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Immingham Green Energy Terminal
Project Case Team
Planning Inspectorate

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MMO Reference: DCO/2022/00012
Planning Inspectorate Reference: TR030008

4 December 2023

Dear Sir or Madame,

Planning Act 2008, AECOM, Proposed Immingham Green Energy Terminal Development Consent Order

This document comprises the Marine Management Organisation's ("MMO") initial comments in respect of the above Development Consent Order application ("DCO Application") in the form of a relevant representation.

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

The MMO's role in Nationally Significant Infrastructure Projects (NSIPs)

The MMO was established by the Marine and Coastal Access Act 2009 (the "2009 Act") to make a contribution to sustainable development in the marine area and to promote clean, healthy, safe, productive and biologically diverse oceans and seas.

The responsibilities of the MMO include the licensing of construction works, deposits and removals in English inshore and offshore waters and for Northern Ireland offshore waters by way of a marine licence. Inshore waters include any area which is submerged at mean high water spring ("MHWS") tide. They also include the waters of every estuary, river or channel where the tide flows at MHWS tide. Waters in areas which are closed permanently or intermittently by a lock or other artificial means against the regular action of the tide are included, where seawater flows into or out from the area.

In the case of NSIPs, the Planning Act 2008 (the "2008 Act") enables DCO's for projects which affect the marine environment to include provisions which deem marine licences. As a prescribed consultee under the 2008 Act, the MMO advises developers during pre-application on those aspects of a project that may have an impact on the marine area or those who use it. In addition to considering the impacts of any construction, deposit or removal within the marine area, this also includes assessing any risks to human health,

other legitimate uses of the sea and any potential impacts on the marine environment from terrestrial works.

Where a marine licence is deemed within a DCO, the MMO is the delivery body responsible for post-consent monitoring, variation, enforcement and revocation of provisions relating to the marine environment. As such, the MMO has a keen interest in ensuring that provisions drafted in a deemed marine licence ("DML") enable the MMO to fulfil these obligations.

Further information on licensable activities can be found on the MMO's website here. Further information on the interaction between the Planning Inspectorate and the MMO can be found in our joint advice note 11 Annex B here.

Relevant Representation

On the 25 October 2023 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 a DCO Application (MMO ref: DCO/2022/00012; PINS ref: TR030008) for the Immingham Green Energy Terminal.

The DCO Application includes a draft development consent order (the "DCO") and an Environmental Statement (the "ES"). The draft DCO includes, at Schedule 3, a draft Deemed Consent under Part 4 (Marine Licensing) of the Marine and Coastal Access Act 2009 ("Deemed Marine Licence" (DML)), this can be found in Schedule 3.

The DCO Application seeks authorisation for the construction, operation and maintenance of a multi-user liquid bulk terminal which would be located on the eastern side of the Port of Immingham ("the Port"), as well as associated development (collectively termed "the Project"). The associated development would comprise the construction and operation of a green hydrogen facility and landside works for the production of green hydrogen from imported green ammonia on site.

Please find the MMO comments below.

Yours faithfully/sincerely

[redacted]

Phillipa Koomson
Marine Licensing Case Officer

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Contents

1. The Proposed Development

The Applicant intends to construct Immingham Green Energy Terminal (IGET) to facilitate the import and export of bulk liquids associated with the energy sector. The project will be located east of the Port of Immingham, on the south bank of the Humber Estuary in north-east Lincolnshire. The project will be used for the import of ammonia (to be converted into green hydrogen, and carbon dioxide (CO_2), to facilitate carbon capture and storage, both of which will assist in the UK's transition towards net zero.

The proposed marine infrastructure will include a terminal for liquid bulks comprising:

- A 1,200 metre (m) long jetty, including a loading platform, associated dolphins, fenders and walkways, topside infrastructure but not limited to control rooms, marine loading arms, pipe-racks, pipelines and other infrastructure.
- A single berth, with a berthing pocket with a depth of up to 14.5m below chart datum to support large (with a draught up to 12.8m) and small vessels.
- Landside related infrastructure including, but not limited to, a jetty access ramp, a flood defence access ramp and works to raise the seawall locally under the jetty access ramp.

2. General Comments

2.1.1. Overall, the MMO considers the DML to be of a reasonable quality. However, we do have some comments to make in relation to the main DCO, specifically article 46 and 62, as well as the DML where we have some small clarifications and requests for further information.

2.1.2. As mentioned in point 3.2.5 below, the MMO notes that the term 'licence holder' has been used throughout the DML. The MMO has moved away from this term and instead request that the term 'undertaker' is used to replace this.

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

3.1. MMO comments on main DCO – Part 5 Miscellaneous and general

Provision 46 Benefits of the Order

3.1.1. There are a number of provisions in this section which could apply to the MMO. However, the MMO cannot accept any restrictions of the operation of our statutory powers. Section 72(7)(a) of the Marine and Coastal Access Act (MCAA) already permits a licence holder to make an application for a marine licence to be transferred, and where such an application is approved for the MMO to then vary the licence accordingly (s. 72(7)(b)). This power should be retained and used in relation to the DML granted under the DCO. Any attempt to create a parallel or hybrid transfer regime in its place should be strongly resisted as it creates legal uncertainty and undermines the MMO's statutory powers. For this reason the following additional wording should be added:
"(8) For the avoidance of doubt sections 72(7) and (8) of the 2009 Act shall continue to apply to all parts of the deemed marine licence".

Provision 62 Arbitration

3.1.2. The DML states **"***Subject to article 63 (procedure regarding certain approvals, etc.) and except where otherwise expressly provided for in this Order or unless otherwise agreed between the parties, any difference under any provision of this Order must be referred to and settled in arbitration in accordance with the rules set out in Schedule 16 (arbitration rules) of this Order, by a single arbitrator to be agreed between the parties, within 14 days of receipt of the notice of arbitration, or if the parties fail to agree within the time period stipulated, to be appointed on the application of either party (after giving notice in writing to the other) by the Secretary of State***".**

3.1.3. An exclusion should be provided here to ensure that the MMO is not bound by arbitration provisions. Therefore the following should be added:

(2) For the avoidance of doubt, any matter for which the consent or approval of the Secretary of State or the MMO is required under any provision of this Order is not to be subject to arbitration.

3.2. MMO comments on Schedule 3, Part 1

3.2.1. With regards to par 1 “capital dredge”, the MMO considers that this definition should be updated to: *“capital dredge” means the dredging to a depth not previously dredged, or to a depth not dredged within the last 10 years and is generally undertaken to create or deepen navigational channels, berths or to remove material deemed unsuitable for the foundation of a construction project and “capital dredging” shall be construed accordingly”*

3.2.2. With regards to the part 1 ‘*consolidated*’ *“dredged materials include glacial clay with a diameter of less than 31.25 micrometres and gravel with a diameter of at least 2 and less than 64 millimetres;”* The MMO would suggest amending as follows:

“consolidated dredged materials” means materials including glacial clay with a diameter of less than 31.25 micrometres and gravel with a diameter of at least 2 and less than 64 millimetres;

3.2.3. With regards to part 1 ‘*the environmental statement’* -the MMO suggests removing ‘the’ for consistency with other definitions, e.g. “environmental statement means […]”.

The MMO notes that there is no further details about what this is intended to contain, either in the DCO or the DML. Therefore, further details would be helpful here to aid interpretation of the DML.

