# Morecambe Offshore Windfarm: Generation Assets

## Examination Documents

## Volume 9

## Marine Mammal Technical Note 1 (EIA)

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Rev 02

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## Glossary of Acronyms

| | |
|---|---|
| ADD | Acoustic Deterrent Device |
| AIS | Automatic Identification System |
| BEIS | Department for Business, Energy & Industrial Strategy |
| CEA | Cumulative Effect Assessment |
| Cefas | Centre for Environment, Fisheries and Aquaculture Science |
| CGNS | Celtic and Greater North Sea |
| CIS | Celtic and Irish Sea |
| CSIP | Cetacean Stranding Investigation Programme |
| dDCO | Draft Development Consent Order |
| DCO | Development Consent Order |
| DRC | Dose-Response Curve |
| EDR | Effective Deterrence Range |
| EIA | Environmental Impact Assessment |
| EIAR | Environmental Impact Assessment Report |
| EMPs | Environmental Management Plans |
| ES | Environmental Statement |
| HF | High-Frequency |
| HRA | Habitats Regulation Assessment |
| IEMEP | Inis Ealga Marine Energy Park |
| IoM | Isle of Man |
| iPCoD | Interim Population Consequences of Disturbance |
| IS | Irish Sea |
| IWC | International Whaling Commission |
| MAC | Maritime Area Consent |
| MMMP | Marine Mammal Mitigation Protocol |
| MMO | Marine Management Organisation |
| MU | Management Unit |
| NRW | Natural Resources Wales |
| NE | Natural England |
| NEQ | Net Explosive Quantity |
| NI | Northern Ireland |
| NISA | North Irish Sea Array |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Policy Statement |

| | |
|---|---|
| NW | North-West |
| OBS | Offshore Booster Station |
| ORESS | Offshore Renewable Electricity Support Scheme |
| OSP | Offshore substation platforms |
| OWF | Offshore Wind Farm |
| PEIR | Preliminary Environmental Information Report |
| PEMP | Project Environmental Management Plan |
| PINS | Planning Inspectorate |
| PTS | Permanent Threshold Shift |
| RIAA | Report to Inform Appropriate Assessment |
| RMS | Root Mean Squared |
| RoC | Review of Consents |
| RR | Relevant Representation |
| SAC | Special Area of Conservation |
| SPL | Sound Pressure Level |
| $SPL_{RMS}$ | Sound Pressure Level Root Mean Squared |
| TTS | Temporary Threshold Shift |
| UK | United Kingdom |
| UWSMS | Underwater Sound Management Strategy |
| UXO | Unexploded Ordnance |
| VHF | Very-High Frequency |
| VTMP | Vessel Traffic Management Plan |
| WiSe | Wildlife Safe |
| WTG | Wind turbine generator |

# Glossary of Unit Terms

| | |
|---|---|
| dB | Decibel |
| dB re 1 μPa | Underwater dB are referenced to a pressure of 1 micro Pascal (μPa), which is abbreviated as dB re 1 μPa |
| Hz | Hertz |
| kHz | Kilohertz |
| $km^2$ | square kilometre |
| μPa | Micro pascal |

# Glossary of Terminology

| | |
|---|---|
| Agreement for Lease (AfL) | Agreements under which seabed rights are awarded following the completion of The Crown Estate tender process. |
| Applicant | Morecambe Offshore Windfarm Ltd |
| Application | This refers to the Applicant's application for a Development Consent Order (DCO). An application consists of a series of documents and plans which are published on the Planning Inspectorate's (PINS) website. |
| Generation Assets (the Project) | Generation assets associated with the Morecambe Offshore Windfarm. This is infrastructure in connection with electricity production, namely the fixed foundation wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)) and possible platform link cables to connect OSP(s). |
| Sound Pressure Level (SPL) | The sound pressure level or SPL is an expression of the sound pressure using the decibel (dB) scale, and the standard reference pressures of 1 μPa for water and 20 μPa for air. |
| The Planning Inspectorate | The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects. |
| Windfarm site | The area within which the WTGs, inter-array cables, OSP(s) and platform link cables would be present. |

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# 1 Introduction

1. This document presents an update to the assessment of effects on marine mammal receptors presented in Chapter 11 Marine Mammals of the Environmental Statement (ES) (APP-048) submitted as part of the assessment of the Morecambe Offshore Windfarm Generation Assets (the Project) by Morecambe Offshore Windfarm Ltd (the Applicant).

2. This has been undertaken in response to comments provided by Natural England (NE), who in their Relevant Representation (RR) (RR-061), indicated that further information, updates and clarifications were required. Commentary on a relevant comment from the Marine Management Organisation (MMO) (RR-047) is also included. This note has then been updated for Deadline 3 following written representation from Natural Resource Wales (NRW) at Deadline 1 (REP1-099), expanding on responses provided by the Applicant at Deadline 2 (REP2-027). This technical note follows the Applicant's Response to RR's (PD1-011) submitted for Procedural Deadline A. It is noted that some of the information has also been provided in The Applicant's Response to the Rule 9 Letter for Morecambe Offshore Windfarm Generation Assets (PD1-010), as indicated in **Table 1.1**.

*Table 1.1 RRs that have been addressed within this technical note*

| RR ID (as stated in PD1-010) | Section where the RR is addressed | Provided as part of the Rule 9 response (PD1-010) |
|---|---|---|
| RR-061-180 (NE Ref D16) | **Section 2.1** | n/a |
| RR-061-185 (NE Ref D21) | **Section 2.2** | Incorporated into Section 5.1 |
| RR-061-189 (NE Ref D25) | **Section 2.3** | n/a |
| RR-061-190 (NE Ref D26) | **Section 2.4** | Section 5.2 |
| RR-047-30 (MMO Ref 3.2.2) | **Section 2.5** | n/a |
| RR-061-168 & RR-061-196 (NE Ref D4 & NE Ref D32) | **Section 2.6** | Section 5.1 and 5.3 |
| RR-061-168 & RR-061-192 (NE Ref D4 & NE Ref D28) | **Section 64** | Section 5.1 |
| RR-061-214 (NE Ref D50) | **Section 2.8** | Section 5.1.3 |
| Written Representation from NRW at Deadline 2 (REP1-099) | **Section 3** | N/A |

# 2 Updates and amendments for the Marine Mammal Assessment (Chapter 11 Marine Mammals (APP-048)) following Relevant Representations

3. The following updates and amendments for marine mammals have been based on the methodology outlined in the ES Chapter 11 Marine Mammals (APP-048):

- For permanent and temporary impacts, refer to Section 11.4.2.1 Table 11.8 and 11.10 in ES Chapter 11 Marine Mammals (APP-048) for detailed information; and
- For population modelling, if there is a continued decline of >1% per year (versus a modelled unimpacted reference population) over a set period of time (e.g. the first 6 years, based on the former Favourable Conservation Status reporting period), then there is a high likelihood that there is a significant level of effect (NRW, 2023) (see Section 11.6.3.2 in ES Chapter 11 Marine Mammals (APP-048) for further information).

## 2.1 Additional information to baseline noise levels (NE Ref D16)

4. The following information is provided in response to NE's comment (NE Ref D16, RR-061-180):

"*The baseline noise levels have not been presented, despite the NPS requirement".*

5. The Applicant notes the National Policy Statement (NPS) EN-3 requirements (paragraph 2.8.131) (Department for Energy Security & Net Zero, 2023) state 'where necessary'. The Applicant considers that baseline noise levels do not contribute to the underwater noise assessment, which relies entirely on absolute noise thresholds as criteria. The Applicant has, however, prepared additional information (**Section 2.1.1**) regarding baseline noise levels to supplement Appendix 11.1 Underwater Noise Assessment (APP-065) and provide justification of the assessments with the Development Consent Order (DCO) Application.

### 2.1.1 Baseline ambient noise

6. The baseline noise level in open water, in the absence of any specific anthropogenic noise source, is generally dependent on a mix of the movement of the water and sediment and weather conditions. There is a component of

biological noise from marine mammal and fish vocalisation, as well as an element from invertebrates.

7. Outside of the naturally occurring ambient noise, anthropogenic noise dominates the background. The Irish Sea is heavily shipped by fishing, cargo, and passenger vessels, which contribute to the ambient noise in the water. The larger vessels are not only louder, but the noise tends to have a lower frequency, which travels more readily, especially in the deeper open water. Other vessels such as dredgers and small fishing boats have a lower overall contribution. There are no known dredging areas, active dredge zones, or dredging application options or prospective dredging areas within the windfarm site, with the nearest aggregate production area being 9.7km away (Liverpool Bay aggregate production area (Area 457)).

8. Other sources of anthropogenic noise include oil and gas platforms, other drilling activity and military exercises and operational windfarms. Drilling, including oil and gas drilling, may contribute some low frequency noise at the region around the windfarm site, although due to its low-level nature, this is unlikely to contribute to the overall ambient noise. Little information is available on the scope and timing of military exercises, but they are not expected to last for an extended period and so would have little contribution to the long-term ambient noise in the area. Operational windfarms have a very localised disturbance effect and are not generally audible outside the array area; therefore, they are unlikely to contribute to the overall ambient noise.

9. Typical underwater noise levels show a frequency dependency in relation to different noise sources; the classic curves are given in Wenz (1962) and are reproduced in **Figure 2.1** below. **Figure 2.1** shows that any unweighted overall (i.e., single-figure non-frequency-dependent) noise level is typically dependent on the very low frequency element of the noise. The introduction of a nearby anthropogenic noise source (such as piling or sources involving engines) will tend to increase the noise levels in the 100 Hz to 1 kHz region, but to a lesser extent will also extend into higher and lower frequencies.

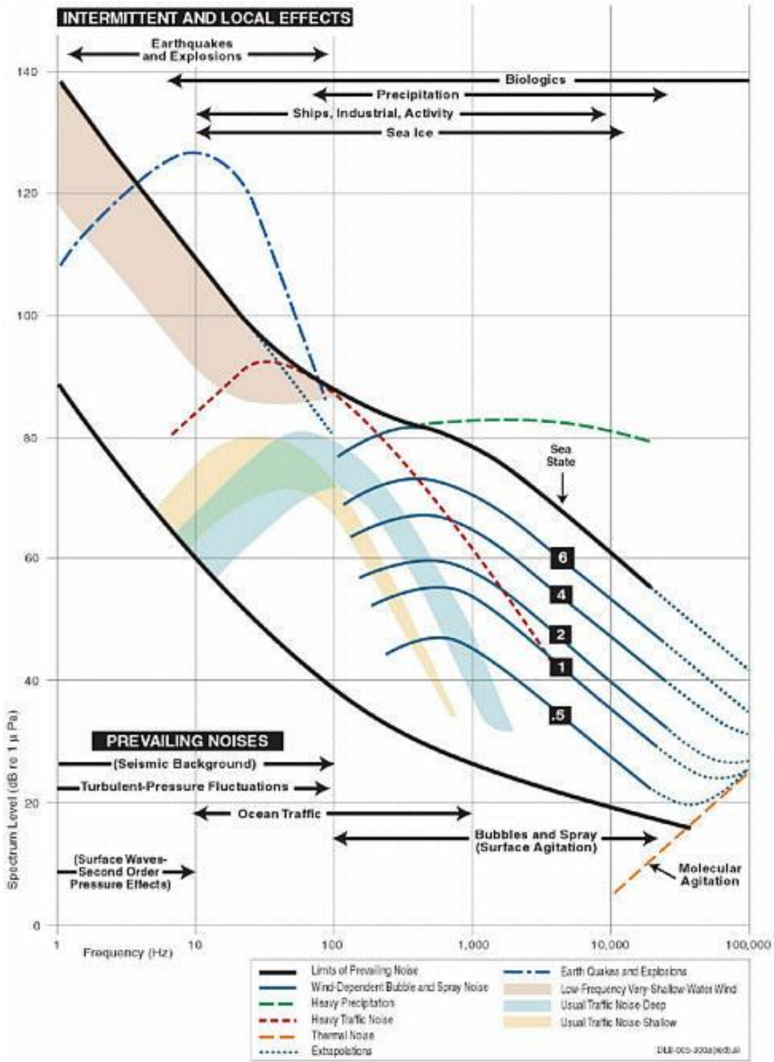


*Figure 2.1 Ambient underwater noise following Wenz (1962) showing frequency dependency from different noise sources*

10. Searching Subacoustech's underwater noise measurement database showed a comprehensive baseline noise survey was undertaken in the Irish Sea using an underwater noise monitoring station installed in the middle of the Burbo Bank Extension Offshore Wind Farm (OWF) (approximately 29km from the Project), which continuously monitored the ambient noise levels between 23rd March 2016 and 25th April 2016. The measurements taken during this survey identified the main contributing sources of noise that make up the ambient noise environment in the vicinity. Although this survey was undertaken in 2016, it is expected to represent a reasonable approximation of the subsea noise levels in the Irish Sea regions.

11. The overview of the entire monitoring period in **Figure 2.2** below shows that the range of underwater noise levels typically lay, with isolated exceptions, between 95 dB and 130 Decibel (dB) re 1 µPa Sound Pressure Level Root Mean Squared ($SPL_{RMS}$) (displayed as 10-minute averages). Although there were clear instances of times when the noise levels reached or approached

the upper and lower extremes on most days, a trend can be identified when looking at this timeframe. The logarithmic average noise level over this period was 120.4 dB re 1 µPa $SPL_{RMS}$.

