Centre for Environment Fisheries & Aquaculture Science

Cefas

MARINE AND COASTAL ACCESS ACT 2009. APPLICATION BY FALMOUTH DOCKS AND ENGINEERING COMPANY (FDEC) FOR BENTHIC ADVICE RELATING TO WORKS ASSOCIATED WITH THE DEVELOPMENT OF FALMOUTH DOCKS, CORNWALL, UK.
Reference Number: MLA/2025/00157

From: Adrian Farcas
Cefas, Lowestoft Laboratory
Date: 15th August 2025

To: **Yvonne Golightly** **MMO (via MCMS)**
Cc: Kirsty Clarke SEAL Case Officer

1. With reference to the above application for relating to the Environmental Statement (ES) for works relating to Falmouth Docks by Falmouth Docks and Engineering Company (FDEC) (the 'Applicant' hereafter) and your request for comments dated 21st July 2025 please find my comments below.

2. This minute is provided in response to your advisory request in relation to the above proposal in my capacity as scientific and technical advisor for sediment quality in relation to, and regulatory requirements for dredge and disposal operations. The response pertains to those areas of the application request that are of relevance to this field. This minute does not provide specialist advice regarding benthic ecology, marine processes, fish and fisheries, shellfisheries, or underwater noise as, whilst these are within Cefas' remit, they are outside my area of specialism.

3. In providing this advice I have spent 15 hours of the allocated 15 hours by the MMO. I have booked my time to MLA/2025/00157.

4. I have provided my comments based on the below category system:
   Category 1: **Major Comment (Action)-** It is my advice that the application should not be granted a licence until this is resolved. There is high uncertainty or a large risk to the environment. MMO are strongly advised to request this further information then re-consult Cefas.
   Category 2: **Minor Comment (Action)-** There is data/ information/ evidence missing that could affect the assessment. Provision of the data/information would allow for due diligence to ensure there is sufficient confidence in the applicant's and my own assessment but would not necessarily preclude the granting of a licence. MMO advised to request further information from applicant and then to re-consult Cefas, however MMO may be able to grant licence if this information is not submitted, provided MMO have clear rationale for their decision.
   Category 3: **Minor Comment (No Action)-** These highlight those things that should be included as best practice but would not affect my overall conclusions. Should be taken forward by the developer for any future applications/ post consent requirements, or presentation issues. MMO case team could pass this on to applicant however this information is not required for consultation with Cefas.
   Category 4: **Observation-** Statements regarding what is stated in the application, or areas of good practice are highlighted. No action for MMO case team but this could

be passed on to applicant if MMO wish, to pass on areas of good practice.

Document (s) reviewed from MCMS, accessed August 2025

5. FDEC (2025). Volume 1: Main Environmental Statement Chapter 1: Introduction.
6. FDEC (2025). Volume 1: Main Environmental Statement Chapter 2: EIA Process and Methodology.
7. FDEC (2025). Volume 1: Main Environmental Statement Chapter 4: Proposed Development Description.
8. FDEC (2025). Volume 1: Main Environmental Statement Chapter 5: Demolition and Construction Description.
9. FDEC (2025). Volume 1: Main Environmental Statement. Chapter 20: Intra-Cumulative Effects.
10. FDEC (2025). Volume 1: Main Environmental Statement. Chapter 14 Noise and Vibration
11. FDEC (2025). Volume 2: Main Environmental Statement. TA14.1-14.4 Noise and Vibration Technical Appendix
12. FDEC (2025). Volume 1: Main Environmental Statement. Chapter 7: Underwater Noise
13. FDEC (2025). Volume 2: Main Environmental Statement TA02.12 Habitats Regulations Assessment.

Description of the proposed works

14. Falmouth Docks and Engineering Company (FDEC (hereafter 'the Applicant')) are seeking to deliver the proposed redevelopment and upgrade of facilities at Falmouth Docks (the 'site'), which is located within the administrative boundary of Cornwall Council (CC). The applicant recognises that the proposed development, owing to its nature, scale and location, is likely to give rise to significant effects on the environment. The applicant has therefore commissioned an environmental impact assessment (EIA) for the proposed development, the findings of which are presented within an Environmental Statement (ES (paragraph 5-13)).

15. The Technical Appendix (TA07.1) on Underwater Noise Modelling, prepared by HR Wallingford for Ramboll UK Ltd, forms part of the Environmental Statement for the Falmouth Docks Development. It evaluates underwater noise impacts from demolition, construction, and operational activities on marine mammals and fish in the Fal Estuary. The project involves upgrading facilities for floating offshore wind (FLOW) devices and larger cruise ships (up to Excellence Class), including new suspended decks, reclamation, wharf extensions, Northern Arm demolition, and berth dredging. Using numerical models like UnaCorda for sound propagation and an agent-based model for animal movement (with a uniform fleeing speed of 1.5 meters per second for marine mammals), the report assesses baseline vessel noise from AIS data, impulsive sources like percussive piling (210 dB re 1 μPa^2 s SEL) and hydraulic hammering, and continuous sources like backhoe dredging (175 dB re 1 μPa^2 s SEL). Predicted impacts include PTS/TTS distances up to several kilometres during piling (reduced by mitigations like soft-starts and bubble curtains) and behavioural disturbance extending to shorelines or approximately 6 km for large vessels. Recommendations include marine mammal observers (MMO) and passive acoustic monitoring (PAM) to address risks like animal trapping near structures.