3.2.4. The MMO notes that the following terms are included in Part 2 Conditions, however are not currently defined in Part 1: Environment Agency, Health and Safety Executive, Historic England and Natural England. The MMO requests that these are defined.

3.2.5. With regards to part 1 ‘*licence holder’ “means has the meaning given to “undertaker” in article 2 (interpretation) of the Order and any agent, contractor or sub- contractor acting on its behalf;”*

i) The MMO suggest that ‘means’ is removed.
ii) The MMO has moved away from the phrase ‘licence holder’ and consider that the term ‘undertaker’ should be used here and throughout the DML.
iii) This definition includes agent, contractor and sub-contractors of the undertaker, which therefore conflicts with conditions 7(3), 10(1), 14(1), 14(2), 15(1)(b), 25(1)(d) and 25(4). It is strongly recommended that the reference to agents, contractors and subcontracts is removed from this definition to avoid confusion in these later clauses e.g. “undertaker” means Associated British Ports with company number ZC000195 and registered at 25 Bedford Street, London, WC2E 9ES”;

3.2.6. With regards to part 1 *‘marine written scheme of investigations’* the MMO request that more detail be added to this definition, including whether this is an outline document or not. If so, this should be amended to “outline marine wrriten scheme of investigation”.

3.2.7. With regards to part 1 *‘sediment sampling’ “means the document of that name identified in the table at Schedule 15 (documents and plans to be certified) of the Order and which has been certified by the 62 Secretary of State as the sediment sampling plan for the purposes of the Order and any consequent approval by the MMO of sediment sampling analyses;”* – The MMO requires a more detailed definition, for example:

The SSP must include, but is not limited to—

(a) location of the area to be dredged;

(b) name of the disposal site;

(c) details of the material type proposed for dredging and disposal;

(d) volume of the material proposed for dredge and disposal;

(e) type and dredging methodology (including whether it is a capital dredge or maintenance dredge, dredge depth and proposed programme for the dredge and disposal activities);

(f) the location and depth of any supporting samples; and

(g) analysis results which must not exceed 3 years in age."

3.2.8. With regards to part 1 *"unconsolidated" "dredged materials include alluvial sand with a diameter of at least 62.5 micrometres and less than two millimetres, alluvial silt with a diameter of at least 31.25 and less than 62.5 micrometres and gravel with a diameter of at least 2 and less than 64 millimetres;"* – The MMO suggests amending as follows:

"unconsolidated dredged materials" means materials including alluvial sand with a diameter of at least 62.5 micrometres and less than two millimetres, alluvial silt with a diameter of at least 31.25 and less than 62.5 micrometres and gravel with a diameter of at least 2 and less than 64 millimetres;

3.2.9. With regards to part 1 (7) '*Notifications regarding licensed activity' 7(6) Any changes to details supplied under sub paragraph (2) must be notified to the MMO in writing prior to the agent, contractor or vessel engaging in the licenced activity in question.* – The MMO advises that the timeframe for notifications under 7(2)(b) is 24 hours, and we would consider also including a similar time frame for this (e.g. within 24 hours). Therefore, MMO suggests the wording is updated to the following:

7(6) Any changes to details supplied under sub paragraph (2) must be notified to the MMO in writing no less than 24 hours prior to the agent, contractor or vessel engaging in the licenced activity in question.

3.3. MMO comments on Schedule 3, Part 2 – Conditions applying to all licensable activities

3.3.1. Condition 8.—(1) Construction environmental management plan

i) The MMO request further clarity regarding the interrelation between the outline and final construction environmental management plan (CEMP). For example, its welcomed that consultation with the MMO is required on the CEMP. However, the MMO requests clarity on whether there is a CEMP or an outline CEMP at this stage.

j) As with the Cold Weather construction restriction (11), the MMO requests that more detail is included in this provision, for example what it will contain.

3.3.2. The MMO has comments surrounding Condition 9 Sediment Sampling and Condition 20(1) Disposal at Sea. However, the MMO is currently reviewing these in line with other developmetns and will provide further comments at a later stage.

3.3.3. Condition 10 Agents/contractors/sub-contractors – The MMO advises that if this paragraph remains, reference to agents/contractors and sub-contracts should be removed from the definition of licence holder.

3.3.4. Condition 20(2) - The MMO advises that the following should be added to this wording: "[…] approved in writing by the MMO".

3.3.5. The MMO suggests an additional paragraph should be added at the end of condition (20):

With respect to any provision of this Schedule which requires the licensed activities to be carried out in accordance with documents, strategies, information, plans, protocols or statements approved by the MMO prior to or under this licence, the documents, strategies, information, plans, protocols or statements so approved are taken to include amendments approved in writing by the MMO subsequent to the first approval of those documents, strategies, information, plans, protocols or statements provided it has been demonstrated to the satisfaction of the MMO that the subject matter of the relevant amendments does not give rise to any materially new or materially different environmental effects to those assessed in the environmental statement or in any updated environmental information supplied under the 2017 Regulations. (2) When any approval or agreement is required of, or with, the MMO pursuant to this Schedule such approval or agreement must not be given if it would give rise to any materially new or materially different significant effects on the environment that have not been assessed in the environmental statement or in any updated environmental information supplied under the 2017 Regulations.

3.3.6. The MMO recommends that the following paragraph should also be added to ensure that any changes to the plans, protocols, or statements that were originally approved under the license must be approved in writing by the MMO:

"With respect to any condition which requires the licenced activities to be carried out in accordance with the plans, protocols or statements approved under this licence. The plans, protocols and statements so approved are taken to include amendments that may be approved in writing by the MMO subsequent to the first approval of those plans, protocols or statements provided it has been demonstrated to the satisfaction of the MMO that the subsequent matter of the relevant amendments do not give rise to any materially new or materially different environmental effects to those assessed in the environmental information"

3.4. Schedule 14 Protective Provisions: MMO comments on Part 1 for the Protection of the Humber Conservancy Commissioners

3.4.1. The MMO notes that there are inconsistensies in terminology across the DCO which differs from the River Humber used in the DML. The MMO suggests that there is consistency throughout the DML.

4. Environmental Statement (ES)

4.1. Coastal Processes

4.1.1. The ES effectively considers physical processes as a pathway to impact rather than a receptor category. The four pathways assessed in Chapter 16: Hydrodynamics, Sediment transport, Plume dispersion, and Waves encompass the potential effects of physical processes. While not explicitly listed as receptors, paragraph 16.1.3 of the ES identifies specific features of interest for the assessment, including the local coastline, nearshore sandbank and channels, berths, and jetty infrastructure. This approach is appropriate and comprehensive.

4.1.2. The assessment concludes that all physical process effects are expected to be low or negligible significance. This conclusion appears to be well-supported by the evidence presented. Paragraphs 4.1.5 to 4.1.7 of this document provide a minor caveat regarding potential impacts on sediment transport, but overall, the assessment is sound.

4.1.3. Paragraph 2.3.24 of the ES seemingly defines as (marine) ecological receptors everything within the marine site boundary (being within the boundary of the Humber Estuary European Marine Site, a statutory designated site that encompasses the Humber Estuary Special Protection Area (SPA), Special Area of Conservation (SAC), RAMSAR and Site of Special Scientific Interest (SSSI) designations). No specific physical process receptors are defined. Paragraph 2.4.1 identifies that *"the proposed alignment, length and pile density of the jetty … define a preliminary design which minimises the impacts on the habitats of the Humber Estuary",* as determined by physical process modelling, hence that physical processes are the pathway to ecological impact. This is a reasonable approach.