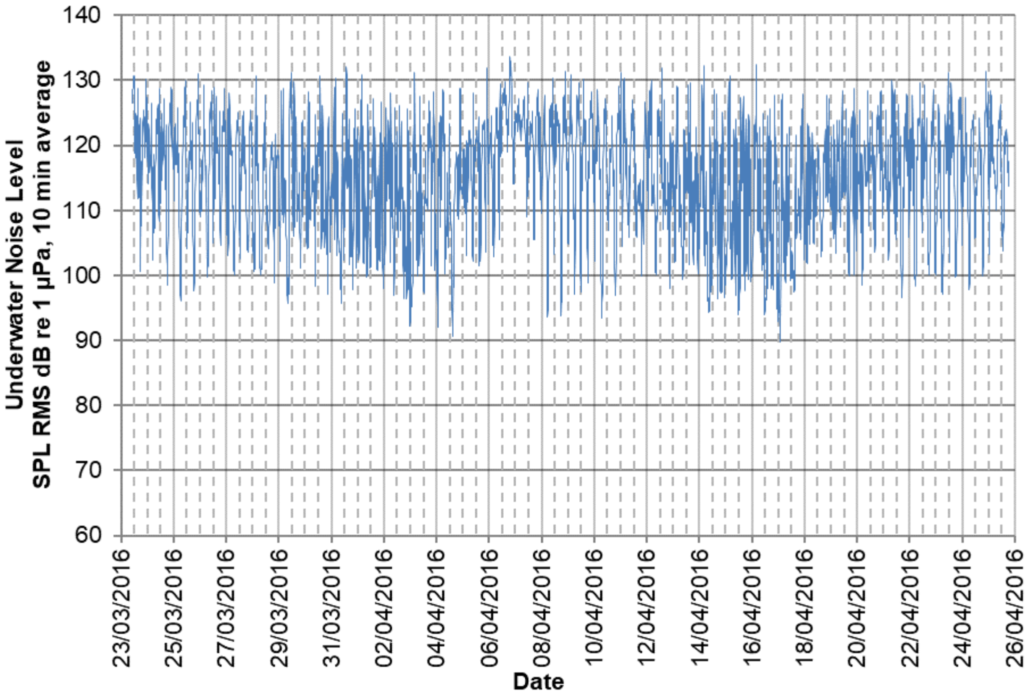


*Figure 2.2 Overall sampled underwater noise levels at Burbo Bank Extension site, March-April 2016*

12. Two primary sources influenced the noise levels in the Irish Sea: flow-related noise associated with tides moving material on the seabed and vessel noise. The highest noise levels recorded above were produced at times of greatest currents and the passing of vessels, whereas the quietest noise levels were at slack water with no significant anthropogenic influence.

13. Another underwater noise dataset was recorded at Gwynt y Môr OWF (approximately 29km from the Project) over four days in August 2012 during construction of the OWF, but in the absence of, and away from any specific construction activity in the vicinity. Noise levels were measured on a survey vessel and were 88 – 132 dB $SPL_{RMS}$ with mean daily noise levels of 92 – 119 dB $SPL_{RMS}$. This was lower than that measured at the Burbo Bank Extension site, although benefited from being measured while drifting on the vessel, which minimised any flow noise on the hydrophone.

14. In principle, when noise introduced by anthropogenic sources propagates far enough it will reduce to the level of ambient noise, at which point it can be considered negligible. In practice, as the underwater noise thresholds defined by Southall *et al.* (2019) and Popper *et al*. (2014) in the Appendix 11.1 Underwater Noise Assessment (APP-065) were all considerably above the level of background noise, any noise baseline would not influence an assessment to these criteria.

15. In response to NE's comment on baseline noise levels (NE Ref D16, RR-061-180), the Applicant has undertaken a review of available evidence and data sources, including data collected for historic OWF in the Irish Sea, to meet the requirement of NPS EN-3 paragraph 2.8.131. The Applicant considers that the information presented is sufficient to demonstrate that the level of background noise is below the threshold at which it would influence the assessments, and therefore that the information in Appendix 11.1 Underwater Noise Assessment (APP-065) is unchanged.

## 2.2 Updates to sensitivities for disturbance (NE Ref D21)

16. This section provides additional information in response to NE's comment (NE Ref D21; RR-061-185):

"*Natural England does not agree that sensitivity of dolphin and seal species to disturbance effects is low. Whilst there may not be as much evidence for these species group, it would be precautionary to consider them as having medium sensitivity. Appendix 5.2.11.2 states that dolphin species are assumed to have the same sensitivity as harbour porpoise (medium); Chapter 11 should align with this.*

*We consider that seals can be disturbed by piling over similar ranges to harbour porpoise (~25km), therefore it is appropriate to assign a similar level of sensitivity i.e. medium. Change the sensitivity of seals and dolphin species to disturbance to Medium, and revise the assessment RR-061-185)".*

17. The sensitivity assigned to dolphin and seal species for disturbance effects has been presented as medium, to show a more precautionary assessment. The following assessments were therefore updated in **Section 2.6.1** for Project-alone and **Section 2.6.2** for cumulative effects.

18. **Table 2.1** presents a summary of all assessments regarding the disturbance of marine mammals caused by underwater noise from the Project-alone, while **Table 2.2** covers the cumulative disturbance effects.

19. **Table 2.1** presents the updated significance of effect from the Project-alone assessment for disturbance from underwater noise, and all changes in the significance of effect with the updated sensitives is coloured in red.

20. The Project-alone significance of effect for all marine mammals for disturbance from Acoustic Deterrent Device (ADD) activation, piling (using results from Interims Population Consequences of Disturbance (iPCoD) modelling), construction activities, disturbance from vessels, maintenance noise and operational noise from the wind turbine generators (WTG) is **minor adverse,** therefore **not significant in Environmental Impact Assessment (EIA) terms (Table 2.1)**. This conclusion is in line with the ES Chapter 11 Marine Mammals (APP-048), where the worst-case conclusions were

assessed as **negligible** to **minor adverse**, which is **not significant in EIA terms** (**Table 2.1**).

21. **Table 2.2** presents the updated significances of effect from the cumulative effects of underwater noise caused by piling at other OWF and other noisy activities (including piling). The updated sensitives are highlighted in red. The significance of effect is **minor adverse**, and therefore **not significant in EIA terms.** The overall conclusion of effects is not significant in EIA terms in line with that the results presented in ES Chapter 11 Marine Mammals (APP-048).

22. In response to NE's comment on the sensitivity of dolphin and seal species to disturbance effects (NE Ref D21, RR-061-185) the Applicant has provided updated assessments applying an increased level of sensitivity (Medium increased from Low). For all species and impacts considered, the worst-case significance of effect remains **minor adverse** or increases from **negligible to minor adverse**, which is **not significant in EIA terms**. Consequently, the overall conclusion regarding the assessment of the significance of effect from disturbance impacts on dolphin and seal species is unchanged from that presented in Chapter 11 Marine Mammals (APP-048).

*Table 2.1 Updated sensitivities for dolphin and seals for the Project-alone assessment for disturbance of marine mammals from underwater noise (updates to the ES are shown in red)*

| Species/ receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect (based on the updated sensitivity levels) |
|---|---|---|---|---|---|
| Bottlenose dolphin | Disturbance during ADD activation | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | iPCoD modelling (piling) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels (maximum area of 285.4km$^2$) | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from all operation and maintenance vessels | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| Common dolphin | Disturbance based on dose-response curve (DRC) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

| Species/ receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect (based on the updated sensitivity levels) |
|---|---|---|---|---|---|
| | Disturbance during ADD activation | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels (maximum area of 285.4km$^2$) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from all operation and maintenance vessels | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| Risso's dolphin | Disturbance based on DRC | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during ADD activation | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

| Species/ receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect (based on the updated sensitivity levels) |
|---|---|---|---|---|---|
| | (maximum area of 285.4km$^2$) | | | | |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from all operation and maintenance vessels | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| White-beaked dolphin | Disturbance based on DRC | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during ADD activation | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels (maximum area of 285.4km$^2$) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |

| Species/ receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect (based on the updated sensitivity levels) |
|---|---|---|---|---|---|
| | Disturbance from all operation and maintenance vessels | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| Grey seal | Disturbance during ADD activation | Medium | Low (negligible)** | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | iPCoD modelling (piling) | Medium | Negligible (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels (maximum area of 285.4km$^2$) | Medium | Low (negligible)** | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from all operation and maintenance vessels | Medium | Low (low)** | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| Harbour seal | Disturbance during ADD activation | Medium | Negligible (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

| Species/ receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect (based on the updated sensitivity levels) |
|---|---|---|---|---|---|
| | iPCoD modelling | Medium | Negligible (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance during all construction activities | Medium | Negligible (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from all construction vessels (maximum area of 285.4km$^2$) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Disturbance from maintenance activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Operational WTGs | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Disturbance from all operation and maintenance vessels | Medium | Low (negligible)** | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

***Magnitudes in brackets are for the wider Management Units (MU)*

*Table 2.2 Updated sensitivities for dolphin and seals for the cumulative effects assessment of marine mammals from underwater noise during piling and other noisy projects and activities (updates to the ES are shown in red).*

| Marine mammal species/receptor | Impact | Sensitivity (updated from low*) | Magnitude | Significance of effect (as presented in Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| Bottlenose dolphin | iPCoD modelling | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Other noisy projects and activities | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| Risso's dolphin | Piling assessment | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Other noisy projects and activities | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| Common dolphin | Piling assessment | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| | Other noisy projects and activities | Medium | Low | Not Significant (Minor adverse) | Not Significant (Minor adverse) |
| White-beaked dolphin | Other noisy projects and activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| Grey seal | iPCoD modelling (piling) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Other noisy projects and activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| Harbour seal | iPCoD modelling (piling) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |
| | Other noisy projects and activities | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

## 2.3 Additional information on ship strike sensitivity (NE Ref D25)

23. This section provides additional information in response to NE's comment RR-061-189 (NE Ref D25);

"*The Applicant has not presented information to justify why minke whale has a medium sensitivity to collision risk, compared to low sensitivity for other marine mammals. We advise that sensitivity to collision risk should be medium for all species. We consider this appropriate based on the statement in paragraph 11.475*".

24. Additional information regarding collision risk has been outlined to provide justification for the sensitivity levels for marine mammal receptors.

25. Marine mammals have some ability to detect and avoid vessels (National Oceanic and Atmospheric Administration (NOAA), 2021).

26. Research shows that larger vessels, such as cruise ships and cargo vessels over 80 meters in length, are more likely to cause severe or fatal injuries to marine mammals (Laist *et al*., 2001; Keen *et al*., 2023) in comparison to smaller vessels. High speeds are a key factor in collisions with cetaceans; for instance, the likelihood of a lethal injury to large whales, specifically the North Atlantic right whale in this study, increased from around 20% to 80% when vessel speeds increased from 8 to 15 knots (Vanderlaan & Taggart, 2007). Serious injuries have also been documented at lower speeds of 2 and 5.5 knots (Conn & Silber, 2013). Conversely, vessels traveling at speeds below 10 knots rarely cause serious injuries, making reduced speed one of the most effective mitigation strategies (Laist *et al*., 2001; Conn & Silber, 2013; Laist *et al*., 2014; Keen *et al*., 2023).

27. The predictability of vessel movements by marine mammals is crucial in minimising the risks posed by vessel traffic (Nowacek *et al*., 2007, Lusseau, 2003; 2006). Reducing vessel speed not only allows more time for marine mammals to move away but also significantly reduces emitted vessel noise. This reduction in noise enables marine mammals to hear approaching ships and prevents interference with intra-species communication (Leaper, 2019).

28. An analysis of the International Whaling Commission (IWC) Ship Strike Database reveals that baleen whales, specifically fin and humpback whales, followed closely by right whales, constitute the majority of ship strike victims (Winkler *et al*., 2020). However, a significant proportion of reported cases (12.1%) lacked species identification. Reports of collisions involving smaller cetacean species are generally scarce due to reporting biases, such as unnoticed collisions, quickly sinking carcasses, or less concern for smaller species (Schoeman *et al*., 2020). The IWC report underscores that the lack of

species identification and the mis- or underreporting of ship strikes remain global issues, leading to uncertainties in the numbers and species affected (Van Waerebeek *et al*., 2007; Winkler *et al*., 2020).

29. In the United Kingdom, approximately 4-6% of stranded small cetaceans (harbour porpoise, common dolphin, white-beaked dolphin and Risso's dolphin) showed evidence of physical trauma during postmortem examinations, potentially attributable to ship strikes. This is compared to 15-20% of stranded whales, based on data from the Cetacean Strandings Investigation Programme (CSIP) database (1990-2010) (Evans *et al*., 2011).

30. Harbour porpoises, being small and highly mobile, are generally expected to avoid vessels due to their responses to vessel noise (e.g., Thomsen *et al*., 2006; Polacheck & Thorpe, 1990). Predictive modelling indicated a negative relationship between the number of ships and the distribution of harbour porpoises in the Irish and Celtic Seas, and North Sea during summer. This suggests that harbour porpoises may exhibit avoidance behaviour, thereby reducing the risk of collisions with vessels (Heinänen & Skov, 2015).

31. Vessel activity influences dolphin behaviour, with socialising and foraging often occurring in the presence of various vessel sizes, as demonstrated in a study conducted by Mills *et al.* (2023) in a busy shipping channel in the Gulf of Mexico. It has been suggested in this study that vessel movements enhanced nutrient mixing, thereby increasing prey abundance. Locally, bottlenose dolphins in Cardigan Bay exhibit responses to vessels that vary based on the type of vessel and their degree of habituation (Koroza & Evans, 2022). Observations indicated that the resident bottlenose dolphins in Cardigan Bay were more likely to tolerate disturbances compared to more transient dolphins in the region (Hudson, 2014). At the time of writing this technical note, there was no information or recorded instances of ship strikes for bottlenose dolphin in Cardigan Bay.

32. In a telemetry study of harbour and grey seals, alongside vessel Automatic Identification System (AIS) information across the British Isles, data indicated vessel and seal co-occurrence was high and that spatial overlap with ships occurred within 50km of the coast close to haul-out sites (Jones *et al*., 2017). Areas with high risk of vessel exposure included 11 Special Areas of Conservation (SAC). In an attempt to determine the likelihood of harbour seal injury occurring due to co-presence with large vessels within the Moray Firth, there appeared to be to be no relationship between areas in high co-occurrence and incidences of injury (Onoufriou *et al*., 2016). In fact, seals were observed not to react to close passing vessels.

33. The information provided above highlights that larger whale species, such as minke whales, are at a greater risk of vessel collisions compared to smaller cetaceans. Evidence shows a lower incidence of physical trauma in strandings

of smaller species, like dolphins and seals, which often display normal behaviour around vessels or even habituate to their presence. In contrast, harbour porpoises exhibit strong avoidance behaviour due to their sensitivity to noise and movement. However, minke whales, being less agile and more prone to ship strikes, do not demonstrate the same avoidance capabilities. Given their size, behaviour, and the documented increase in collisions, baleen whales, such as minke whale, should be considered to have a higher sensitivity to vessel strikes than dolphins, seals, or porpoises.

34. In response to NE's comment on ship strike sensitivity (NE Ref D25; RR-061-189), the Applicant has undertaken a review of available literature and data sources. In addition to the information presented in Chapter 11 Marine Mammals (APP-048) and based on the recent supporting information presented in this section, the Applicant considers that the approach set out in Chapter 11 Marine Mammals (APP-048) is precautionary and proportional to the impact taking into account the behaviour and sensitivity of each species. Therefore, the sensitivities to collision risk remain unchanged.