16. The findings from TA 7.1 are directly incorporated into Chaper7 (CH07) (Underwater Noise) summarizing baseline vessel noise (120-140 hours/year disturbance), demolition/construction modelling (e.g., hydraulic hammering, backhoe dredging, percussive piling both unmitigated and mitigated with bubble curtains and soft starts), and operational increases (~15 hours/year from 11 extra cruise/12 cargo vessels).

17. Furthermore, Chapter 9 (CH09) of the Environmental Statement, focused on Marine Ecology, directly builds upon the quantitative underwater noise predictions presented in CH07 and its detailed supporting TA7.1, by integrating these noise modelling outputs to assess the ecological implications for sensitive marine receptors such as fish, marine mammals (e.g., cetaceans and seals), and other species within the Fal Estuary.

Responses to Questions posed by the MMO Case Officer. All responses are observations unless otherwise stated.

MMO Question 1. To the best of your knowledge, is the description of the environment and potential impacts accurate?

18. The description of the underwater noise environment and potential impacts appears accurate based on the provided modelling study. The technical report details baseline vessel noise using AIS data and empirical models, predicting annual mean sound pressure levels above behavioural thresholds for marine mammals in the main shipping route. It also models demolition and construction noise (e.g., hydraulic hammering, backhoe dredging, percussive piling) and their impacts on marine mammals and fish, including distances to TTS/PTS thresholds and behavioural disturbance. Impacts are quantified spatially (e.g., up to 6 km for cruise ship disturbance, 4 km for TTS in very high frequency cetaceans during percussive piling). The study accounts for site-specific factors like bathymetry, estuary geometry, and potential animal trapping near structures or shorelines.

MMO Question 2. Has the appropriate evidence base been used? Is the evidence complete for its intended use i.e., is there sufficient information to allow a decision on the application to be made? If not, please explain why and what you would expect to see and any additional work.

19. The evidence base is appropriate and largely complete for assessing underwater noise impacts. It uses established models e.g., Range-dependent Acoustic Model (RAM) for sound propagation. Source levels are derived from literature and adjusted for site conditions. Thresholds follow Southall et al. (2019) for mammals and Popper et al. (2014) for fish. Baseline uses 2019 AIS data for vessel noise. This supports decision-making on licensing, as it covers injury, behavioural effects, and mitigation efficacy.

MMO Question 3. Do you agree with the conclusions reached?

20. Yes, we agree with the conclusions reached in the report, which highlight significant potential for PTS/TTS and behavioural disturbance during construction (e.g., up to approximately 4 km TTS for very high-frequency cetaceans during unmitigated piling, reduced with soft-starts and bubble curtains) and a modest increase in vessel-related disturbance post-development. These conclusions are soundly based on the modelled results and align with precautionary principles, but they appear conservative due to methodological choices that could overestimate impacts. Please see the observations made below in relation to EIA methodology and assessment.

MMO Question 4. Is the EIA methodology and assessment presented clearly and fully justified?

<u>Assessment of Vessel Noise</u>

21. The EIA methodology for vessel noise, outlined in section 3.1, is sound and clearly presented, using the Ross model (RANDI-3.1) to estimate broadband source levels based on vessel length and speed from 2019 AIS data. Synthetic source spectra (Figure 3.1) are generated for vessels like passenger ships and cargo carriers, with a conservative assumed speed of 6 knots (Table

6.1), suitable for the Fal Estuary's navigational constraints. Propagation is modelled with a simplified 15 log R transmission loss (Section 3.1). This predicts baseline behavioural disturbance of 120–140 hours per year, increasing by ~15 hours post-development due to larger cruise ships (e.g., Excellence Class).

22. The methodology is appropriate for the current assessment, but precautionary for two reasons. First, the Ross model (RANDI-3.1) was historically widely used for vessel noise assessments; however, it has been largely superseded by models like JOMOPANS-ECHO, which provide more precise source level predictions by incorporating ship-type-specific parameters and validated data. Compared to the JOMOPANS-ECHO model, the Ross model overestimates noise levels in the low frequency bands (<250 Hz) that dominate vessel noise spectra. Therefore, this conservative source level assumption likely inflates disturbance estimates. Second, the simplified 15 log R propagation model is likely precautionary in the shallow estuarine environment and thus further leads to wider impact zone predictions.