4.1.4. The principal evidence for the assessment of hydrodynamic and sediment transport effects is numerical modeling, supported by conceptual analysis (paragraph 16.1.7). The modeling is underpinned by evidence listed in paragraph 16.1.6, including a geophysical survey report, hydrodynamic survey report, and numerical model calibration report. The MMO concurs that this evidence is appropriate for the assessment.

4.1.5. The Applicant has addressed previous coastal process advisory comments made on the PEIR (Table 16-1), which suggested brief analyses to strengthen confidence in the underlying modelling. The Applicant indicates in Table 16-1 that an 'additional review' of model performance is provided in Appendix 16.A (model calibration), including a focus on natural 'excess suspended sediment concentration (SSC) events'. However, Appendix 16.A does not contain any specific mention of excess SSC events. Instead, it presents an analysis of event definition for application in modeling, but does not address the implications of model representation of the event for interpreting the impact assessments.

4.1.6. Plate 22 suggests that wave height peaks and periods are generally underpredicted over the calibration period. Plate 21 suggests that measured SSC is reliably higher than modeled, and Tables 9/10 suggest actual sediment deposition rates are generally higher than modeled - modeled rates generally reflect the minimum measured deposition rates. Altogether, these observations could imply that the modeling is not fully representative of potential 'worst-case' hydrodynamic and sedimentological impacts. Despite these observations, the Applicant maintains throughout Appendix 16.A that it considers model performance to be adequate for the assessment, based on their target accuracy. The MMO does not dispute this, as these models cannot be expected to reproduce observed measurements exactly.

4.1.7. The Applicant has referred to their modeling scenarios for both construction and operations as 'worst-case' based on the assumption that all elements of the infrastructure and berth would be in place simultaneously. However, given the observations noted in paragraph 4.1.6 above, MMO in consultation with Cefas questions whether the results of numerical modeling can be considered definitive 'worst-case' outcomes. The Applicant does claim this for the results of modeled bed elevation changes (paragraph 16.8.53), but has not provided a specific explanation of how this interpretation is supported by the modeling calibration, as suggested in Table 16-1. Nevertheless, the Humber Estuary is already a dynamic and highly-developed location, and it is possible to gauge the importance of the observed modeling inaccuracies by comparison with adjacent existing facilities. The baseline data does not suggest that the modelling inaccuracies risk further meaningful degradation of the state of the marine environment. Therefore, MMO concludes that the risk, if it were that the modeling data do not represent absolute worst-case outcomes, is minimal.

4.1.8. The MMO is content that the modelling process in paragraphs 16.1.7-10 is appropriate and consistent with similar projects.

4.1.9. Cumulative and in-combination effects are addressed in a separate dedicated Chapter 25, which primarily focuses on the defined ecological receptors. However, the nature of the modelling for impacts on sediment transport effectively serves as a form of in-combination physical process assessment.

4.1.10. The MMO considers that the physical process combinations (Tables 25-6, 25-7) and, consequently, the associated pathways to ecological impacts, are described in a reasonable manner in these assessments.

4.1.11. The cumulative effects assessment identifies developments such as Able Marine Energy Park, Immingham RO-RO, and rock revetment repairs as having relevant marine impacts (Table 25-9). However, no cumulative impacts are assessed as the footprints of process changes associated with these developments are sufficiently spatially separated. This appears to be a reasonable conclusion.

4.1.12. Previous MMO comments during Statutory consultation (January 2023) suggested a broader approach to the current standard cumulative assessment. However, the Applicant has not adopted this suggestion (as addressed in Table 25-1). Since this does not materially affect the impact assessment, MMO does not consider it necessary to pursue this matter further.

4.1.13. The MMO has identified no significant information gaps in the assessment, aside from the minor points raised in paragraphs 4.1.5-4.1.7 of this document. Given that all physical process effects are anticipated to be minimal or negligible, no mitigation measures are proposed (paragraph 16.9.1). The MMO concurs with this approach.

4.1.14. Previous advice identified numerical justification for the reliability of the physical process modelling as the primary area of potential weakness for this assessment, since the scope of the modelling and the subsequent application of the data/results in impact assessments was considered comprehensive. The Applicant has addressed these comments in Appendices16.A and 16.C.

4.1.15. The coastal process assessment presented in this document is comprehensive and detailed. A few minor points have been raised regarding the modeling of sediment plume and transport impacts. However, these concerns are not considered significant for coastal processes systems.

4.2. Dredge and Disposal

4.2.1. The Applicant has concluded that the impacts associated with dredging and disposal will be minor adverse and not significant.

4.2.2. Alterations in dissolved oxygen concentraions resulting from the dredging and piling operations are anticipated to be temporary, and the Humber estuary is expected to be able to adapt to the change. The justification for this conclusion is that the Humber, despite the extensive maintenance dredging that has been conducted throughout the river for many years, already has generally high dissolved oxygen concentrations compared to other rivers. Additionally, they assert that the material's coarse composition and the use of a backhoe (rather than a method like trailer suction, which can cause greater sediment disturbance) further reduce the likelihood of suspended sediment concentrations leading to decreased dissolved oxygen levels.

4.2.3. Overall, the MMO considers the argument's logic sound: coarser material is less likely to remain in suspension than finer material and therefore has a lower potential to increase water column turbidity. Although the argument is logical, it does not appear to be particularly relevant for this application given that the particle size data show that only four samples contain less than 20% gravel, with all other samples being mostly sand or mostly silt (approximately half and half). Ultimately, the volume of material to be dredged is significantly lower than what is typically dredged for maintenance purposes on the river (the various maintenance licenses throughout the Humber remove large volumes of material each year).

4.2.4. Changes in water quality caused by the disturbance of sediment-bound contaminants are also considered to be minor adverse and not significant. The report concludes that any changes to contaminant status would primarily involve a "worse failure" for contaminants such as Polybrominated Diphenyl Ethers (PBDEs) and certain Poly Aromatic Hydrocarbons (PAHs), but that the rise in contaminant levels would be insignificant and short-lived. They make reference to the SediChem tool developed by APEM to predict changes in water quality, which takes sediment contaminant data and applies various parameters (net flow rate, maximum suspended sediment

concentration, worst-case partition coefficients). The findings of this evaluation indicate a minimal increase in contaminant status.

4.2.5. When considering the contaminants tested for in the sediments, it is unsurprising that the predicted change would be low, given that many of the contaminants tested for (PAHs, Poly Chlorinated Biphenyls, Organochlorine Pesticides) are hydrophobic and are well-documented (e.g., in the literature, and by the European Chemicals Agency) to have high octanol-water partition coefficients . In this respect, MMO would agree with the Applicant's conclusions, but would defer further comment to the Environment Agency given their remit over designated water bodies.

4.2.6. The redistribution of sediment-bound contaminants is also considered to be minor adverse and not significant. The Applicant basis this conclusion on the low levels of contaminants in the sediment data. No quantitative assessment is made to support this determination.

4.2.7. It would have been better if the Applicant had attempted some comparison of the sediment results to the contaminant status of the surrounding area and/or impact zone(s). The mode of action for this impact pathway is whether the activity will result in higher contaminant levels in the surrounding environment – similar to the Applicant's assessment of impacts to water quality, however different in that it would be broader than just considering changes to water quality.