## 2.4 Updates to the collision risk assessment (NE Ref D26)

35. This section provides additional information in response to NE's comment RR-061-190 (NE Ref D26):

"*The values in the collision risk rate (%) do not appear correct. For example, for harbour porpoise: the number of deaths due to physical trauma of unknown cause (n=69) plus the deaths due to physical trauma following probable impact from vessel (n=14), totalling 83, is equivalent to 6.90% of the total necropsies where cause of death was established (n=1203); not the 5.6% presented. Review the numbers in this table and update, and/or clarify how the collision risk rate has been calculated"*.

36. The Applicant has reviewed the data used to calculate the collision risk rate which has been updated in **Table 2.3**.

37. Discrepancies identified in Table 11.55 of the Environmental Statement (ES) Chapter 11 Marine Mammals (APP-048) were due to issues in the pivot table of the original datasheet. These discrepancies have not affected the collision risk rate, and therefore the assessment outcomes remain unchanged. The risk rate was estimated by dividing the sum of the number of deaths due to physical trauma of unknown cause plus the deaths due to physical trauma from vessels with the number of necropsied with known causes of death.

38. Based on the information presented in ES Chapter 11 Marine Mammals (APP-048) and the amended values in **Table 2.3**, the Applicant considers that the assessment set out in ES Chapter 11 Marine Mammals (APP-048) is still valid.

*Table 2.3 Summary of strandings in the whole of the United Kingdom (UK) and causes of death of marine mammals from physical trauma of unknown cause and physical trauma following possible collision with a vessel (updates to the ES in red)*

| Species | Number of strandings | Number of necropsies where cause of death established | Cause of death: physical trauma of unknown cause | Cause of death: physical trauma following probable impact from vessel | Collision risk rate: (deaths from vessels strike or physical trauma) / (total known cause of death) | Collision risk rate (%) |
|---|---|---|---|---|---|---|
| Harbour porpoise | 5582 | 1617 | 75 | 16 | 0.056 | 5.6 |
| Bottlenose dolphin | 152 | 45 | 1 | 0 | 0.022 | 2.2 |
| Common dolphin | 1805 | 628 | 17 | 13 | 0.048 | 4.8 |
| Risso’s dolphin | 139 | 41 | 2 | 1 | 0.073 | 7.3 |
| White-beaked dolphin | 186 | 110 | 5 | 0 | 0.045 | 4.5 |
| Minke whale | 236 | 86 | 0 | 6 | 0.07 | 7.0 |
| Grey seal | 1909 | 417 | 18 | 0 | 0.043 | 4.3 |
| Harbour seal | 624 | 179 | 6 | 0 | 0.034 | 3.4 |

## 2.5 Updates to the indicative Unexploded Ordnance (UXO) assessment (RR-047-30)

39. This section provides an updated to a change in magnitude in response to the MMO's comment in reference to Section 3.2.2 in their RR (RR-047-30):

*"Further, Table 5-1 confirms that 616 individual harbour porpoise are at risk of PTS (Permanent Threshold Shift) during high-order detonation (353.6 kg Net Explosive Quantity (NEQ) plus donor charge) but this has been assessed as having a 'Medium' magnitude. For Low-Order clearance, 7 individual harbour porpoise are at risk of PTS, and this has also been assessed as having 'Medium' magnitude. The MMO and Cefas (C*entre for Environment, Fisheries and Aquaculture Science) *question whether 'Medium' magnitude is appropriate for the high-order assessment. The MMO* (Marine Management Organisation) *and Cefas understand that this scoring is based on the fact that 1% of the reference population is anticipated to be exposed (which is 0.986 % of the Celtic and Irish Sea (CIS) Management Unit (MU) according to Table 5-1)."*

40. For harbour porpoise, the maximum number of marine mammals potentially at risk of Permanent Threshold Shift (PTS), as outlined in Table 5.1 in Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067), was estimated to be 616 animals, or 0.986% of the Celtic and Irish Seas (CIS) MU for a high-order detonation. For a low-order clearance, 7 harbour porpoise, or 0.012% of the CIS MU, were assessed to be at risk of PTS. The magnitude for both high and low-order clearance was assessed as medium, as it falls within the 'medium' threshold limits of 0.01 – 1% of the reference population affected. Although these percentages represent the lowest and the highest ends of this 'medium' threshold range, the number of harbour porpoise at risk of PTS (7 and 616) varies significantly. Consequently, 0.986% has been rounded up to 1% and the assessment of magnitude for PTS from high-order clearance in Table 5.1 in Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067) has been revised from medium to high, to conservatively encompass the upper end of the threshold range (**Table 2.4**).

41. In response to NE's comment to update a change in magnitude (reference to Section 3.2.2 in their RR (RR-047-30)), the Applicant has assigned a higher magnitude for harbour porpoise risk to PTS based on the information presented. For harbour porpoise, the effect of PTS from high-order UXO clearance has been assessed as **major adverse** (**significant in EIA terms**), in line with the conclusion in Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067). The UXO assessment presented is only indicative and UXO clearance (if required) would be undertaken as part of a separate future marine licence application. Mitigation measures, following the hierarchy outlined in the Draft Marine Mammal Monitoring Protocol (APP-149), would reduce the significance of effect. .

*Table 2.4 Assessment of PTS from UXO harbour porpoise (updates to ES are shown in red) (updates to Table 5.2 of the Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067))*

| Maximum impact range (and area) | Maximum number of individuals | % of reference population as presented in the Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067) | % of reference population | Sensitivity | Magnitude (permanent Impact) as presented in the Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067) | Magnitude (permanent impact) and Significance of effect |
|---|---|---|---|---|---|---|
| High-order detonation (353.6kg (NEQ) + donor charge) 11km (380.13km$^2$) | 616<br>(1.621/km$^2$ based on the site-specific survey density) | 0.986% of the Celtic and Irish Sea (CIS) MU | 1% of the Celtic and Irish Sea (CIS) MU | High | Medium | High<br>Significant (Major adverse) |
| (Low-order clearance (0.5kg (NEQ)) 1.2km (4.52km$^2$) | 7<br>(1.621/km$^2$ based on the site-specific survey density | 0.012% of the CIS MU | 0.012% of the CIS MU | High | Medium | Medium<br>Significant (Major adverse) |

## 2.6 Clarification for iPCoD modelling (NE Ref D4 & D32)

42. This section provides additional information in response to NE's comment (D4; RR-061-168):

"*Natural England does not agree with the project-alone assessment of disturbance impacts from piling. We have concerns with how the results of the iPCoD modelling are presented. We also require that the impact significance should be presented based on each approach taken to assessing disturbance, not just based on the iPCoD modelling. We cannot agree with the assessment conclusions of the project-alone disturbance effects at this stage. (See Natural England Refs 19 and 23)*

*Update how the iPCoD modelling results are presented in line with comments. Present impact significance for all approaches used to assess disturbance impact.*

*Commit to further mitigation of project-alone impacts, should they be significant*."

43. This section also provides additional information in response to NE's comment (D32; RR-061-196):

"*The values in the median impacted as percentage of unimpacted column of this table do not correspond to the difference between the un-impacted population mean and the impacted population mean. For example, 288 as a percentage of 293 is 98.29%, not 100.00%. Indeed, Plate 11.3 shows a visible difference in the population size between the two, which is not reflected in Table 11.39.*

*We advise that the difference between the two presented means is included in the table, alongside the median values. The Applicant can provide information to support the value they consider to be most appropriate. Note this comment applies to all tables which present the iPCoD modelling results, including in the CEA. This is of particular importance in the CEA assessment of bottlenose dolphin, where in 2031 the impacted population mean is >5% lower than the un-impacted population mean, and so potentially significant.*

*Present the difference between the two means in each table that presents iPCoD modelling results, including in the CEA. The Applicant can provide information to support the value they consider to be most appropriate".*

44. In relation to the assessment of the population consequences of pile driving noise disturbance on marine mammal receptors, further information and clarification is provided in this section. The iPCoD modelling results presented in Sections 11.6.3.2 and 11.7.3.2 in ES Chapter 11 Marine Mammals (APP-048) and in the Report to Inform Appropriate Assessment (RIAA) (APP-027) considered the median of the ratio of impacted: unimpacted population sizes

for the relevant marine mammal populations as the key metric to determine effect significance using the iPCoD method. This is due to the fact that the median of the ratio of impacted: unimpacted population sizes is considered more statistically robust to the effects of extreme outliers than the mean value, particularly with lower sample sizes (Sinclair *et al*., 2019).

45. In addition, this metric is considered least sensitive to mis-specification of demographic parameters, therefore enabling more robust assessment of offshore renewable effects (Jital *et al*., 2017; Sinclair *et al*., 2019). Evaluations of the sensitivity of outputs to misspecification of demographic parameters have demonstrated that the ratio output metric of the counterfactual of population size (the median of the ratio of the impacted to un-impacted population size across all simulated matched replicate pairs) is a robust metric, and is therefore recommended for population viability type analyses that compare modelled populations with counterfactual populations in the context of offshore wind EIA (Jital *et al*., 2017; Sinclair *et al*., 2019). The approach taken in the ES Chapter 11 Marine Mammals (APP-048) and the RIAA (APP-027) is therefore in line with the guidance set out by the iPCoD developers (Sinclair *et al.,* 2019) and others (Jitlal *et al.,* 2017).

46. This rationale, developed by the authors of the iPCoD code, has resulted in the median of the ratio of impacted:unimpacted population sizes being used and accepted for other recent OWF EIAs, such as Moray West, Seagreen Alpha and Bravo Wind farms, the Sheringham and Dudgeon Extension Projects, North Falls and the Dogger Bank South Projects which all presented the median of the ratio of impacted to un-impacted population size.

47. It is important to note that iPCoD runs 1,000 permutations of a population growth projection for impacted and unimpacted populations. This results in 1,000 impacted: unimpacted population pairs for each time-point in the modelling period (often 25 years). Calculating the ratio between each pair and then taking the median of all ratios results in the "median of the ratio of impacted: unimpacted population sizes", which is expressed in percentage terms in the iPCoD results tables: Table 11.38 to Table 11.44 for Project-alone assessment and Tables 11.86 to 11.92 for cumulative disturbance of the ES Chapter 11 Marine Mammals (APP-048) and RIAA (APP-027). Crucially, this is not the same process as taking the median of the 1,000 impacted populations at a given time point, the median of the unimpacted population, and then comparing their ratio. In short, one method results in the median of all modelled population differences, the other method results in the difference between the medians of all modelled impacted and unimpacted populations. Therefore, it is not possible to use the average (mean or median) population values presented within iPCoD tables to calculate the median of the ratio of impacted: unimpacted population sizes, which is also presented in the same tables and is the primary metric for assessing effect significance.

48. For completeness, and at the request of NE in their comment (Ref. D32), the mean and median ratios of impacted: unimpacted population sizes are presented for the iPCoD simulation runs conducted for the Project-alone (**Section 2.6.1**) and cumulatively (**Section 2.6.2**) in relation to reference populations used in the ES Chapter 11 Marine Mammals (APP-048). In line with this comment, updates to the RIAA (APP-027) have been made separately in a Technical Note (Document Reference 9.26) submitted alongside this Technical Note at Deadline 1. Once again, it is important to note that it should not be expected that calculating the percentage difference between the mean impacted and unimpacted population sizes at a given timepoint (presented in the result tables) will result in the same value as the mean ratio of impacted: unimpacted population sizes presented in the same tables.

49. In terms of the Project-alone, the modelled impact of piling from the Project falls below the threshold of a 1% annual decline in population (regardless of whether median or mean values are used) which was considered not significant in the ES Chapter 11 Marine Mammals (APP-048).

50. For the cumulative assessment, for all species assessed, the modelled impact of piling from the Project fell below the threshold of a 1% annual decline in population (regardless of whether median or mean values are used) which was considered insignificant. The greatest impact of cumulative disturbance using median values occurs for minke whale, with a predicted 3.2% decline in population size over a 25-year period, which is below the 1% annual decline mark (as presented in ES Chapter 11 Marine Mammals (APP-048). When considering the mean values presented here, the greatest impact of cumulative disturbance for minke whale is a predicted 3.75% decline in population size over a 25-year period, which is also below the 1% annual decline mark (**Table 2.14**), and not materially different to the median values presented in the ES Chapter 11 Marine Mammals (APP-048). When considering the mean population sizes, the greatest impact of cumulative disturbance occurs for bottlenose dolphin, with a predicted 4.73% decline in population size over a 25-year period (**Table 2.13**), which is below the 1% annual decline mark.

51. For the reasons set out above, comparison of the median ratio of impacted: unimpacted populations is considered to be a measure more robust to the influence of outliers and mis-specification of demographic parameters than the mean. However, the additional information presented here in this section demonstrates that the choice of using median or mean values to compare population sizes does not materially affect the outcomes of the assessment presented in ES Chapter 11 Marine Mammals (APP-048), with all modelling results showing less than 1% annual decline for the first six years, whether the mean or median values are used.

## 2.6.1 Clarifications to the Project-alone from underwater noise due to piling

### 2.6.1.1 Harbour porpoise

52. For harbour porpoise, iPCoD results were presented for Project-alone effects in Section 11.6.3.2 in the ES Chapter 11 Marine Mammals (APP-048). The results have been presented again here, with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes displayed (**Table 2.5**). The results show a less than 1% average[1] annual decline over the first six years and over the 25 year period for both the mean and median, assessed as negligible magnitude, therefore **minor adverse** significance of effect, **not significant in EIA terms**, in line with the results presented within ES Chapter 11 Marine Mammals (APP-048).

[1] This was determined by dividing the overall percentage change for the 6 and 25 year timepoints by 6 and 25, respectively, to obtain an annual average change.

*Table 2.5 Results of the iPCoD modelling for the Project, giving the mean population size of the harbour porpoise population (CIS MU) for years up to 2052 for both impacted and un-impacted populations, in addition to the mean and median ratio between their population sizes (clarifications to Table 11.38 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 62,516 | 62,516 | 100.00% | 62,516 | 62,516 | 100.00% |
| End 2028 | 62,451 | 62,451 | 100.00% | 62,590 | 62,590 | 100.00% |
| End 2029 | 62,424 | 62,268 | 99.75% | 62,431 | 62,304 | 99.89% |
| End 2032 | 62,524 | 62,403 | 99.81% | 62,317 | 62,191 | 99.89% |
| End 2037 | 62,307 | 62,180 | 99.80% | 61,858 | 61,698 | 99.89% |
| End 2047 | 62,036 | 61,908 | 99.80% | 61,274 | 61,197 | 99.89% |
| End 2052 | 61,876 | 61,750 | 99.80% | 60,910 | 60,745 | 99.89% |

#### 2.6.1.2 Bottlenose dolphin

53. For bottlenose dolphin, iPCoD results were presented for Project-alone effects in Section 11.6.3.2 in the ES Chapter 11 Marine Mammals (APP-048). The results have been presented again here, with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes displayed (**Table 2.6**). The results show a less than 1% average annual decline over the first six years and over the 25 year period for both mean and median, assessed as negligible magnitude, therefore **minor adverse** significance of effect, **not significant in EIA terms**, in line with the results presented within ES Chapter 11 Marine Mammals (APP-048).

