MMO would suggest the Applicant removes this.

5.6.16. **Condition 22-** The MMO notes that the Applicants have updated this condition extensively in order to meet the request of MMO, the MMO thanks the Applicant for this engagement. However, the MMO queries whether or not the Applicants would consider defining the term 'WGS84' as this has not previously been defined.

Part 3- Procedure for the discharge of conditions

5.6.17. **Condition 24-** The Applicants should capitalise the 'M' in 'Marine written scheme of investigation' as this has not currently been done. The MMO expect this to be amended.

5.6.18. **Condition 27-** The MMO had previously requested that the time stipulation for this condition be extended to 13 weeks so as to match with the current MMO 'Key Performance Indicator' for processing marine licences. The MMO notes that this request has not been undertaken by the Applicant, the MMO requests again that this condition is amended to give a 13-week timeframe for processing to occur.

5.6.19. **Condition 28-** It is unclear to the MMO why this paragraph is necessary, especially drafted so broadly. The Applicant is asked to clarify exactly which anticipatory steps it is necessary to take before the DCO comes into force. Subject to the Applicant's response to this issue, and this being acceptable to the MMO, the MMO will require the Applicant to make these steps explicit in any drafting, in order to avoid any confusion and ambiguity which may undermine the MMO's regulatory role.

[redacted]

Jack Coe
Marine Licensing Case Officer

D [redacted]

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