4.2.8. Existing contaminants levels can be informed by sediment datasets in the surrounding area. For example, ABP Immingham hold several licences permitting maintenance dredging in the area, for which various sediment data exist. Data for licences L/2014/00429/5 and L/2014/00430/4 for example indicate levels of trace metals and certain organic contaminants to be broadly around or slightly above Cefas Action Level 1 (AL1) Overall, we would consider that the levels observed within the sediment sampling for the present application are broadly consistent with those observed in other sediment sampling in the area.

4.2.9. The application will require the disposal at sea of dredged material. The contaminant levels observed are either below or slightly above AL1 for most contaminants (where an AL exists). The metals, organotins, PCB and OCP results are all much closer to their AL1 levels than their AL2 levels, and as such they do not preclude material from disposal at sea. For PAHs, most PAH congeners are below AL1 in most samples, however there are notable elevations above AL1 in samples 4 and 5. In absence of a defined AL2 for PAHs, 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. Neither sample (4 and 5) exceed the effect-range median (ERM) for either PAH group, although the LMW PAHs are closer to the ERM than the ERL. However, overall the MMO in consultation with Cefas does not consider that these levels should preclude the material from

disposal at sea as they appear largely consistent with other sediment contaminant data (as per those referenced in point 4.2.7).

4.2.10. The evidence to support this application comprises bespoke marine sediment sampling which the Applicant states is in line with pre-application sampling advice under SAM/2022/00106. This appears to be a typo, as according to MMO records – verified by consulting MCMS/the Public Register – SAM/2022/00106 refers to an application for Fawley Power Station, whereas the sample plan advice for the present application appears to be SAM/2022/00110.

4.2.11. The sampling conducted comprises samples taken from eight stations at a range of depths (0m – 2.9m) which were analysed for trace metals, organotins, PAHs, total hydrocarbon content (THC), PCBs, OCPs, total organic carbon (TOC) and particle size analysis (PSA).

4.2.12. The sampling conducted adheres to that recommended under SAM/2022/00110, however, we have not been able to determine from the documents reviewed which laboratory conducted the analyses. This should be clarified before a determination is made as it could impact the confidence which should be ascribed to the data. Given the experience that ABP have with marine licence applications, the MMO are fairly confident that the laboratory will have been validated by the MMO, however this cannot be assumed without substantiation for the purposes of decision-making. Therefore a completed MMO contaminant analysis template should be provided indicating the laboratory that undertook each analyses. Especially given that the application involves disposal at sea, for which xls submission of sediment data is essential to facilitate reporting.

4.2.13. Cumulative effects are discussed in Chapter 27. The assessment put forward appears comprehensive from a dredge and disposal remit.

4.2.14. The MMO does not consider any mitigation to be necessary at this time in regards to dredge and disposal, however this is not final until the contracting laboratory has been confirmed.

4.3. Benthic ecology

4.3.1. The MMO concurs that the impacts of *"direct changes to benthic habitats and species as a result of sediment deposition"* and *"changes in water and sediment quality"* resulting from marine piling are highly localized and will lead to temporary and small-scale alterations in suspended sediment levels. Benthic species and habitats are not anticipated to be sensitive to these potential effects.

4.3.2. The MMO agrees that the likelihood of accidental spills during piling activities will be effectively mitigated through adherence to established protocols and guidance. Consequently, these potential impacts can be scoped out from further assessment.

4.3.3. The MMO is content that Chapter 2 of the ES provides a clear description of the project. Furthermore, the appropriate receptors have been scoped in. Table 9-17 of the ES includes appropriate potential impacts from relevant activities on benthic habitats and species. These impacts include the direct and indirect loss of, or changes in, habitat and species because of piling, capital dredge and dredge disposal activities

and the impacts of underwater noise and introduction and spread of invasive non-native species (INSS). The MMO particularly welcomes the inclusion of consideration of the potential for non-natives to colonise piles and other structures in Section 9.8 of the ES.

4.3.4. The MMO is content that appropriate evidence base has been used in the assessment of benthic ecology receptors and is informed by the subtidal grab sampling survey undertaken on the 1 July 2022.

4.3.5. Chapter 25 of the ES discusses the cumulative and in-combination effects on benthic ecology receptors because of the proposed development and Tables 25-10 and 25-11 contain a summary of significant in-combination and cumulative effects. The potential in-combination and cumulative effects on benthic habitats and species, for both construction and operation phases of the proposed development, were assessed as “minor adverse (Not significant)” and the MMO agrees with this conclusion.

4.3.6. Table 9-22 of Chapter 9 of the ES includes a summary of the potential impacts to benthic ecology receptors, mitigation measures and residual adverse effects. Mitigation measures specific to benthic ecology receptors have not been proposed for the operation phase of the proposed development and the MMO agrees with this conclusion.

4.3.7. The mitigation measure proposed to limit *“changes to benthic habitats and species as a result of sediment deposition during dredging and dredge disposal”* involves targeting disposal geographically to avoid depth reductions. This will also act to limit the direct impact to the benthic assemblage within the disposal area and the MMO agrees with this mitigation.

4.3.8. The mitigation to reduce the introduction and spread of non-native species includes relevant and widely accepted biosecurity control measures and the MMO agrees with these mitigation measures.

4.3.9. In summary, the MMO considers that ABP have submitted the ES in support of the construction of the proposed Immingham Green Energy Terminal which contains relevant information regarding benthic ecology receptors, and the MMO offers no comment that requires further information from the Applicant.

4.4. Fish ecology

4.4.1. The MMO has reviewed the relevant receptors scoped in and out of the assessment, as presented in Table 9-17 of Chapter 9 . The MMO is content with the Applicant's decision to scope out the following impact pathways for fish:

i. Direct loss or changes to fish populations and habitat during marine piling.

Justification: The direct footprint of the marine piling only covers a highly localized area, and the mobile nature of fish allows them to utilize nearby areas.

ii. Indirect changes to seabed habitats for fish during marine piling, capital dredging, and dredge disposal.

Justification: Potential effects resulting in changes to hydrodynamic and sedimentary processes are predicted to be negligible and highly localised and will cause no direct changes to fish habitat.

iii. Changes in water and sediment quality during marine piling.

Justification: Temporary changes in suspended sediment levels and related changes in sediment-bound contaminants and dissolved oxygen associated with bed disturbance during marine piling are expected to be highly localized and temporary, so they are considered highly unlikely to produce adverse effects on any fish species. The potential for accidental spills will also be negligible during construction through following established industry guidance and protocols.

4.4.2. The MMO is content with the Applicant's decision to scope these impacts out of the assessment. All other impact pathways have been scoped into the assessment for fish, which is appropriate.

4.4.3. The MMO has considered the Applicant's justification for scoping out these impact pathways and agrees that they are appropriate. The MMO is satisfied that the Applicant has taken a precautionary approach to the assessment of impacts on fish and that all other relevant impact pathways have been scoped into the assessment.

4.4.4. The evidence base used to characterise the IGET study area is appropriate. Fisheries survey data collected for the Humber Sea Terminal and Port of Immingham projects, and by the Environment Agency at Foulholme Sands and Burcom as part of their TraC fish Monitoring, have been used to inform the characterisation, with all survey sites were located within 5km of the IGET site. Other general publications that describe fish populations in the Humber have also been used to inform the characterisation.