*Table 2.6 Results of the iPCoD modelling for the Project, giving the mean population size of the bottlenose dolphin population (IS MU) for years up to 2052 for both impacted and un-impacted populations in addition to the mean and median ratio between their population sizes (clarifications to Table 11.39 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 296 | 296 | 100.00% | 296 | 296 | 100.00% |
| End 2028 | 295 | 295 | 100.00% | 296 | 296 | 100.00% |
| End 2029 | 293 | 288 | 98.30% | 294 | 290 | 100.00% |
| End 2032 | 287 | 283 | 98.69% | 288 | 284 | 100.00% |
| End 2037 | 278 | 275 | 98.85% | 278 | 274 | 100.00% |
| End 2047 | 262 | 259 | 98.75% | 258 | 256 | 100.00% |
| End 2052 | 255 | 252 | 98.73% | 252 | 250 | 100.00% |

#### 2.6.1.3 Minke whale

54. For minke whale, iPCoD results were presented for Project-alone effects in Section 11.6.3.2 in the ES Chapter 11 Marine Mammals (APP-048). The results have been presented again here, with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes displayed (**Table 2.7**). The results show a less than 1% average annual decline over the first six years and over the 25 years period for both the mean and median, assessed as negligible magnitude, therefore **minor adverse** significance of effect, **not significant in EIA terms**, in line with the results presented within ES Chapter 11 Marine Mammals (APP-048).

*Table 2.7 Results of the iPCoD modelling for the Project, giving the mean population size of the minke whale population (Celtic and Greater North Sea (CGNS MU) for years up to 2052 for both impacted and un-impacted populations in addition to the mean and median ratio between their population sizes (clarifications to Table 11.40 of ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 20,120 | 20,120 | 100.00% | 20,120 | 20,120 | 100.00% |
| End 2028 | 20,188 | 20,188 | 100.00% | 20,256 | 20,256 | 100.00% |
| End 2029 | 20,222 | 20,203 | 99.91% | 20,236 | 20,217 | 99.94% |
| End 2032 | 20,193 | 20,145 | 99.76% | 20,148 | 20,078 | 99.81% |
| End 2037 | 20,189 | 20,114 | 99.63% | 20,032 | 19,944 | 99.70% |
| End 2047 | 20,115 | 20,026 | 99.56% | 19,857 | 19,784 | 99.63% |
| End 2052 | 19,976 | 19,887 | 99.56% | 19,407 | 19,320 | 99.63% |

#### 2.6.1.4 Grey seal

55. For grey seal, iPCoD results were presented for Project-alone effects in Section 11.6.3.2 in the ES Chapter 11 Marine Mammals (APP-048). The results have been presented again here, for both the smaller ‘combined population’ (North-West (NW) England MU and Isle of Man (IoM) population) (**Table 2.8**) and for the wider reference population (**Table 2.9**), with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes. The results show no annual decline over the first six years and over the 25 years period for both the mean and median, assessed as negligible magnitude, therefore **minor adverse** significance of effect, **not significant in EIA terms**, in line with the results presented within ES Chapter 11 Marine Mammals (APP-048).

*Table 2.8 Results of the iPCoD modelling for the Project, giving the mean population size of the grey seal combined population (NW England MU and IoM population) for years up to 2052 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.42 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 1,592 | 1,592 | 100.00% | 1,592 | 1,592 | 100.00% |
| End 2028 | 1,605 | 1,605 | 100.00% | 1,612 | 1,605 | 100.00% |
| End 2029 | 1,617 | 1,617 | 100.00% | 1,620 | 1,617 | 100.00% |
| End 2032 | 1,650 | 1,649 | 100.00% | 1,654 | 1,649 | 100.00% |
| End 2037 | 1,701 | 1,701 | 100.00% | 1,692 | 1,701 | 100.00% |
| End 2047 | 1,814 | 1,814 | 100.00% | 1,806 | 1,814 | 100.00% |
| End 2052 | 1,876 | 1,876 | 100.00% | 1,868 | 1,876 | 100.00% |

*Table 2.9 Results of the iPCoD modelling for the Project, giving the mean population size of the grey seal population (wider population (see Section 11.5.9) for years up to 2052 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.41 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 13,288 | 13,288 | 100.00% | 13,288 | 13,288 | 100.00% |
| End 2028 | 13,388 | 13,388 | 100.00% | 13,454 | 13,454 | 100.00% |
| End 2029 | 13,443 | 13,444 | 100.00% | 13,501 | 13,501 | 100.00% |
| End 2032 | 13,735 | 13,736 | 100.00% | 13,811 | 13,811 | 100.00% |
| End 2037 | 14,202 | 14,203 | 100.00% | 14,243 | 14,244 | 100.00% |
| End 2047 | 15,116 | 15,118 | 100.00% | 15,011 | 15,015 | 100.00% |
| End 2052 | 15,583 | 15,585 | 100.00% | 15,431 | 15,434 | 100.00% |

#### 2.6.1.5 Harbour seal

56. For harbour seal, iPCoD results were presented for Project-alone effects in Section 11.6.3.2 in the ES Chapter 11 Marine Mammals (APP-048), the results have been presented again here for both the NW MU (**Table 2.10**) and the NW and Northern Ireland (NI) MU (**Table 2.11**), with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes displayed. The results show no annual decline in the first six years and over the 25 years period for both the mean and median, assessed as negligible magnitude, therefore **minor adverse** significance of effect, **not significant in EIA terms**, in line with the results presented within ES Chapter 11 Marine Mammals (APP-048).

*Table 2.10 Results of the iPCoD modelling for the Project, giving the mean population size of the harbour seal population (North West MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.44 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 4 | 4 | 100.00% | 4 | 4 | 100.00% |
| End 2028 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2029 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2032 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2037 | 3 | 3 | 100.00% | 2 | 2 | 100.00% |
| End 2047 | 3 | 3 | 100.00% | 0 | 0 | 100.00% |
| End 2052 | 3 | 3 | 100.00% | 0 | 0 | 100.00% |

*Table 2.11 Results of the iPCoD modelling for the Project, giving the mean population size of the harbour seal population (NW England MU and NI MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.43 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 1,412 | 1,412 | 100.00% | 1,412 | 1,412 | 100.00% |
| End 2028 | 1,413 | 1,413 | 100.00% | 1,416 | 1,416 | 100.00% |
| End 2029 | 1,413 | 1,413 | 100.00% | 1,414 | 1,414 | 100.00% |
| End 2032 | 1,417 | 1,417 | 100.00% | 1,412 | 1,412 | 100.00% |
| End 2037 | 1,425 | 1,425 | 100.00% | 1,421 | 1,421 | 100.00% |
| End 2047 | 1,428 | 1,428 | 100.00% | 1,406 | 1,406 | 100.00% |
| End 2052 | 1,426 | 1,426 | 100.00% | 1,406 | 1,406 | 100.00% |

## 2.6.2 Clarifications to cumulative effects from underwater noise due to piling

57. Section 11.7.3.2 in ES Chapter 11 Marine Mammals (APP-048) presents the assessment of the potential cumulative effects of other projects that could occur at the same time as the Project. Population modelling was deemed the best tool to use to assess the potential impacts of cumulative disturbance as it considers the consequences of disturbance and hearing damage (worst-case numbers) that might result from the construction of the Project and other projects.

58. The results have been presented again here, with both median and mean population sizes, and the mean and median ratios of impacted: unimpacted population sizes. A greater than 1% average annual decline is not found for any species, regardless of whether mean or median metric are used, and therefore the conclusions within ES Chapter 11 Marine Mammals (APP-048) remain valid.

### 2.6.2.1 Harbour porpoise

59. For harbour porpoise, iPCoD modelling resulted in no significant effect on the population (**Table 2.12**). Whether the mean or median value is used to inform the results, the results show a less than 1% average annual decline over the first six years and over the 25 year period for both the mean and median. Therefore, disturbance from cumulative underwater noise from piling is assessed as negligible magnitude, with **minor adverse** significance of effect which is **not significant in EIA terms**. There would be no significant effect on the harbour porpoise population due to piling, and the conclusions of ES Chapter 11 Marine Mammals (APP-048) therefore remain valid.

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*Table 2.12 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the harbour porpoise population (CIS MU) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.86 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 62,516 | 62,516 | 100.00% | 62,516 | 62,516 | 100.00% |
| End 2027 | 62,574 | 62,569 | 99.99% | 62,730 | 62,721 | 100.00% |
| End 2028 | 62,509 | 62,278 | 99.63% | 62,837 | 62,508 | 99.78% |
| End 2031 | 62,389 | 61,703 | 98.91% | 62,426 | 61,650 | 99.22% |
| End 2036 | 62,482 | 61,818 | 98.95% | 62,299 | 61,505 | 99.26% |
| End 2046 | 62,436 | 61,770 | 98.95% | 61,605 | 60,900 | 99.27% |
| End 2051 | 62,564 | 61,897 | 98.95% | 61,739 | 61,130 | 99.26% |

#### 2.6.2.2 Bottlenose dolphin

60. For bottlenose dolphin, iPCoD modelling resulted in no significant effect on the population (**Table 2.13**). Whether the mean or median value is used to inform the results, the results show a less than 1% average annual decline over the first six years and over the 25 year period for both the mean and median. Hence, disturbance from cumulative underwater noise from piling is assessed as negligible magnitude, therefore **minor adverse** significance of effect and **not significant in EIA terms**. There would be no significant effect on the bottlenose dolphin population due to piling, and therefore the conclusions of ES Chapter 11 Marine Mammals (APP-048) remain valid.

*Table 2.13 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the bottlenose dolphin population (IS MU) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.87 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 296 | 296 | 100.00% | 296 | 296 | 100.00% |
| End 2027 | 295 | 289 | 98.13% | 296 | 292 | 100.00% |
| End 2028 | 292 | 281 | 96.14% | 294 | 284 | 98.61% |
| End 2031 | 286 | 271 | 94.85% | 288 | 272 | 97.71% |
| End 2036 | 277 | 264 | 95.64% | 276 | 262 | 97.87% |
| End 2046 | 261 | 249 | 95.32% | 260 | 245 | 97.80% |
| End 2051 | 254 | 242 | 95.27% | 250 | 236 | 97.97% |

#### 2.6.2.3 Minke whale

61. For minke whale, iPCoD modelling resulted in no significant effect on the population (**Table 2.14**). Whether the mean or median value is used to inform the results, the results show a less than 1% average annual decline over the first six years and over the 25 year period for both the mean and median. Hence, disturbance from cumulative underwater noise from piling is assessed as negligible magnitude. Significance of effect is assessed as **minor adverse** and **not significant in EIA terms**. There would be no significant effect on the minke whale population due to piling, and therefore the conclusions of ES Chapter 11 Marine Mammals (APP-048) remain valid.

*Table 2.14 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the minke whale population (CGNS MU) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.88 of the ES Chapter 11 Marine Mammals (APP-048)))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 20,118 | 20,118 | 100.00% | 20,118 | 20,118 | 100.00% |
| End 2027 | 20,125 | 20,123 | 99.99% | 20,293 | 20,289 | 100.00% |
| End 2028 | 20,185 | 20,140 | 99.78% | 20,378 | 20,348 | 99.87% |
| End 2031 | 20,226 | 19,885 | 98.31% | 20,406 | 20,129 | 98.75% |
| End 2036 | 20,270 | 19,691 | 97.13% | 20,451 | 19,834 | 97.63% |
| End 2046 | 20,472 | 19,724 | 96.33% | 20,513 | 19,746 | 96.88% |
| End 2051 | 20,525 | 19,757 | 96.25% | 20,355 | 19,707 | 96.80% |

#### 2.6.2.4 Grey seal

62. For grey seal, iPCoD modelling resulted in no significant effect on the population (**Table 2.15** (NW England and IoM MU)) and (**Table 2.16** (wider population)). Whether the mean or median value is used to inform the results, the results show a less than 1% average annual decline over the first six years and over the 25 year period for both the mean and median. Hence, disturbance from cumulative underwater noise from piling is assessed as negligible magnitude with **minor adverse** significance of effect which is **not significant in EIA terms**. There would be no significant effect on the grey seal population due to piling, and therefore the conclusions of ES Chapter 11 Marine Mammals (APP-048) remain valid.

*Table 2.15 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the grey seal combined population (NW England MU and IoM population) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.90 of the ES Chapter 11 Marine Mammals (APP-048)))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 1,592 | 1,592 | 100.00% | 1,592 | 1,592 | 100.00% |
| End 2028 | 1,603 | 1,603 | 100.00% | 1,608 | 1,608 | 100.00% |
| End 2029 | 1,612 | 1,611 | 99.98% | 1,616 | 1,616 | 100.00% |
| End 2032 | 1,645 | 1,642 | 99.82% | 1,654 | 1,652 | 99.88% |
| End 2037 | 1,711 | 1,708 | 99.78% | 1,708 | 1,706 | 99.86% |
| End 2047 | 1,834 | 1,830 | 99.77% | 1,826 | 1,822 | 99.96% |
| End 2052 | 1,896 | 1,892 | 99.78% | 1,872 | 1,870 | 100.00% |

*Table 2.16 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the grey seal population (wider reference population) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.89 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 13,288 | 13,288 | 100.00% | 13,288 | 13,288 | 100.00% |
| End 2027 | 13,393 | 13,393 | 100.00% | 13,458 | 13,458 | 100.00% |
| End 2028 | 13,473 | 13,475 | 100.02% | 13,547 | 13,548 | 100.01% |
| End 2031 | 13,727 | 13,732 | 100.04% | 13,759 | 13,767 | 100.04% |
| End 2036 | 14,192 | 14,197 | 100.04% | 14,148 | 14,154 | 100.04% |
| End 2046 | 15,049 | 15,054 | 100.04% | 14,984 | 14,986 | 100.03% |
| End 2051 | 15,557 | 15,563 | 100.03% | 15,450 | 15,448 | 100.03% |

* Note that the marginal increase in the impacted population in comparison to the un-impacted population is a result of the environmental stochasticity built into the model

### 2.6.2.5 Harbour seal

63. For harbour seal, iPCoD modelling resulted in no significant effect on the population (**Table 2.17** (NW England MU) and **Table 2.18** (NW England and NI MU)). Whether the mean or median value is used to inform the results, the results show a less than 1% average annual decline over the first six years and over the 25 year period for both the mean and median. Hence, disturbance from cumulative underwater noise from piling is assessed as negligible magnitude, with **minor adverse** significance of effect, which is **not significant in EIA terms**. There would be no significant effect on the harbour seal population due to piling, and therefore the conclusions of ES Chapter 11 Marine Mammals (APP-048) remain valid.