<u>Assessment of Demolition and Construction Activities</u>

23. The methodology for percussive piling, hydraulic hammering, and backhoe dredging is thoroughly described in sections 3.2 and 5.1-5.6, using UnaCorda for sound propagation and an agent-based model (not HydroBoids, despite its mention) for marine mammal fleeing at a uniform 1.5 m/s (Table 5.6). Piling involves 1.32-m piles with 300 kJ hammer energy, a source level of 210 dB re 1 μPa² s SEL unmitigated (200 dB with bubble curtains), and a 20-minute soft start (section 5.3.2). Dredging uses a source level of 175 dB re 1 μPa² s SEL (section 5.3.4).

24. UnaCorda accounts for depth-dependent sound speed profiles and bathymetry, with SELcum for PTS/TTS calculated as maximum values across the water column (section 5.6), a conservative approach for fleeing receptors.

25. Results show unmitigated PTS up to 2.6 km (at Location 3) and TTS up to 4.1 km (at location 2) for very high-frequency cetaceans during percussive piling, reduced to a maximum of 1.5 km PTS (at Location 2) and 2.8 km TTS (at Location 3) with bubble curtain mitigation, and dredging TTS up to 500 m (Tables 8.1 - 8.3).

26. **<u>Minor Comment (Action):</u>** The maximum predicted PTS range is 2.6 km (2600 m), specifically for VHF cetaceans (i.e., harbour porpoises) during unmitigated percussive piling at Queen's Wharf (Location 3), as detailed in Table 7.8 (Rmax 2600 m) and Figure 7.28 of TA7.1, where the SELcum PTS threshold (155 dB re 1 μPa² s, per Southall et al. 2019) contour extends eastward across the estuary due to trapping constraints in the fleeing model. However, in CH07 (Underwater Noise), the ES summarizes unmitigated PTS as 2,000 m for VHF cetaceans (section 7.9.11). Similarly, CH09 (Marine Ecology) adopts this 2 km figure when assessing effects. We also note that the maximum predicted TTS range, namely 4.1 km for VHF Cetaceans is consistent across TA7.1, CH07 and C09. A possible explanation for this discrepancy is that that maximum PTS and maximum TTS ranges were not achieved at the same location (the former is at location 3, while the latter is at location 2) – however, this should not preclude the selection of the maximum effect range across all locations, separately for each effect threshold.

27. Aside from the conservatism embedded in some the scenarios assumption (e.g., in the assumed durations) and possibly in the source levels, these results furthermore appear precautionary based on two perspectives. First, a sense-checking exercise conducted with our own models, using identical source levels, piling profiles, and environmental assumptions

(bathymetry, seabed), predicts smaller PTS/TTS ranges for both stationary fish and fleeing marine mammals.

28. For stationary receptors, this suggests UnaCorda's propagation is precautionary (a possible reason being the use maximum SEL across depths). For fleeing animals, the report larger ranges likely stem from conservative assumptions about trapping by shorelines or obstacles, inflating SELcum. It should be noted that at the assumed fleeing speed of 1.5 m/s, or 5.4 km/h, the receptors would reach the furthest (i.e., northern) shores in less than an hour and the other shores much quicker (e.g., the eastern shore in about 20 minutes and the nearest shores in 5-10 minutes).

29. Notwithstanding the conservatism in the estimation of the propagation loss, our sense-checking indicates that that the report predictions for fleeing receptors sit somewhere in between the estimates for stationary animals and those that would be obtained under an unrestricted fleeing assumption. Presumably, the use of HydroBoids for dynamic fleeing could potentially reduce overestimation, allowing animals to navigate around obstacles like shorelines and structures in the Fal Estuary, avoiding trapping scenarios. However, this approach would come with caveats due to uncertainties in animal behaviour, such as variable swim speeds, group-specific responses, or context-dependent factors like foraging motivation, which may limit accuracy without site-specific behavioural data or validation.

30. Second, literature comparisons-like the ORJIP ReCon Project (2023) show SELcum-based PTS ranges under 100 meters and TTS up to 1–6 km for larger piles (2–8 m in diameter, strike energies up to 4000 kJ), with empirical data confirming minimal injury due to fleeing and mitigation like soft-starts and bubble curtains. The current report's larger ranges (1–4 km) reflect the estuarine setting's constraints and conservative modelling, ensuring impacts are not underestimated.

Adrian Farcas
Underwater Noise Modeller

Quality Check	*Date*
Kirsty Clarke	15/08/2025

References

MacGillivray, A., & de Jong, C. (2021). A reference spectrum model for estimating source levels of marine shipping based on Automated Identification System data, 9(4), 369.

Verfuss, U. K., Remmers, P., Ryder, M., Palmer, K., Wood, J. D., & Bellmann, M. A. (2023). Reducing uncertainty in underwater noise assessments (ReCon). Report prepared for the Offshore Renewables Joint Industry Programme (ORJIP) Offshore Wind. The Carbon Trust.