4.4.5. The Applicant has used the hearing threshold guidelines from Popper et al. (2014) to inform the underwater noise (UWN) impact assessment and predict the range of effect from noise and vibration on fish, which the MMO finds appropriate.

4.4.6. The MMO finds that the evidence used to characterise the environment for fish in the Humber and to inform the EIA is appropriate and similar to that used for licence applications of a similar nature and size.

4.4.7. The following mitigation measures for fish have been proposed by the Applicant:

i. Soft-start procedures on commencement of piling, in accordance with Joint Nature Conservation Committee (JNCC, 2010) marine piling protocol.
ii. Use vibro piling where possible - approximately 60 minutes of vibro-piling per 12-hour shift.
iii. Nighttime working restriction - piling will occur between 07:00 to 19:00 in the winter months and sunrise to sunset in the summer months.
iv. Seasonal marine piling restrictions.

4.4.8. The MMO supports the use of soft-start procedures when piling (Paragraph 4.4.7 i) as this will allow marine receptors to move away from the source of disturbance and avoid auditory injury.

4.4.9. Vibro piling will be used where possible (paragraph 4.4.7 ii) which the MMO also supports as energy levels emitted for this form of piling are generally lower and thus

are less likely to cause auditory injury. However, the predicted duration of vibro piling per 12-hour shift is considerably lower than that of impact piling.

4.4.10. The MMO seeks clarification regarding the Applicant's proposed restrictions on nighttime piling (Paragraph 4.4.7 iii). In Section 9.8.153, the Applicant asserts that: *"Marine piling activities will take place between 07:00 and 19:00 during the winter months and from sunrise to sunset during the summer months. This approach has the potential to disproportionately impact fish species that migrate during daylight hours, while simultaneously reducing potential exposure for fish species that predominantly migrate during nighttime hours (e.g., river lamprey and glass eel)."*

However, in Section 9.9.5, the Applicant states:
'*During the periods 1 March to 31 March, 1 June to 30 June and 1 August to 31 October inclusive, piling will be restricted at night. Specifically, no percussive piling will be undertaken from 19:00 to 07:00 in March, September and October and between sunset and sunrise in June and August*'.

4.4.11. The MMO recommends that no marine piling of any kind be permitted at night throughout the year, particularly considering the proposed extended duration of construction and dredging activities proposed. While a nighttime piling restriction would be most beneficial to nocturnal receptors, it would also provide a continuous period of respite for all marine receptors affected by the IGET works and other developments currently in the planning stages. Therefore, the MMO proposes that the Applicant's commitment to prohibit nighttime piling be incorporated into the DML as follows:

Condition: No marine piling of any kind is to be carried out between the hours of 07:00 and 19:00 during winter months* and from sunrise to sunset during summer months*.

The MMO requests that these timeframes be defined by the Applicant.

4.4.12. Regarding the mitigation measures outlined in paragraph 4.4.7 iv, the Applicant has proposed the following temporal piling restrictions:

i. No percussive marine piling is to occur within the waterbody between April 1 and May 31 inclusive of any calendar year. This restriction aims to minimise the potential impact on the largest number of migratory fish species in the Humber Estuary, aligning with the periods identified in Table 9-16, and additionally safeguarding the more vulnerable early life stages of several migratory fish species.

ii. The duration of percussive marine piling within the waterbody is to be restricted from June 1 to June 30 and from August 1 to October 31 inclusive of any year to minimise the impacts on fish migrating through the Humber Estuary during this period, such as silver eels, river lamprey, and returning adult Atlantic salmon. The maximum allowable percussive marine piling time within any four-week period must not exceed 140 hours when a single marine piling rig is in operation or a total of 196 hours when two rigs are in operation (assuming that up to two marine piling rigs could be pile driving simultaneously). The measurement of time during each work-block described above must commence at the beginning of each

timeframe, continue throughout, and cease at the end, where measurement will resume at the start of the next timeframe. This process will be repeated until the completion of marine piling works.

4.4.13. In response to paragraph 4.4.12 i, the MMO supports the proposed percussive piling restriction between April 1 and May 31 (inclusive) and concurs that this measure will minimise potential impacts on the largest number of migratory fish species in the Humber Estuary, including those in early life stages. However, it is important to acknowledge that this restriction only covers a portion of the salmon smolt downstream migration, which typically occurs from April to June (inclusive). Please refer to paragraph 4.4.14 i for further comments regarding smolts.

4.4.14. The MMO objects to the Applicant's proposal to limit piling duration to 140 hours (single rig) or 196 hours (two rigs) from June 1 to June 30 and August 1 to October 31 for the following reasons:

i. Salmon smolts are known to employ selective ebb-tide stream transport, migrating in the upper water column and within the fastest-flowing section of the water channel (Moore et al., 1995; Lacroix et al., 2004). Consequently, smolts migrating downstream during June are likely to be located in the main channel and susceptible to the effects of underwater noise. Limiting piling by the number of hours per day fails to account for the tidal state that smolts will utilise for downstream migration during June. In other words, if piling occurs in the month of June during an ebbing tide, there is a potential for an "acoustic barrier" to obstruct the downstream migration of smolts.

ii. The Applicant intends to conduct impact piling over approximately 343 days, working 7 days per week. They will utilise up to 2 rigs, operating for up to 270 minutes (4.5 hours) per 12-hour shift. Assuming the "worst-case" scenario of 4.5 hours of percussive piling per day, this translates to 126 hours of piling over a 4-week period. The MMO acknowledges that a certain degree of flexibility is necessary to accommodate additional stopping and starting, remobilization, etc., which may arise due to technical reasons or the presence of marine mammals in the vicinity. However, under a 2-rig scenario, the proposed cap of 196 hours for piling significantly exceeds the Applicant's worst-case scenario of 126 hours of piling and lacks adequate justification.

iii. Furthermore, a significant concern is that by not imposing daily piling restrictions, the Applicant could, in theory, conduct prolonged periods of piling during sensitive migratory periods.

iv. Most importantly, the cumulative impacts of concurrent piling noise at IGET and Immingham Eastern Ro-Ro Terminal (IERRT) time have not been thoroughly assessed or modelled. Therefore, the maximum energy levels and range of impact for noise remain unknown. Additionally, since IGET and IERRT have proposed identical mitigation measures, it is highly likely that each project will engage in piling at different times throughout the day, as well as concurrently during these "sensitive" months. Consequently, piling in the vicinity of these projects, which are located in close proximity to one another, is likely to result in a substantially longer overall piling period. Please refer to comments in point 4.4.17 for further details on the cumulative impact assessment.

4.4.15. The MMO concurs that piling restrictions are not necessary for piling activities conducted outside the waterbody during periods of low water (i.e., in the dry).

4.4.16. Table 2 of the assessment of cumulative effects provides a shortlist of developments that have been scoped in/out of the topic-specific cumulative effects assessment (CEA). 19 projects relevant to marine ecology with construction periods that overlap with the IGET schedule have been scoped into the CEA. The assessment focuses primarily on potential cumulative effects arising from the IERRT due to the nature and close proximity of this development with IGET.