*Table 2.17 Results of the iPCoD modelling for the Project, giving the mean population size of the harbour seal population (North West MU) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.92 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 4 | 4 | 100.00% | 4 | 4 | 100.00% |
| End 2028 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2029 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2032 | 3 | 3 | 100.00% | 4 | 4 | 100.00% |
| End 2037 | 3 | 3 | 100.00% | 2 | 2 | 100.00% |
| End 2047 | 3 | 3 | 100.00% | 0 | 0 | 100.00% |
| End 2052 | 3 | 3 | 100.00% | 0 | 0 | 100.00% |

*Table 2.18 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the harbour seal population (North West MU and NI MU) for years up to 2051 for both impacted and un-impacted populations in addition to the median and mean ratio between their population sizes (clarifications to Table 11.91 of the ES Chapter 11 Marine Mammals (APP-048))*

| Year | Un-impacted population mean | Impacted population mean | Mean impacted as % of un-impacted | Un-impacted population median | Impacted population median | Median impacted as % of un-impacted |
|---|---|---|---|---|---|---|
| Start | 1,412 | 1,412 | 100.00% | 1,412 | 1,412 | 100.00% |
| End 2027 | 1,415 | 1,415 | 100.00% | 1,418 | 1,418 | 100.00% |
| End 2028 | 1,413 | 1,413 | 100.00% | 1,414 | 1,414 | 100.00% |
| End 2031 | 1,416 | 1,416 | 100.00% | 1,416 | 1,416 | 100.00% |
| End 2036 | 1,420 | 1,420 | 100.00% | 1,414 | 1,414 | 100.00% |
| End 2046 | 1,430 | 1,430 | 100.00% | 1,420 | 1,420 | 100.00% |
| End 2051 | 1,436 | 1,436 | 100.00% | 1,420 | 1,420 | 100.00% |

64. In response to NE's comment (D4; RR-061-168) and D32; RR-061-196) on the presentation of iPCoD modelling results, particularly with regard to the mean and median of the ratio of impacted: unimpacted population sizes, the Applicant considers that the additional information provided in this section is sufficient to determine that the median is the most appropriate key metric to evaluate the significance of a population level effect. Having calculated both the mean and the median values to compare population sizes, the assessment conclusions presented for Project-alone and cumulatively in Chapter 11 Marine Mammals (APP-048) remain unchanged.

## 2.7 Clarification on disturbance assessments (NE Ref D4 & D28)

65. This section provides additional information in response to NE's comment (D4; RR-061-168):

"*Natural England does not agree with the project-alone assessment of disturbance impacts from piling. We have concerns with how the results of the iPCoD modelling are presented. We also require that the impact significance should be presented based on each approach taken to assessing disturbance, not just based on the iPCoD modelling. We cannot agree with the assessment conclusions of the project-alone disturbance effects at this stage. (See Natural England Refs 19 and 23)*

*Update how the iPCoD modelling results are presented in line with comments. Present impact significance for all approaches used to assess disturbance impact.*

*Commit to further mitigation of project-alone impacts, should they be significant*."

66. This section also provides additional information in response to NE's comment (D28; RR-061-192):

"*The significance of the disturbance impact must be presented for each of the approaches used to determine disturbance distance. Each approach and subsequent assessment of impact significance provides necessary information for Natural England to inform its advice. For example, the magnitude of impact to harbour porpoise using the EDR* (Effective Deterrence Range) *approach is Medium, which when combined with a Medium sensitivity, leads to a Moderate impact significance which is Significant in EIA terms. Information such as this is currently missing. It is not appropriate to only present the significance of the disturbance impact after population modelling has been undertaken. This also applies to the CEA* (Cumulative Effect Assessment). *We advise that an assessment of cumulative impacts to cetacean species is presented using the approach that* *generates the worst-case numbers disturbed. The Applicant should not only present the iPCoD modelling results.*

*Present the impact significance for each approach used to determine the disturbance range, using the combination of sensitivity and magnitude (percentage of reference population within the disturbance range). Present the cumulative impact significant for each species using the worst-case numbers disturbed i.e. not only the iPCoD modelling results."*

67. As outlined in **Section 2.2**, the amended sensitivities in response to NE Ref. D21 (RR-061-185) have been incorporated into the updated assessment in **Sections 2.7.1** and **2.7.2**, which present information on the significance for each assessment method.

### 2.7.1 Clarifications to the Project-alone assessment

68. This section provides information in response to NE's comment (D4; RR-061-168).

69. Harbour porpoise **Table 2.19** presents the magnitude and significance of effect for all assessment methods used in the ES Chapter 11 Marine Mammals (APP-048) to assess for potential disturbance to harbour porpoise from piling, including the Effective Deterrence Range (EDR) approach, the DRC approach, and the population modelling (iPCoD) approach.

70. For the EDR approach, the significance of effect is moderate adverse (significant in EIA terms). Whereas for the other two methods, the DRC and the iPCoD population modelling shows that there is minor adverse and negligible adverse effect respectively (not significant in EIA terms) for the potential of disturbance to harbour porpoise.

71. Brown *et al*. (2023) highlights the approach used to produce the current 26km EDR likely overestimates the response because it does not account for underlying seasonal variation during baseline and piling periods. In addition, findings in the latest PrePared report looking at harbour porpoise response to piling at Ocean Winds Moray West OWF found evidence of an EDR of 10km, providing a strong case for reducing the current 26 km EDR for unabated impact piling of monopiles (Benhemma-Le Gall *et al*., 2024).

72. As stated by NE within their Phase III Best Practice guide[2] "*a dose-response curve is recommended to assess behavioural responses as a matter of best practice, where possible and relevant. This is the most recent approach, is a*

[2] Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards; Phase III: Expectations for data analysis and presentation at examination for offshore wind applications (Parker *et al*., 2022)

*more realistic representation of animal response, and is based on empirical at-sea monitoring data*".

73. Therefore, the resultant significance level using the DRC approach is considered the most realistic assessment for harbour porpoise and based on the latest research and knowledge, while the EDR approach, as outlined above, can be considered to be over-precautionary. Regardless, the resultant iPCoD modelling used the results from the EDR approach to investigate the validity of the indicated a significant effect on the harbour porpoise population, with no population level effect expected, even using the over-precautionary EDR approach.

74. Taking into account all considerations above, it has been concluded that the potential for disturbance from the Project for harbour porpoise would be **minor adverse, therefore not significant in EIA terms,** and in line with the assessment set out in ES Chapter 11 Marine Mammals (APP-048).

*Table 2.19 Assessment of potential disturbance of harbour porpoise (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect (changes compared to ES highlighted in red) |
|---|---|---|---|---|---|
| 26km EDR for monopiles (2,124km$^2$) | 3,443<br>(5.5% of CIS MU) | Medium | Medium | Not provided | Significant (Moderate adverse)<br>*Significance is further investigated through iPCoD modelling* |
| DRC | 1,857.9<br>(2.97% of CIS MU) | Medium | Low | Not provided | Not Significant<br>(Minor adverse) |
| iPCoD modelling | <1% of CIS MU | Medium | Negligible | Not Significant<br>(Minor adverse) | Not Significant<br>(Minor adverse) |

#### 2.7.1.1 Bottlenose dolphin

75. **Table 2.20** presents the results from all methods used to assess for potential disturbance from underwater noise due to piling to bottlenose dolphin. Results from the DRC (with the harbour porpoise DRC used as a proxy) show that there could be a major adverse effect (significant in EIA terms), however taking into account the difference in hearing sensitivity between harbour porpoise (Very-High Frequency (VHF) cetaceans) and bottlenose dolphin (High-Frequency (HF) cetaceans (see Table 11.20 in ES Chapter 11 Marine Mammals (APP-048); Southall *et al.,* 2019), this would be over-precautionary. DRC should be used where the species and sound type combination is available, which is lacking for all dolphin species (Sinclair *et al*., 2023). In addition, the resultant iPCoD modelling used the results from the DRC approach to investigate the validity of the indicated significant effect on the bottlenose dolphin population, with no population level effect expected, even with the over-precautionary use of the harbour porpoise DRC.

76. Using a temporary hearing threshold (TTS) as a proxy for disturbance or results from the iPCoD population assessment generate an effect of minor adverse (not significant in EIA terms). It is also important to note that bottlenose dolphin have a predominantly coastal distribution (see ES Appendix 11.2 Marine Mammal Information and Survey Data (APP-066)). They are primarily an inshore species, with most sightings within 10km of land. The Project windfarm site would be located approximately 30km from the nearest point on the coast; therefore, bottlenose dolphin are unlikely to be significantly disturbed.

77. It is therefore concluded that the significance of effect for bottlenose dolphin to potential underwater noise disturbance from piling is **minor adverse (not significant in EIA terms)** whereas it was assessed as negligible adverse in the ES Chapter 11 Marine Mammals (APP-048). Increasing the sensitivity (in line with NE Ref. D21) would result in an increase in the significance of effect, but it would remain as not significant in EIA terms.

*Table 2.20 Assessment of potential disturbance of bottlenose dolphin (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low*) | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| TTS 0.1km$^2$ | 0.001<br>(0.0004% of Irish Sea (IS) MU) | Medium | Negligible | Not provided | Not Significant<br>(Minor adverse) |
| DRC | 56.3<br>(19.2% of IS MU) | Medium | High | Not provided | Significant<br>(Major adverse)<br>*Significance is further investigated through iPCoD modelling* |
| iPCoD modelling | <2% of IS MU | Medium | Negligible | Not Significant<br>(Minor adverse) | Not Significant<br>(Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

78. Common dolphin **Table 2.21** presents the results from all methods used to assess for potential disturbance to common dolphin from underwater noise due to piling. Using TTS as a proxy for disturbance or results from the DRC assessment (using the harbour porpoise DRC as a proxy) results in a significance effect of minor adverse (not significant in EIA terms).

79. Amending the sensitivity of disturbance from underwater noise for common dolphin from low to medium (in line with NE Ref. D21) changes the significance of effect from negligible adverse (not significant in EIA terms) to **minor adverse, not significant in EIA terms (Table 2.21),** and therefore the overall conclusions are in line with the with the ES Chapter 11 Marine Mammals (APP-048).

*Table 2.21 Assessment of potential disturbance of common dolphin (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| TTS 0.1km$^2$ | 0.003 (0.000003% of CGNS MU) | Medium | Negligible | Not provided | Not Significant (Minor adverse) |
| DRC | 127.6 (0.12% of CGNS MU) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

80. Risso's dolphin **Table 2.22** presents the results from all methods used to assess for potential disturbance to Risso's dolphin from underwater noise due to piling. Using TTS as a proxy for disturbance or results from the DRC assessment (using the harbour porpoise DRC as a proxy) results in a significance effect of minor adverse (not significant in EIA terms).

81. Amending the sensitivity of disturbance from underwater noise for Risso's dolphin from low to medium changes the significance of effect from negligible adverse (not significant in EIA terms) to **minor adverse, not significant in EIA terms (Table 2.22)** and therefore the overall conclusions are in line with the ES Chapter 11 Marine Mammals (APP-048)).

*Table 2.22 Assessment of potential disturbance of Risso's dolphin (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| TTS 0.1km$^2$ | 0.0006<br>(0.0000005% of CGNS MU) | Medium | Negligible | Not provided | Not Significant<br>(Minor adverse) |
| DRC | 2.4<br>(0.02% of CGNS MU) | Medium | Negligible | Not Significant<br>(Negligible adverse) | Not Significant<br>(Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

82. White-beaked dolphin **Table 2.23** presents the results from all methods used to assess for potential disturbance to white-beaked dolphin from underwater noise due to piling. Using TTS as a proxy for disturbance or results from the DRC assessment (using the harbour porpoise DRC as a proxy) results in a significance effect of minor adverse (not significant in EIA terms).

83. Amending the sensitivity of disturbance from underwater noise for white-beaked dolphin from low to medium (in line with NE Ref. D21) changes the significance of effect from negligible adverse (not significant in EIA terms) to **minor adverse, which is not significant in EIA terms** (**Table 2.23**), and therefore the overall conclusions are in line with the ES Chapter 11 Marine Mammals (APP-048).

*Table 2.23 Assessment of potential disturbance of white-beaked dolphin (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| TTS 0.1km$^2$ | 0.001<br>(0.000002% of CGNS MU) | Medium | Negligible | Not provided | Not Significant<br>(Minor adverse) |
| DRC | 17.9<br>(0.04% of CGNS MU) | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant<br>(Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

84. Minke whale **Table 2.24** presents the results from assessing any potential disturbance to minke whale from underwater noise due to piling, including using the 30km EDR approach (Richardson *et al*., 1999) based on the literature review in Section 6.1.3 in Appendix 11.2 Marine Mammal Information and Survey Data (APP-066) and iPCoD modelling. Both methods result in a significance of effect of **minor adverse (not significant in EIA terms),** and therefore the overall conclusions are in line with the ES Chapter 11 Marine Mammals (APP-048).

*Table 2.24 Assessment of potential disturbance of minke whale (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| 30km disturbance range (2827.43km$^2$) | 24.9<br>(0.12% of CGNS MU) | Medium | Negligible | Not provided | Not Significant (Minor adverse) |
| iPCoD modelling | <1% of CGNS[3] MU | Medium | Negligible | Not Significant (Minor adverse) | Not Significant (Minor adverse) |

[3] An error involving the incorrect Management Unit has been identified and corrected in The Applicant's Response to the Rule 9 Letter (PD1-010).

#### 2.7.1.2 Grey seal

85. **Table 2.25** presents all methods used to assess for potential disturbance to grey seal. Using the 25km disturbance range (Russel *et al*., 2016) the significance of effect is major adverse (which is significant in EIA terms). The 25km disturbance range is the only accepted range for assessing disturbance to seals from piling. However, it is unknown how appropriate the 25km disturbance range is as the study was conducted on harbour seal only.