4.4.17. The Applicant has assumed, under their worst-case scenario, that simultaneous piling will occur at IERRT and IGET. However, the ES lacks UWN modeling to substantiate this scenario. Considering that ABP is the Applicant for both projects, a more integrated approach would have been anticipated in this ES (and that of IERRT), encompassing UWN modeling for a scenario of concurrent piling with 2 rigs operating at IGET and 2 rigs operating at IERRT, to accurately represent the true extent of piling noise.

4.4.18. Despite reservations regarding the UWN modeling presented in the ES and the Applicant's proposed seasonal temporal mitigation, MMO cannot concur with the conclusions drawn on the cumulative impacts of noise and vibration for fisheries and fish ecology in the absence of concurrent modeling for the IGET and IERRT projects.

4.4.19. In light of the probable cumulative impacts of UWN from piling, as outlined in paragraph 4.4.17, the MMO strongly recommends that the Applicant investigate the implementation of noise abatement measures, such as bubble curtains, for this project (as well as IERRT, which is also an ABP project). Recent coverage highlighting the successful use of bubble curtains for the South Shields Regeneration Project demonstrates their effectiveness as appropriate mitigation in an estuarine environment. This technology enabled piling work at this project to proceed without requiring temporal piling restrictions.

4.5. Shellfish ecology

4.5.1. The MMO agrees with the conclusions reached by the Applicant relating to shellfish receptors.

4.5.2. The MMO also agree with the applicant to scope out impacts relating to commercial shellfisheries.

4.5.3. In the MMO’s opinion, the Applicant has used an appropriate evidence base for the assessment of shellfish receptors. The Intertidal benthic surveys conducted in the Port of Immingham area in 2021, subtidal sampling in July 2022, and benthic sampling at the disposal sites (Holme Channel disposal site (HU056) and Clay Huts disposal site (HU060)) provide a comprehensive understanding of the benthic communities in the project area.

4.5.4. The mud shrimp Corophium volutator and the mudsnail Peringia ulvae were among the dominant species identified in the intertidal benthic surveys (2021). The presence of these species is indicative of a healthy and diverse benthic community.

4.5.5. The mud shrimp C. volutator was also commonly recorded in the subtidal sampling (2022), although in lower abundance.

4.5.6. The benthic sampling at the Holme Channel disposal site (HU056) recorded low abundances of a few species, including C. volutator and the mysid shrimp Gastrosaccus spinifer.

4.5.7. The applicant has accurately identified Chinese mitten crab Eriocheir sinensis and Pacific oyster Magallana gigas as invasive marine species that are known to occur in the Humber Estuary region.

4.5.8. The MMO is content that the evidence being proposed is consistent with operations of a similar nature. Furthermore, a detailed method and description for the assessment of cumulative and in-combination effects has been provided. Table 1 of Appendix 25. C identifies the proposed developments shortlisted for the assessment.

4.5.9. The MMO finds the information provided is detailed, all relevant, and extensive, both in respect of the baseline and the impact assessments conducted. We have identified no significant gaps in respect to shellfish receptors. Therefore, no further information is required to assess the impacts on shellfish receptors.

4.6. Commercial Fisheries

4.6.1. The MMO notes that this proect is unlikely to have any impacts on commercial fishing operations due to the location of the works. There may be some disruption to the entry to the port by commercial users.

4.6.2. The proposed works may have an impact on the fish and shellfish stocks within the work area. Increased amounts of suspended sediment concentrations will be created by the works themselves. Given that disturbance of the seabed can significantly alter nursery and spawning grounds, it would be ideal for works to commence at a time that would be least detrimental to the least number of species. River lamprey spawning periods are usually between April / May, works should try to avoid that period.

4.6.3. However, the MMO defers to the Inshore Fisheries Conservation Authority (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.

4.7. Underwater noise

4.7.1. No receptors as such have been scoped out from assessment. It is appropriate that underwater noise arising from marine piling, capital dredging and dredge disposal (i.e., the movement of the dredger to and from the disposal site) has been scoped in for benthic habitats and species, fish and marine mammals (see Table 9.17 in Chapter 9).

4.7.2. Underwater noise arising from vessel operations, maintenance dredge and dredge disposal (during the operational phase) has been scoped out however, for all marine receptors (Table 9.21 in Chapter 9). The justification put forward is that the outcomes of the assessment of underwater noise disturbance from capital dredging activities during construction will be the same for maintenance dredging activities during operation. Provided that the worst-case dredging assumptions have been considered, then the MMO has no major objections to the scoping out (of a more detailed assessment) of maintenance dredging during the operational phase. Nevertheless, it will still be important to consider any overlap of maintenance dredging operations with key migratory or spawning periods.

4.7.3. Vessel noise during the operational phase has also been scoped out from further assessment for all marine receptor groups. Chapter 2 of the ES states that the Terminal will operate 24 hours a day, seven days a week and 365 days a year. The Terminal will have capacity to accommodate up to 292 vessel calls per year and it is anticipated that up to 12 of these calls will be associated with the hydrogen production facility (section 2.6.2 of Chapter 2). The vessels which make up the remaining 280 calls to the Terminal are expected to serve the future carbon capture and storage market and other liquid bulk energy product markets. We have no major objections to the scoping out of vessel noise during the operational phase, given that the Humber is one of the busiest and fastest-growing trading areas in Europe.

4.7.4. The MMO believes that an appropriate evidence base has largely been proposed, and effort has been undertaken to produce an informative and transparent assessment. Specifically, Appendix 9.B – Underwater Noise details the noise modelling which has been conducted and presents an assessment of the potential effects of underwater noise and vibration from the Project on marine fauna. This assessment has informed the outcomes of the marine ecology assessment (Chapter 9 Marine Ecology) and therefore, we have focused our review on this appendix.

Comments on Appendix 9.B – Underwater Noise

Percussive / impact piling:

4.7.5. For the assessment of impact piling, the Applicant has derived near-source (10m from the source) levels from the literature and has back-propagated these using a simple logarithmic spreading model to provide estimated source levels.

4.7.6. The Applicant confirms that there will be two piling rigs operating simultaneously (with a total maximum of up to three piles installed per day). For the concurrent piling scenario of 2.3 m diameter and 1.5 m diameter piles, the Applicant has added the sound pressure levels (if one does this calculation then there is an addition of 0.4 decibels (dB)). For the concurrent piling of two 1.5 m diameter piles, the Applicant has added the two sources (e.g., increasing the received level by 3 dB).

4.7.7. The source levels have then been used as input parameters in the NMFS piling calculator to derive predicted effect ranges for fish and marine mammals. Table 6 for example, shows the input values for impact piling of the 2.3 m diameter piles (including the total number of piles per day, and total number of strikes per pile).

4.7.8. While the MMO has no major concerns/objections with the source levels presented as such, it would be helpful if the Applicant could please provide more context on how these levels are relevant to the IGET development. For instance, it is not just the pile size (diameter) which is a factor. Other important considerations are the hammer energy, strike rate (piling profile) and water depth.

4.7.9. For the concurrent piling scenarios, it would be helpful if the Applicant could please provide more detail e.g., in the form of a figure, showing the locations of the piling at both the jetty approach and jetty head platform, taking into consideration the minimum and maximum separation distances between the piling vessels. This would help illustrate that the chosen scenarios / modelling strategy, and the inherent idealisations / simplifications are indeed appropriate and precautionary.

4.7.10. As advised previously, simultaneous piling from two rigs would likely not increase the received peak pressure levels or the single strike SEL. 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) (thus, there is no need to add 3 dB to the SPLpeak as the applicant has done). Piling from two rigs would however increase the total number of strikes and thus the SELcum over 24 hours. As noted above, the total number of piles installed per day and total number of strikes per pile have been included in the NMFS calculator which is appropriate.

4.7.11. Para 1.6.9 and para 1.6.10 – The MMO previously queried why the RMS source level is 10 dB higher than the SEL source level. The Applicant has responded (see Table 1) with: *"The peak, SEL and RMS levels are those that were measured directly in the field and published in the literature that is referenced in Section 1.6. The SEL that is reported is effectively the SELss. The RMS metric has not been used in the modelling of impacts of impact piling on fish but is included as a specific variable in the NOAA user spreadsheet tool that has been used to assess the effects of impact piling on marine mammals (Section 1.9)".* Nevertheless, the MMO reiterates that the relevant metrics for assessing the impacts of impulsive activities are the SELcum (calculated by the aggregation of SELss) and SPLpeak.

4.7.12. The assessment largely refers to appropriate peer-reviewed criteria for fish and marine mammal species. For behaviour and fish, the assessment refers to thresholds derived from Hawkins et al. (2014). Hawkins at el. exposed wild sprat and mackerel to short sequences of repeated impulsive playback sounds at different sound pressure levels, simulating the strikes from a percussive pile driver. The sound pressure levels to which the fish schools responded on 50% of the presentations were 163.2 and 163 dB re 1 µPa (peak-to-peak) (and estimated single strike sound exposure levels (SELss) were 135 dB and 142 dB re 1 µPa2 ·s for sprat and mackerel respectively). Whilst recognising that the application of simplistic sound level thresholds for behaviour should generally be avoided, these thresholds can be considered to be a conservative indicator for the risk of behavioural responses and potential displacement. As advised for the PEIR consultation, it is not entirely appropriate to convert the peak-to-peak threshold to a zero-to-peak threshold (of 157 dB by subtracting 6 dB) as the Applicant has done here. The MMO recommends that future assessments also adopt the threshold of 135 dB SELss.

4.7.13. As noted above, the NMFS calculator has been used to derive predicted effect ranges for piling. The assessment concludes that impact piling has the potential to create a partial temporary barrier to fish movements (see Annex 9.B for full results).

4.7.14. The MMO has no major concerns with the predictions for marine mammals for percussive (and vibro) piling. In general, the ranges appear to be relatively conservative in most cases.

Vibro-piling:

4.7.15. The SPLrms is the most appropriate metric to apply for continuous sources. The SPLrms is additive when there are two or more continuous sources. If the piling rigs are relatively close together (within the estuary), then it is reasonable to add 3 dB as the Applicant has done here.

Dredging and vessels:

4.7.16. The dredging requirements for the Project are anticipated to involve the use of a backhoe dredger and trailing suction hopper dredger (TSHD). Dredge operations will be continuous (24/7). Vessels involved during the construction of the Project will primarily be the jack up barge, floating crane barge, flat top barges, backhoe dredger with associated attendant barges, multicats, tugs and safety boat. The period of capital dredging during construction will last for a period of around 12 days.

4.7.17. The MMO welcomes that the Applicant has now considered the cumulative sound exposure (over 24-hours) for dredging operations and fish.

4.7.18. For marine mammals, the predictions in Table 20 (below for reference) for dredging and vessel movements look smaller than expected. This same point was raised during the PEIR consultation. The Applicant has responded stating that *"the assumptions and input values to this spreadsheet are clearly set out in Table 19. These have been revisited and checked and the outputs remain unchanged in the appendix, apart from the rounding of distances to the nearest order of magnitude".* Based on our experience of assessing such sources, and even if we assume a fleeing receptor, we expect larger Temporary Threshold Shift (TTS) effect ranges (over part of the estuary) for harbour porpoise and 24-hour exposure.

Table 20: Approximate distances (metres) marine mammal response criteria are reached during dredging and vessel movements

Marine Mammal Hearing Group	PTS	TTS
High-frequency (HF) cetacean (harbour porpoise)	<1	40
Phocid pinniped (PW) (grey seal and common seal)	<1	10

4.7.19. In the first instance, these values do not make much sense considering that earlier on in section 1.9.24, the report predicts that there is a risk of TTS occurring within 700 m for all fish species.

4.7.20. In fact, it is possible to construct some simple exposure calculation tests that indicate much larger effect ranges than those indicated in Table 20. For example, if we start from a SL value of 188 dB rms for dredging, in order to calculate 24h SEL, we need to estimate three distinct terms or quantities: the 24h exposure add-on (a positive term), the propagation loss (negative) and the auditory weighting term (also negative). The first quantity, namely the 24 h exposure add-on term is straightforward

to calculate as 49 dB. The calculation of the propagation loss term is in general more complex, but nevertheless it is possible to estimate that it will balance out the exposure add-on term within a kilometre or so from the source (i.e., a propagation loss of ~50 dB for 1 km range). The last term, the effect of harbour porpoise auditory weightings, can be quite variable, according to the chosen spectrum (note that, ideally, the weighting should be performed on the received spectrum not on the source one, as the propagation loss is frequency dependent and thus will modify the spectrum). If one uses, for example, the dredging spectrum from Robinson et al. (2012), then the result of applying the harbour porpoise auditory weightings is a negative term of approximately 15 dB. Thus, starting from the 188 dB rms SL, we subtract 15 dB to get 173 dB, while the 24h exposure term and propagation loss to 1 km term cancel each other out. Since the 173 dB is precisely the value of the Permanent Threshold Shift (PTS) threshold for harbour porpoise, this example indicates that the PTS range is approximately 1 km.

4.7.21. Alternatively, we can construct an even simpler counter-argument. Namely, if we focus solely on the source level at 1 m, not including propagation, then the weighted SL value of 173 dB indicates that the animal exposure reaches 173 dB SEL after 1 second (by definition). Since this is the PTS threshold, and it is reached in 1 second rather than 24 h, the PTS range for 24 h exposure is implausible to be <1 m as indicated in Table 20.

4.7.22. Thus, the PTS range is very unlikely to be <1m. However, the MMO acknowledges that marine mammals are not expected to remain stationary for extended periods of time in close vicinity to the source.

Comparisons of received levels with ambient noise:

4.7.23. Para 1.5.14 - 1.5.15 states that *"A series of pre-construction and during construction underwater noise monitoring was undertaken in the Humber Estuary at Green Port Hull ("GPH") from 17 to 22 October 2014 inclusive….RMS SPLs showed a repeating pattern of peaks and troughs, ranging from 107 to 154 dB re 1 µPa".* Furthermore, Table 5 (below for reference) shows the maximum unweighted received levels during proposed development activities. [The simple logarithmic spreading model was applied to the worst case (highest) unweighted SLs associated with the Project activities (impact piling, vibro-piling and dredging and vessel movements) to determine the unweighted received levels with range (see para 1.8.1)]. The ranges in Table 5 look reasonable.