86. The 25km disturbance range for grey seal could be considered over precautionary because it stems from a single study on harbour seal response to OWFs. This study did not account for variations in piling characteristics or the effects of bathymetry on sound propagation. Consequently, the displacement distance of grey seal could vary significantly across sites (Madsen *et al*., 2006, Russel *et al*., 2016).

87. The results from the iPCoD modelling used the results from the 25km disturbance range approach to investigate the validity of the indicated significant effect on the grey seal population, with no population level effect expected.

88. The DRC assessment and the iPCoD modelling result in a minor adverse significance of effect (not significant in EIA terms).

89. Therefore, taking all three assessments into account, it is concluded that the potential for disturbance to grey seal from underwater noise due to piling would be **minor adverse (not significant in EIA terms),** in line with the conclusions of the ES Chapter 11 Marine Mammals (APP-048).

90. In the ES Chapter 11 Marine Mammals (APP-048), the significance of effect was assessed as negligible adverse (not significant in EIA terms). Increasing the sensitivity (in line with NE Ref. D21) has increased the significance of effect, but it remains not significant in EIA terms.

*Table 2.25 Assessment of potential disturbance of grey seal (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low)** | Magnitude* (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| 25km disturbance range (1963.5 $km^2$) | 196.4<br>(12.3% of the combined MU; or 1.5% of the wider reference population) | Medium | High<br>(Low) | Not provided | Significant (Major adverse)<br>*Significance is further investigated through iPCoD modelling* |
| DRC | 0.151<br>(0.009% of the combined MU; 0.00001% of the wider reference population) | Medium | Negligible<br>(negligible) | Not provided | Not Significant<br>(Minor adverse) |
| iPCoD modelling | <1% of the combined and wider reference population[3] | Medium | Negligible<br>(negligible) | Not Significant<br>(Negligible adverse) | Not Significant<br>(Minor adverse) |

**Magnitudes in brackets are for the wider MU.*

***In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

### 2.7.1.3 Harbour seal

91. **Table 2.26** presents all methods used to assess for potential disturbance to harbour seal. Using the 25km EDR (Russel *et al*., 2016) which is the only accepted disturbance range for seals, could be again considered as over precautionary as it is a result from one study. Disturbance ranges can vary amongst different projects, due to pile designs, bathymetry on sound propagation. Using the 25km disturbance range, the effect would be minor adverse, and under the DRC and iPCoD modelling approach, the assessments are also minor adverse (both not significant in EIA terms). In ES Chapter 11 Marine Mammals (APP-048), the effect was assessed as negligible adverse (not significant in EIA terms), but due to increasing the sensitivity from low to medium to disturbance (NE Ref. D21), the significance of effect would be minor adverse (not significant in EIA terms).

92. Therefore, taking all three assessments into account, it is concluded that the potential for disturbance to harbour seal from underwater noise due to piling would be minor adverse (not significant in EIA terms), in line with the overall conclusions of ES Chapter 11 Marine Mammals (APP-048). Again, the iPCoD modelling is the most appropriate tool to assess the potential impacts of disturbance to consider the longer term population consequences of harbour seal.

*Table 2.26 Assessment of potential disturbance of harbour seal (updates to ES are shown in red)*

| Assessment Method | Maximum number of individuals (% of reference population) | Sensitivity (updated from low)** | Magnitude* (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|---|
| 25km disturbance range (1963.5 $km^2$) | 0.22<br>(3.1% of the NW MU; or 0.015% of wider reference population) | Medium | Low (negligible) | Not provided | Not Significant (Minor adverse) |
| DRC | 0.001<br>(0.0084% of the NW MU; or <0.00001% of the wider reference population) | Medium | Negligible<br>(negligible) | Not provided | Not Significant (Minor adverse) |
| iPCoD modelling | <1% of the NW MU, and the wider reference population[3]) | Medium | Negligible | Not Significant<br>(Negligible adverse) | Not Significant (Minor adverse) |

**Magnitudes in brackets are for the wider MU*

***In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

### 2.7.2 Clarifications to cumulative effects from underwater noise due to piling

93. This section provides information in response to NE's comment (NE Ref. D28; RR-061-192).

94. The following section applies to harbour porpoise, bottlenose dolphin, minke whale, grey seal and harbour seal, where a quantitative assessment (beyond population modelling) has not been presented previously in the ES. Within the ES, following the initial screening of UK and European OWFs, further screening was undertaken to identify those OWF projects that have the potential for overlapping construction phases with the Project. This screening considered known piling activities and/or construction timings, in order to determine a more realistic, but still worst-case, list of UK and European OWF projects that may have the potential for overlapping piling activities with the Project (see Appendix 11.4 Marine Mammal CEA Project Screening (APP-068) for further details).

95. The potential disturbance from underwater noise during piling activities has been assessed based on the worst-case numbers of animals disturbed taken from assessments either using disturbance ranges or EDRs or the DRCs (Project-alone). The worst-case numbers of animals disturbed used for the cumulative assessment is presented in Table 7.6 in Appendix 11.2 Marine Mammal Information and Survey Data (APP-066) from other OWF projects' ESs and Preliminary Environmental Information Report (PEIR)s. These numbers were only presented in the iPCoD modelling, however, to address NE's comment (NE Ref. D28), these numbers are presented in **Table 2.27, Table 2.29, Table 2.31**, **Table 2.33** and **Table 2.35** and quantitatively assessed by adding the numbers of potentially disturbed animals together to get the total estimated number and estimated effect on the population. The total estimates of the number of animals that could be potentially disturbed from underwater noise from other piling projects is presented with and without the Project, with the significance of effect.

96. There were six OWFs screened in as having a construction period that could potentially overlap with the construction of the Project, that could be undertaking piling activities at the same time as the Project (Table 11.84, in the ES Chapter 11 Marine Mammals (APP-048)). These other projects were included in individual marine mammal assessments if the projects were within the marine mammal MU. The numbers of animals potentially disturbed were added together to get an overall estimated impact on the population.

97. For common dolphin, Risso's dolphin and white-beaked dolphin, the quantified assessments using disturbance ranges or DRC have already been provided within Table 11.85 of the ES Chapter 11 Marine Mammals (APP-048) (note

that white-beaked dolphin are not included in this cumulative assessment (for disturbance from piling) as no project screened in for assessment included this species as a receptor).

#### 2.7.2.1 Harbour porpoise

98. **Table 2.27** provides a quantified assessment of magnitude of cumulative disturbance due to piling overlap with other OWF, utilising project-specific data from published PEIRs and ESs as outlined in Appendix 11.2 Marine Mammal Information and Survey Data (APP-066).

*Table 2.27 Quantified Cumulative Effects Assessment (CEA) for the potential disturbance for harbour porpoise during single piling at the OWF projects which could be piling at the same time as the Project*

| **Harbour porpoise** | | | |
|---|---|---|---|
| **Project** | **Harbour porpoise density (/$km^2$)** | **Impact area ($km^2$)** | **Maximum number of individuals potentially disturbed during single piling** |
| The Project | 1.621 | 2123.7 | 3,442.5 |
| Awel y Môr | 1.00 | DRC | 2,112 |
| Mona | 0.097 | DRC | 429.0 |
| Morgan Generation Assets | 0.274 | DRC | 979.0 |
| Morgan and Morecambe Transmission Assets[4] | 0.560 | DRC | 1,793.0 |
| Erebus | 0.400 | DRC | 1,967.0 |
| White Cross | 0.92 | 2123.7 | 1,949.6 |
| **Total number of harbour porpoise** | | | **12,672.1** |
| **(*without the Project*)** | | | ***9,229.6*** |
| **Percentage of CIS MU** | | | **20.3%** |
| **(*without the Project*)** | | | ***14.8%*** |
| **Magnitude of cumulative effect** | | | **High** |
| **(*without the Project*)** | | | ***High*** |

[4] At the time of writing the ES, a decision had been taken that the offshore substation platforms (OSPs) would not be included within the DCO Application for the Transmission Assets. This decision post-dated the Transmission Asset PEIR (within which the OSPs are also assessed). The final ES for the Transmission Assets will therefore not include the OSPs or associated interconnector cables. Additionally, a decision had been taken since the PEIR that the Morgan Offshore Booster Station (OBS) would no longer be required. Whilst the OSPs, OBS and interconnector cables will not form part of the DCO Application for the Transmission Assets, they are included here as they were contained within the Transmission Asset PEIR which has been used to inform the ES.

99. **Table 2.28** presents the assessment of significance of effect for harbour porpoise due to cumulative effects from piling and using data such as EDRs and DRC assessments from other projects. With or without the project, the significance of effect on harbour porpoise is major adverse (**Table 2.28**). This is considered very precautionary as it does not take into account any mitigation measures, and it is unlikely that all projects would pile on the same day for various reasons such as project timings, technical and mechanical issues, port calls, and varying weather restraints affecting vessels and equipment. In addition, the potential for a significant effect was further investigated through iPCoD modelling to determine the validity of the indicated significant effect on the harbour porpoise population. The results of the population modelling, using the same data as shown in **Table 2.27**, found that there is no population level effect expected as presented in Section 11.7.3.2. in the ES Chapter 11 Marine Mammals (APP-048).

100. In the ES Chapter 11 Marine Mammals (APP-048), impact significance results were presented as minor adverse due to the results from the population modelling. The Applicant still considers iPCoD to be the best approach. The model requires detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproduction rates (Sinclair *et al*., 2023) by taking the worst-case numbers of disturbance, models a thousand scenarios, and looks at population effects on an annual and longer term basis. Therefore, it is considered to be the most appropriate tool to assess cumulative disturbance. For harbour porpoise the effect of cumulative disturbance from piling has been assessed as **minor adverse (not significant in EIA terms)**, in line with ES Chapter 11 Marine Mammals (APP-048).

*Table 2.28 Assessment of significance of effect for disturbance of harbour porpoise from cumulative effects from underwater noise (updates to ES are shown in red)*

| Assessment Method | Sensitivity | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|
| Quantified assessment (see **Table 2.27**) | Medium | High | Not provided | Significant (Major adverse)<br>*Significance is further investigated through iPCoD modelling* |
| iPCoD modelling | Medium | Negligible | Not Significant (Minor adverse) | Not Significant (Minor adverse) |

#### 2.7.2.2 Bottlenose dolphin

101. **Table 2.29** provides a quantified assessment of disturbance to bottlenose dolphin due to piling overlap with other OWF, utilising project-specific data from PEIRs and ESs as outlined in Table 7.6 in ES Appendix 11.2 Marine Mammal Information and Survey Data (APP-066). **Table 2.29** shows that a high percentage of bottlenose dolphins would be at risk of potential disturbance. However, this assessment does not consider the distance to the piling activity nor the unlikelihood of all activities taking place on the same day. This is due to factors such as project timings, technical and mechanical issues, port calls, and varying weather constraints affecting vessels and equipment. Therefore, population modelling was used by the Applicant which takes into account the detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproductive rates (Sinclair *et al*., 2023). This method is, therefore, regarded as the most appropriate for evaluating potential cumulative disturbances and the population consequences for bottlenose dolphin from the IS MU.

*Table 2.29 Quantified CEA for the potential disturbance for, bottlenose dolphin during single piling at the OWF projects which could be piling at the same time as the Project*

| **Bottlenose dolphin** | | | |
|---|---|---|---|
| **Project** | **Bottlenose Dolphin density (/km²)** | **Impact area (km²)** | **Maximum number of individuals potentially disturbed during single piling** |
| The Project | 0.0104 | DRC | 56.3 |
| Awel y Môr | 0.0350 | DRC | 23 |
| Mona | 0.0350 | DRC | 13 |
| Morgan Generation Assets | 0.0350 | DRC | 11 |
| Morgan and Morecambe Transmission Assets[4] | 0.0010 | DRC | 4 |
| **Total number of bottlenose dolphin** ***(without the Projects)*** | | | **107.3** / ***51.0*** |
| **Percentage of IS MU** ***(without the Project)*** | | | **36.6%** / **17.4%** |
| **Magnitude of cumulative effect** ***(without the Project)*** | | | **High** / ***High*** |

102. **Table 2.30** presents the significance of effect from cumulative disturbance due to piling for bottlenose dolphin. Again, it is considered that using the DRC assessments from other projects is over precautionary, as these assessments are not specifically designed for dolphin species. Furthermore, the population

modelling incorporated the worst-case numbers of disturbance and auditory injury and provided data on how that could impact the IS bottlenose dolphin population.

103. Therefore, for bottlenose dolphin the effect of cumulative disturbance from piling has been **assessed as minor adverse (not significant in EIA terms)** which is no change to the significance of effect presented in ES Chapter 11 Marine Mammals (APP-048) as the Applicant still considers population modelling to be the best approach.

*Table 2.30 Assessment of significance of effect for disturbance of bottlenose from cumulative effects from underwater noise (updates to ES are shown in red)*

| Assessment Method | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|
| Quantified assessment (**see Table 2.29**) | Medium | High | Not provided | Significant (Major adverse)<br>*Significance is further investigated through iPCoD modelling* |
| iPCoD modelling | Medium | Negligible | Not Significant (Minor adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium*

104. Minke whale **Table 2.31** provides a quantified assessment of disturbance to minke whale due to piling overlap with other OWF, utilising project-specific data from PEIRs and ESs as outlined in Table 7.6 in ES Appendix 11.2 Marine Mammal Information and Survey Data (APP-066), and results in a minor adverse effect (not significant in EIA terms).

*Table 2.31 Quantified CEA for the potential disturbance for, minke whale during single piling at the OWF projects which could be piling at the same time as the Project*

| Minke whale | | | |
|---|---|---|---|
| **Project** | **Minke whale density (/km$^2$)** | **Impact area (km$^2$)** | **Maximum number of individuals potentially disturbed during single piling** |
| The Project | 0.0088 | 2827.43 | 24.9 |
| Awel y Môr | 0.0170 | DRC | 36 |
| Mona | 0.0173 | DRC | 77 |
| Morgan Generation Assets | 0.0173 | DRC | 69 |
| Morgan and Morecambe Transmission Assets[4] | 0.0050 | DRC | 17 |
| Erebus | 0.0112 | DRC | 53 |
| White Cross | 0.0112 | TTS 100m | 0.0004 |
| **Total number of minke whale (*without the Project*)** | | | **276.9**<br>***252.0*** |
| **Percentage of CGNS MU (*without the Project*)** | | | **1.38%**<br>***1.25%*** |
| **Magnitude of cumulative effect (*without the Project*)** | | | **Low**<br>***Low*** |

105. **Table 2.32** presents the significance of effect for minke whale from cumulative disturbance due to underwater noise from piling, and the significance of effect is minor adverse, therefore, not significant in EIA terms; this is in line with the conclusions of the assessment provided in ES Chapter 11 Marine Mammals (APP-048). A number of minke whale would be at risk of potential disturbance, yet this assessment does not account or the distance to the piling activity or the unlikelihood of all activities occurring simultaneously. Factors such as project schedules, technical and mechanical issues, port calls, and varying weather conditions affecting vessels and equipment contribute to this. Consequently, the Applicant used population modelling, which incorporates detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproductive rates (Sinclair *et al*., 2023). This method is considered the most appropriate for assessing potential cumulative disturbance and its population consequences for minke whale from the CGNS MU.