Range (m)	Impact Piling 1.5m piles (SEL in dB 1 $\mu Pa^2 \cdot s$)	Impact Piling 2.3m piles (SEL in dB 1 $\mu Pa^2 \cdot s$)	Vibro Piling 1.5m and 2.3 piles (SEL in dB 1 $\mu Pa^2 \cdot s$)	Dredging and Vessel Movements (RMS in dB re 1 µPa)
1	206	213	201	188
10	188	195	183	170
100	170	177	165	152
200	164	171	159	146
500	155	162	150	137
1,000	147	154	142	129
2,300*	134	141	129	116
3,400**	125	132	120	107
5,000	114	121	109	96
10,000	82	89	77	64

* Approximate distance from the most seaward point of the proposed development and opposite shore at low water.

** Approximate distance from the most seaward point of the proposed development and opposite shore at high water.

4.7.24. Nevertheless, the report attempts (at various times throughout the document) to compare the received noise levels in Table 5 against the existing background noise levels – see paras 1.8.2, 1.8.3, 1.8.4, 1.9.10 and 1.9.39, 1.9.20, 1.9.49 and 1.9.27. The MMO has some points and queries to make with respect to these statements:

- *"The RMS SPLs showed a repeating pattern of peaks and troughs, ranging from 107 to 154 dB re 1 µPa".* This is quite a large range and a background noise level of 154 dB rms is very high. How often does the background noise reach these high levels? The MMO presumes that such levels would likely be caused by passing vessel traffic, but it would be helpful if further context was provided here.

- Para 1.8.4, for example, states: *"The levels of underwater noise generated by impact piling are predicted to reach existing background levels previously measured in the Humber Estuary within around 2 to 3km from the source. The SEL received levels of underwater noise generated during impact piling for the proposed development are predicted to reduce to around 147 to 154 dB 1 µPa2 ·s within 1km of the source of piling which is equivalent to peak SPL of 166 dB re 1 µPa using Equation 2 and comparable to the SL generated by a tug and barge. The peak levels of underwater noise that reach the opposite shore of the estuary are predicted to range from approximately 125 to 141 dB 1 µPa2 ·s (equivalent to 135 to 157 dB re 1 µPa) depending on the tidal state. These levels are comparable to the SLs generated by recreational boats".* The comparisons made are misleading. Firstly, one cannot compare to the source level of a boat (i.e., tug or barge). Source levels are a theoretical concept (the assumption of a point source and measured from 1 m distance). Furthermore – even if we accept that source level values bear a close correspondence to the sound levels present in the immediate vicinity of a boat – then it would be difficult to argue that a receiver (animal) located at barely 1 m from the source (including a recreational vessel) would not be disturbed. In other words, this

does not hold as an argument that such noise levels are harmless and not concerning. If the argument was comparing the piling noise levels with those that a boat generates at a great distance (e.g., a boat transiting at several km away) then this could be reassuring evidence, but the noise levels being in fact as high as the source levels of boats is quite contrary to that.

- Another important point to consider is that vessels come and go in the estuary, thus contributing/causing the reported transitory peak values of the ambient noise levels, whereas dredging will be continuous (24/7) and the vessel will remain in the vicinity for extended periods of time. Thus, even if – allegedly – the noise levels introduced by dredging would not exceed the observed maxima of the ambient noise levels, they would be expected to remain at these high levels for extensive periods, unlike the brief and rather infrequent peaks of the ambient noise.

4.7.25. Cumulative effects are considered in Appendix 25.C within which Table 2 provides a shortlist of developments that have been scoped in/out of the topic-specific cumulative effects assessment (CEA). A total of 19 projects relevant to Nature Conservation (Marine Ecology) with construction periods that overlap with the IGET schedule have been scoped into the CEA. These projects include Able Marine Energy Park, North Killingholme Power Project, Humber Low Carbon Pipelines, Humber International Terminal berth 2, and Viking CSS Pipeline. The assessment focuses primarily on potential cumulative effects arising from the IERRT due to the nature and close proximity of this development with IGET.

4.7.26. Section 1.6.17 of Appendix 25.C states that *"Underwater noise generated during marine piling required as part of the IERRT project along with the Project have the potential to result in cumulative effects on fish (including diadromous migratory species) and marine mammal receptors in the Humber Estuary. Piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the piling activity and behavioural responses over a wider area of the Humber Estuary for both projects. The same mitigation measures are proposed for both projects to help minimise potential adverse effects (i.e. soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). Without mitigation potential cumulative effects are considered to be moderate adverse. With the application of mitigation, the residual cumulative effect is minor adverse".*

4.7.27. The MMO advises that there will need to be a coordinated / joined up approach to ensure that the various developments taking place within the Humber estuary, especially between IGET and IEERT, are appropriately managed to minimise the risk of potential impact on sensitive receptors, particularly migratory species. We note that the same mitigation measures (i.e., timing restrictions) are proposed for both projects.

4.7.28. The MMO note that it may be wise to have a tracker of some sort for the Humber estuary (if there is not one already). This tracker could show when and where the various developments will be taking place, and what mitigation will be in place, to try and help manage cumulative effects.

4.7.29. Section 9.9 of Chapter 9 details the proposed mitigation. The MMO feels it is appropriate that soft start procedures during piling operations will be adopted. Such

measures may help to reduce the total number of dangerous exposures in terms of auditory injury. We welcome the proposed measures to reduce the risk of impact to marine mammals. These will consist of the establishment of a mitigation zone, and marine mammal observers (who will undertake a 30-minute pre-piling search and observe the mitigation zone during percussive piling). The report states that *"if there is a pause in percussive marine piling operations for any reason over an agreed period of time, then another search (and soft-start procedures for marine piling) will be repeated before activity recommences…".*

4.7.30. A number of measures have been proposed for fish species including nighttime working restrictions (piling will occur between 07:00 to 19:00 in the winter months and sunrise to sunset in the summer months) and seasonal percussive marine piling restrictions).

4.7.31. The MMO note that paragraph 9.4.31 of Chapter 9 states that *"the underwater noise assessment assumes that the dredging and vessel activity will take place continuously (24/7) during construction and as such, provides a precautionary assessment (noting that capital dredging is programmed for 12 days)".* The MMO would argue that this is more realistic rather than precautionary, given that dredge operations will be continuous (24/7). NOAA intends for the weighted SELcum metric to account for the accumulated exposure, i.e., over the duration of the activity within a 24-hour period.

4.7.32. Para 9.8.140 in Chapter 9 – please note that Atlantic mackerel does not have a swim bladder (and therefore falls in the third category comprising fish lacking swim bladders).

Underwater noise summary

4.7.33. Appendix 9.B – Underwater Noise details the noise modelling which has been conducted and presents an assessment of the potential effects of underwater noise and vibration from the Project on marine fauna. This assessment has informed the outcomes of the marine ecology assessment (Chapter 9 Marine Ecology) and therefore, comments were focussed on this appendix. Specific comments on this appendix are provided in paragraph 4.7.5 to 4.7.24.

4.7.34. It may be wise to have a tracker of some sort for the Humber estuary (if there is not one already). This tracker could show when and where the various developments will be taking place, and what mitigation will be in place, to try and help manage cumulative effects.

4.8. Shipping and Navigation

The MMO defers to the Maritime and Coastguard Agency and Trinity House 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.

4.9. Marine Archaeology

4.9.1. The MMO defers to 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.

4.10. Seascape, Landscape and Visual Resources

4.10.1. The MMO defers to Natural England as the Statutory Nature Conservation Body (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 impacts to Areas of Outstanding Natural Beauty as they are the Non-Governmental Organisation responsible for them.

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.

Yours faithfully

[redacted]

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