*Table 2.32 Assessment of significance of effect for disturbance of minke whale from cumulative effects from underwater noise (updates to ES are shown in red)*

| Assessment Method | Sensitivity | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|
| Quantified assessment (**see Table 2.31**) | Medium | Low | Not provided | Not Significant (Minor adverse) |
| iPCoD modelling | Medium | Negligible | Not Significant (Minor adverse) | Not Significant (Minor adverse) |

106. Grey seal **Table 2.33** provides a quantified assessment of disturbance to grey seal due to piling overlap with other OWF, utilising project-specific data from PEIRs and ESs as outlined in ES Appendix 11.2 Marine Mammal Information and Survey Data (APP-066) and results in a **minor adverse effect (not significant in EIA terms)**. A large number of grey seal could be at risk of potential disturbance, although the assessment does not consider the unlikelihood of all activities occurring simultaneously, nor the distances to the piling activities. Factors such as project schedules, technical and mechanical issues, port calls, and varying weather conditions affecting vessels and equipment contribute to this. Consequently, the Applicant used population modelling, which incorporates detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproductive rates (Sinclair *et al*., 2023). This method is considered the most appropriate for assessing potential cumulative disturbance and its population consequences for grey seal.

*Table 2.33 Quantified CEA for the potential disturbance for grey seal during single piling at the OWF projects which could be piling at the same time as the Project*

| **Grey seal** | | | |
|---|---|---|---|
| **Project** | **Grey seal density (/km²)** | **Impact area (km²)** | **Maximum number of individuals potentially disturbed during single piling** |
| The Project | 0.1 | 1963.5 | 196.4 |
| Awel y Môr | 0.070 | DRC | 81 |
| Mona | 0.196 | DRC | 45 |
| Morgan Generation Assets | 0.041 | DRC | 45 |
| Morgan and Morecambe Transmission Assets[4] | 0.106 | DRC | 28 |
| Erebus | 0.070 | DRC | 18 |
| **Total number of grey seal** | | | **413.4** |
| ***(without the Projects)*** | | | ***217*** |
| **Percentage of wider reference population** | | | **3.11%** |
| ***(without the Project)*** | | | ***1.63%*** |
| **Magnitude of cumulative effect** | | | **Low** |
| ***(without the Project)*** | | | ***Low*** |

107. Assessment of significance of effect for disturbance of grey seal from cumulative effects of underwater noise (updates to ES are shown in red) provides the significance of effect for grey seal from cumulative disturbance due to underwater noise from piling, and the significance of effect is **minor adverse, therefore not significant in EIA terms,** in line with the overall conclusions presented in ES Chapter 11 Marine Mammals (APP-048).

108. In the ES Chapter 11 Marine Mammals (APP-048), the significance of effect was assessed as negligible adverse (not significant in EIA terms), therefore amending the sensitivity (in line with NE Ref. D21) increases the significance of effect to minor adverse (not significant in EIA terms).

*Table 2.34 Assessment of significance of effect for disturbance of grey seal from cumulative effects of underwater noise (updates to ES are shown in red)*

| Assessment Method | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|
| Quantified assessment (see **Table 2.33**) | Medium | Low | Not provided | Not Significant (Minor adverse) |
| iPCoD modelling | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

109. Harbour seal **Table 2.35** provides a quantified assessment of cumulative disturbance to harbour seal due to piling overlap with other OWFs, utilising project-specific data from PEIRs and ESs for other OWFs as outlined in ES Appendix 11.2 Marine Mammal Information and Survey Data (APP-066), and results in a **minor adverse effect (not significant in EIA terms)**. Despite the small number of harbour seals that could be at risk of potential disturbance, the assessment in Table 5.17 assumes that all activities would occur simultaneously and does not consider the distances to the piling sites. Factors such as project schedules, technical and mechanical issues, port calls, and varying weather conditions affecting vessels and equipment contribute to this. Consequently, the Applicant used population modelling, which incorporates detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproductive rates (Sinclair *et al*., 2023). This method is considered the most appropriate for assessing potential cumulative disturbance and its population consequences for harbour seal.

*Table 2.35 Quantified CEA for the potential disturbance of harbour seal during single piling event at the OWF projects which could be piling at the same time as the Project*

| **Harbour seal** | | | |
|---|---|---|---|
| **Project** | **Harbour seal density (/km²)** | **Impact area (km²)** | **Maximum number of individuals potentially disturbed during single piling** |
| The Project | 0.22 | 1963.5 | 0.22 |
| Awel y Môr* | 0.22 | n/a | 0.22 |
| Mona | 1 | DRC | 1 |
| Morgan Generation Assets | 1 | DRC | 1 |
| Morgan and Morecambe Transmission Assets[4] | 1 | DRC | 1 |
| **Total number of harbour seal** | | | **3.44** |
| ***(without the Project)*** | | | ***3.22*** |
| **Percentage of wider reference population** | | | **0.30%** |
| ***(without the Project)*** | | | ***0.28%*** |
| **Magnitude of cumulative effect** | | | **Negligible** |
| ***(without the Project)*** | | | ***Negligible*** |

**This project did not assess harbour seal. However, due to the proximity to the Project, the same values as the Project have been applied as a precautionary measure.*

110. **Table 2.36** presents the significance of effect for grey seal from cumulative disturbance due to underwater noise from piling, and the significance of effect is **minor adverse, therefore not significant in EIA terms,** in line with the overall conclusions presented in the ES Chapter 11 Marine Mammals (APP-048).

111. In the ES Chapter 11 Marine Mammals (APP-048), the significance of effect was assessed as negligible adverse (not significant in EIA terms), therefore amending the sensitivity (in line with NE Ref. D21) increases the significance of effect to **minor adverse**, but it remains **not significant in EIA terms**.

*Table 2.36 Assessment of significance of effect for disturbance of harbour seal from cumulative effects of underwater noise (updates to ES are shown in red)*

| Assessment Method | Sensitivity (updated from low)* | Magnitude (temporary effect) | Significance of effect (as presented in the ES Chapter 11 Marine Mammals (APP-048)) | Significance of effect |
|---|---|---|---|---|
| Quantified assessment (see **Table 2.35**) | Medium | Negligible | Not provided | Not Significant (Minor adverse) |
| iPCoD modelling | Medium | Negligible | Not Significant (Negligible adverse) | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

112. In response to NE's comment on the insufficient presentation of disturbance assessments (D4; RR-061-168) for Project-alone and cumulatively with other plans and projects, the Applicant has undertaken a review and a comparison of all methods used to assess for potential disturbance from underwater noise due to piling. The Applicant considers that the results presented in the ES Chapter 11 Marine Mammals (APP-048) were the most appropriate and remain unchanged.

## 2.8 Cumulative effects from underwater noise from all noisy activities (NE Ref D50)

113. This section provides additional information in response to NE's comment (Ne Ref. D50; RR-061-214) which is linked to NE's RR Ref. RR-061-192 (NE Ref. D28):

"*The Applicant does not appear to have presented the number of animals impacted from all cumulative disturbance pathways (piling at other OWFs; construction activities (other than piling) at other OWFs; other industries and activities). This combined disturbance impact should be presented.*

*Present the combined cumulative effect of disturbance from underwater noise, across the three pathways that are currently assessed only separately.*"

114. **Table 2.37** lists all noisy activities that could coincide with piling at the Project, including piling and construction activities at other OWFs, which are likely to coincide with construction of the Project as well as any other potential noisy activities mentioned in paragraph 11.812 in ES Chapter 11 Marine Mammals (APP-048). The Applicant would also like to highlight that the other noisy activities such as geophysical surveys, seismic surveys, aggregate extraction, dredging and UXO clearance are indicative as it is difficult to know when these

projects may occur. Impacts of these activities would need to be licensed separately, taking account of the Project's consented activities in their licence applications.

115. Therefore, taking this indicative approach determines the associated potential magnitude of cumulative effect of the listed noisy activities should they all occur at the same time. This table is an expanded version of Table 11.107 in ES Chapter 11 Marine Mammal (APP-048).

116. **Table 2.37** presents the magnitude of the potential for cumulative disturbance taking account of all of the piling and other OWF construction activities described in Section 11.7.3.1 in ES Chapter 11 Marine Mammals (APP-048) as well as other noisy activities (i.e. seismic, geophysical, UXO clearance and aggregates and dredging) indicatively as described in Section 11.7.3.2 in ES Chapter 11 Marine Mammals (APP-048). **Table 2.38** presents the same assessment as **Table 2.37** but uses the population modelling results to showcase the difference in magnitudes and effect significances, compared to those in **Table 2.37**. Only those species for which population modelling was conducted in the ES Chapter 11 Marine Mammals (APP-048) are presented in **Table 2.38**.

117. The significance of effect for these updated noisy activities (based both on data from other projects' published PEIRs and ESs only and on population modelling results) has then been evaluated and has been updated from those set out in ES Chapter 11 Marine Mammals (APP-048). **Table 2.39** represents an extended version based on Table 11.108 in ES Chapter 11 Marine Mammals (APP-048). It includes all disturbance assessments provided in the cumulative effects assessment.

118. Based on the assessment using other projects' published PEIRs and ESs only (**Table 2.39**) the results of the CEA for disturbance from all noisy activities including piling are major adverse for harbour porpoise and bottlenose dolphin and moderate adverse for grey seal (which are significant in EIA terms). However, for all three species, a large proportion of the number of individuals potentially disturbed is from piling at both the Project and other OWFs without any mitigation applied. These activities have been further investigated through population modelling, and the resultant magnitudes (taking into account the modelling results) indicate that the significance of effect would be major adverse for bottlenose dolphin, and moderate adverse for minke whale and grey seal (significant in EIA terms) (**Table 2.39**). All other species were assessed as having a **minor adverse significance (not significant in EIA terms**).

119. **Table 2.37** and **Table 2.38** both include an assessment of magnitudes, if the indicative activities (geophysical and seismic surveys, and UXO clearance) are removed from the overall assessment. These activities are included on a

worst-case and precautionary approach, however, none are currently consented or applied for, and therefore their inclusion represents a currently unrealistic future prediction of activities. If these were to be removed from the assessments, the resultant significance would be reduced to minor adverse for harbour porpoise, minke whale and grey seal (when also taking account the population modelling results (**Table 2.39**). Another factor to take into account is that not all activities are likely to occur at the same time, and this level of significance of effect does not include any mitigation.

120. The sensitivities have been amended from low to medium for all dolphin and seal species. This change was requested by NE, within their RR (NE Ref. D21) who did not agree that the disturbance effects for these species are low. For harbour porpoise and minke whale, the sensitivities remained as medium, as defined in Section 11.6.2 in ES Chapter 11 Marine Mammals (APP-048).

121. Taking into account the population modelling results, because the iPCoD takes the worst-case numbers for disturbance and permanent auditory injury along with detailed demographic information and an understanding of the relationship between days of disturbance and individual survival and reproductive rates (Sinclair *et al*., 2023), it is deemed as the most representative method. In addition, the indicative nature of some activities, and that it is unlikely that all activities would take place at the same time, the overall effect significance for all species would be **minor adverse (not significant in EIA terms)**, in line with ES Chapter 11 Marine Mammals (APP-048).

122. Further, while it is not considered that commitment to specific additional mitigation is yet required, it is noted the Applicant will commit to the production of an Underwater Sound Management Strategy (UWSMS) as a mechanism to consider further mitigation measures when further details of the Project and other cumulative projects are developed. This approach of developing a Strategy to mitigate underwater noise impacts is in line with the other Irish Sea Round 4 projects.

*Table 2.37 Quantitative assessment for all overlapping piling and construction at other OWFs, as well as other industry noisy activities with the potential for cumulative disturbance effects for marine mammals, based on data from other Projects' published PEIRs and ESs only (activities in grey are indicative only; no formal application has been made) (magnitude levels based on the percentage of the reference population affected, as set out in Table 11.10 in ES Chapter 11 Marine Mammals (APP-048)*

| **Impact** | **Number of individuals (based on published PEIRs and ESs only)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Harbour porpoise** | **Bottlenose dolphin** | **Common dolphin** | **Risso's dolphin** | **White-beaked dolphin** | **Minke whale** | **Grey seal** | **Harbour seal** |
| Worst-case disturbance from the Project (piling) | 3,442.5 | 56.3 | 127.6 | 2.4 | 17.9 | 24.9 | 196.4 | 0.2 |
| Piling at other OWFs | 9,233.8 | 51.0 | 2,387.0 | 333.0 | 0.0 | 252.0 | 226.5 | 3.66 |
| Construction activities at other OWFs | 146.7 | 35.5 | 15.8 | 0.5 | 2.4 | 14.5 | 40.5 | 0.0 |
| *Geophysical surveys* | 613.9 | 7.4 | 19.8 | 0.4 | 5.0 | 6.2 | 64.5 | 0.05 |
| Aggregates and dredging | 0.035 | - | 1.9 | 0.01 | - | 0.02 | 0.2 | - |
| *Seismic surveys* | 872.6 | 15.8 | 42.5 | 3.3 | 10.6 | 11.9 | 405.4 | 0.3 |
| *UXO clearance* | 1,134.2 | 1.6 | 4.4 | 0.1 | 1.1 | 219.5 | 122.6 | 0.097 |
| **Total number of individuals** | **15,439.5** | **167.6** | **2,599.0** | **339.7** | **37.0** | **529.0** | **1,056.1** | **4.3** |
| *(without indicative activities)* | *12,818.9* | *142.8* | *2,532.3* | *336.0* | *20.3* | *291.4* | *463.6* | *3.86* |
| **Percentage of MU** | **24.7%** | **57.2%** | **2.5%** | **2.8%** | **0.08%** | **2.6%** | **7.9%** | **0.4%** |
| *(without indicative activities)* | *20.5%* | *48.7%* | *2.4%* | *2.7%* | *0.05%* | *1.5%* | *3.5%* | *0.3%* |
| **Magnitude of cumulative effect** | **High** | **High** | **Low** | **Low** | **Negligible** | **Low** | **Medium** | **Negligible** |
| *(without indicative activities)* | *High* | *High* | *Low* | *Low* | *Negligible* | *Low* | *Low* | *Negligible* |

*Table 2.38 Illustrative assessment for all overlapping piling and construction activities at other OWFs, as well as other industry noisy activities with the potential for cumulative disturbance effects for harbour porpoise, bottlenose dolphin, minke whale and seals based on population modelling results (activities in grey are indicative only; no formal application has been made) (magnitude levels based on the percentage of the reference population affected, as set out in Table 11.10 in ES Chapter 11 Marine Mammals (APP-048)*

| **Impact** | **Number of individuals (based on population modelling results)** | | | | |
|---|---|---|---|---|---|
| | **Harbour porpoise** | **Bottlenose dolphin** | **Minke whale** | **Grey seal** | **Harbour seal** |
| Worst-case disturbance from the Project (piling) and piling at other projects* | 0.74% reduction in population** | 2.03% reduction in population** | 3.2% reduction in population** | 0% change in population** | 0% change in population** |
| Construction activities at other OWFs | 146.7 | 35.5 | 14.5 | 40.5 | 0.0 |
| *Geophysical surveys* | *613.9* | *7.4* | *6.2* | *64.5* | *0.05* |
| Aggregate extraction and dredging | 0.035 | - | 0.02 | 0.2 | - |
| *Seismic surveys* | *872.6* | *15.8* | *11.9* | *405.4* | *0.3* |
| *UXO clearance* | *1,134.2* | *1.6* | *219.5* | *122.6* | *0.097* |
| **Total number of individuals** | **2,767.4** | **60.3** | **252.1** | **633.2** | **0.5** |
| *(without indicative activities)* | *146.7* | *35.5* | *14.5* | *40.7* | *0* |
| **Percentage of MU** | **4.4%** | **20.6%** | **1.3%** | **4.8%** | **0.04%** |
| *(without indicative activities)* | *0.2%* | *12.1%* | *0.07%* | *0.3%* | *0%* |
| **Magnitude of cumulative effect** | **Low** | **High** | **Low** | **Low** | **Negligible** |
| *(without indicative activities)* | *Negligible* | *High* | *Negligible* | *Negligible* | *Negligible* |

**Worst-case disturbance has been presented as the median ratio of unimpacted: impacted population change over 25 years taken from the tables and figures in **Section 5.3.2** or in Section 11.7.3.2 in ES Chapter 11 Marine Mammals (APP-048).*

***The percentages were not added to the calculations and are for illustrative purposes only as no value was assigned to it.*

*Table 2.39 Updated Assessment of effect significance for the potential of a cumulative disturbance effect due to piling and other noisy projects and activities*

| Marine mammal species/receptor | Sensitivity | Results of assessment based on published PEIRs and ESs | | Results of assessment based on population modelling | |
|---|---|---|---|---|---|
| | | Magnitude | Significance of effect | Magnitude | Significance of effect |
| Harbour porpoise | Medium | High | Significant (Major adverse) | Negligible | Not significant (Minor adverse) |
| Bottlenose dolphin | Medium* | High | Significant (Major adverse) | Low | Not Significant (Minor adverse) |
| Common dolphin | Medium* | Low | Not Significant (Minor adverse) | *n/a* | *n/a* |
| Risso's dolphin | Medium* | Low | Not Significant (Minor adverse) | *n/a* | *n/a* |
| White-beaked dolphin | Medium* | Negligible | Not Significant (Minor adverse) | *n/a* | *n/a* |
| Minke whale | Medium | Negligible | Not Significant (Minor adverse) | Negligible | Not Significant (Minor adverse) |
| Grey seal | Medium* | Medium | Significant (Moderate adverse) | Negligible | Not Significant (Minor adverse) |
| Harbour seal | Medium* | Negligible | Not Significant (Minor adverse) | Negligible | Not Significant (Minor adverse) |

**In response to RR-061-185, sensitivities have been updated since the ES from low to medium.*

123. In response to NE's comment on the insufficient presentation of all cumulative disturbance pathways (NE Ref. D50; RR-061-214), the Applicant has provided a quantified assessment for each marine mammal receptor. Although the Applicant believes the quantified assessment may not accurately represent disturbed animals due the indicative nature of most activities, the most representative method using iPCoD has not changed the assessment conclusion in ES Chapter 11 Marine Mammals (APP-048).

# 3 Updates and amendments to the Marine Mammal Assessment (Chapter 11 Marine Mammals (APP-048)) following NRW Written Representations

## 3.1 Additional information to the cumulative effects assessment

### 3.1.1 Additive effects

124. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-66 in REP2-027:

*"Separate cumulative assessments have been provided for each of the different impact pathways, with individual cumulative assessment conclusions for each. The impacts of these separate assessments do not appear to have been summed/considered in the same model, thus the impact of multiple pathways of disturbance on the same populations has not been captured. While effects of these impacts acting in concert may not necessarily be additive, no justification has been provided to support this assumption."*

125. The Applicant refers the reader to **Section 2.8**, which provides additional information addressing Natural England's comment (NE Ref. D50; RR-061-214). This comment raised concerns about the lack of a cumulative assessment of disturbance across multiple pathways, such as piling at other OWFs, other construction activities, and impacts from other industries. In response, a quantified assessment has been provided for each marine mammal receptor, capturing the effects of multiple disturbance pathways on the population.

126. As outlined in **Section 2.8**, the Applicant notes that activities such as geophysical surveys, seismic surveys, aggregate extraction, dredging, and UXO clearance are considered indicative, as it is challenging to determine when these projects/activities may occur. This uncertainty supports the conclusion that it is unlikely that all activities would occur simultaneously. However, it is acknowledged that, over time, these activities are likely to take

place individually. Such activities would likely require separate licensing, which would take into account the consented activities of the Project during their own application processes and determine appropriate mitigation.

127. It is not anticipated that the cumulative impacts' overall significance would be elevated beyond the levels assessed individually within the ES Chapter 11 Marine Mammals (APP-048). While individual activities may extend the overall duration of elevated underwater noise across the area, the spatial extent of the most significant disturbance (i.e. piling) will remain limited to the maximum disturbance ranges identified for each species. Once piling is completed, any other construction, or operation and maintenance activities will be local to the Project's array site and intermittent throughout the lifetime of the Project. The Applicant concludes that over this timeframe, the impacts will not exceed the significance concluded in the ES of the individual impacts alone.

128. Furthermore, animals are likely to be disturbed from the loudest source of noise, which could lead to the displacement from the entire area where disturbance is expected to take place. As mentioned, piling is the worst-case with regard to disturbance, and therefore additive effects from less significant noisy activities at the same project will affect areas that animals have already vacated. Temporally, animals may return to the area between periods of noise, resulting in repeated exposures. However, due to the intervals between activities, it is not anticipated that this would result in effects of greater significance than those from individual impacts considered in isolation.

129. With the implementation of the Marine Mammal Mitigation Protocol and adherence to the Underwater Sound Management Strategy Permanent Threshold Shift is not predicted to occur in any marine mammal species and Temporary Threshold Shift is a recoverable impact.

130. With respect to disturbance, the potential for spatially inter-related effects is considered to be minimal as individual animals are likely to be disturbed over a range dictated by the 'loudest' sound (i.e. leading to the greatest disturbance range) such that the potential for secondary (additive) effects from other activities that result in smaller ranges is reduced, as animals are already disturbed and have moved away from the area of highest ensonification.

131. Across the project lifetime, the effects on marine mammal receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented in the ES for each individual phase including when considered cumulative effects with other projects.

### 3.1.2 OWF projects with unknown construction timeframes

132. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-72 in REP2-027:

*"NRW (A) do not agree with the Applicant's assumption that all projects with unknown construction timelines will not overlap with the Morecambe construction period. We consider that it would be conservative to assume that construction for consented Table 4.1 for the projects listed in Paragraph 53) and is like the Morecambe project's operational date. The projects listed in Paragraph 53 should be included in the CEA."*

133. Given, at the time of the Project's DCO Application, no Irish project had made a planning application, four Irish projects that were selected in the first offshore wind auction were considered in the CEA as there was considered the greatest potential for construction overlap. The projects listed in Paragraph 53 (of Appendix 11.4 Marine Mammal CEA Project Screening (APP-068)) are Arklow Bank Phase 2, Shelmalere and Inis Ealga OWFs. At the time of writing ES Chapter 11 Marine Mammals (APP-048), these projects were awarded a Maritime Area Consent (MAC) in 2022 but were not successful in the Offshore Renewable Electricity Support Scheme (ORESS) auction. Indicative timelines suggest that Arklow Bank Phase 2 may commence construction in 2026/27, while Shelmalere and Inis Ealga Marine Energy Park (IEMEP) are unlikely to begin before 2028, with further delays anticipated based on current progress.

134. Since the submission of the Project's ES, An Environmental Impact Assessment Report (EIAR) has since been made available for Arklow Bank Phase 2 OWF (as of June 2024), however, no EIAR has been published for Shelmalere OWF or IEMEP. Since the cut-off date for the CEA screening in Q4 2023, and since submission of the Application to date, no new information about Shelmalere OWF and IEMEP developments has been made publicly available, nor have there been any new applications for foreshore licences. Consequently, only a scoping report for each project (DP Energy & Iberdrola, 2022a; b) is available online. As is typical for such reports, there is insufficient information for a full site specific quantitative cumulative assessment.

135. As previously mentioned in the ES Chapter 11 Marine Mammals (APP-048), the available information regarding the anticipated construction and operational dates for Shelmalere OWF and IEMEP remains high level as scoping information only. A cumulative quantitative assessment would be highly conservative, given the current circumstances of the Project being further along in its consenting process, while two projects have not yet published an ES. The Applicant has therefore provided below a qualitative assessment of Arklow Bank Phase 2, Shelmalere and IEMEP in line with the four Irish projects already included Cumulative effect 1b in ES Chapter 11 Marine Mammals (APP-048). However, it is noted that is it unlikely that all the projects/activities assessed within the CEA would occur at the same time given the different stages and build out of each project.

#### 3.1.2.1 Magnitude of cumulative effect (noise disturbance)

136. As an update to the assessment of Cumulative effect 1b in ES Chapter 11 Marine Mammals (APP-048), this section provides a qualitative assessment of the three Irish projects (Arklow Bank Phase 2, Shelmalere and IEMEP) in addition to those that had initially been considered (Codling Wind Park, Dublin Array, North Irish Sea Array (NISA), Sceirde Rocks), and also includes Irish projects that have advanced to application stage since the submission of the Project DCO Application (the Oriel project). It is noted that the CEA is considered precautionary as it has already included assessment of four Irish projects. However, this update provides further information on the wider number of projects potentially being developed in Irish waters and includes information from projects EIAR's where available.

137. The projects included in this update are:

- **Arklow Bank Phase 2** (EIAR now available in 2024) (considered for all species except harbour seal as is outside the CEA screening area)
- **Codling Wind Park** (EIAR now available in 2024) (considered for all species except harbour seal as is outside the CEA screening area)
- **Dublin Array** (no EIAR available) (considered for all species except harbour seal as is outside the CEA screening area)
- **IEMEP** (no EIAR available) (considered for all species except bottlenose dolphin and harbour seal as is outside the CEA screening area)
- **North Irish Sea Array** (EIAR now available in 2024) (considered for all species except harbour seal as is outside the CEA screening area)
- **Sceirde Rocks** (Application submitted (16.01.2025), but no EIAR available at the time of writing (21.01.2025) (considered for all species except bottlenose dolphin, Risso's dolphin, grey and harbour seal as are outside the CEA screening area)
- **Shelmalere** (no EIAR available) (considered for all species except harbour seal)
- **Oriel** (EIAR now available in 2024) (considered for all species except harbour seal as is outside the CEA screening area)

138. Consequently, all species assessed for Morecambe, apart from harbour seal, have been considered.

139. Despite the uncertain status of timelines, and unrealistic chance of occurrence, this updated assessment assumes that all projects have a possible overlap in construction windows with piling at the Project and provides a qualitative analysis allowing for the variable level of detail available from each project.

140. To recap, overall, the significance of cumulative disturbance is considered to be at worst minor significant (when considering the results of the population

modelling undertaken). The results from the quantitative assessment alone, as per paragraph 11.807 in ES Chapter 11 Marine Mammals (APP-048) capture the effect from construction activities of four projects (but does not take into account the results of the population modelling or mitigation):

- moderate adverse for harbour porpoise and bottlenose dolphin
- minor adverse for minke whale and grey seal
- negligible adverse for the remaining dolphin species

141. **Arklow Bank Phase 2 -** The EIAR for Arklow Bank Phase 2 OWF (SSE Renewables, 2024) included population modelling using iPCoD, covering Arklow, Codling, Dublin Array, North Irish Sea Array (NISA), and Oriel. The results showed that disturbance from piling was not significant, indicating that the predicted disturbance levels are insufficient to cause minor population level changes for any species. The iPCoD assessment found that Irish projects, including Arklow have no population impact from disturbance. The disturbance impact from piling is greater than other construction activities, thus, if those projects are undertaking less noisy construction activities it would have even less of an effect.

142. In the Arklow Bank Phase 2 CEA, the Project (Morecambe) was also considered as part of a quantitative assessment, together with other OWFs, two cable projects and seismic surveys. The EIAR concluded a slight adverse significance of effect from piling disturbance, which is not significant in EIA terms.

143. ***North Irish Sea Array -*** Cumulative population modelling, using iPCoD, for piling was undertaken for the NISA application (North Irish Sea Array Windfarm Ltd, 2024) for Arklow, Codling, Dublin Array, and Oriel (and NISA). The modelling concluded that there would be a short-term decrease in the bottlenose dolphin population, as some individuals could be affected during piling at cumulative projects. However, the long-term population trajectory would not be affected. Therefore, it was concluded that there would be no significant effects on bottlenose dolphin at the population level. For harbour porpoise, harbour seal and grey seal the results indicated a stable trajectory of both the impacted and un-impacted population throughout the modelling period. For common dolphin and minke whale (for which modelling was not conducted), the conclusion was a slight effect of cumulative disturbance, which is not significant in EIA terms (North Irish Sea Array, 2024).

144. In the NSIA CEA, the Morecambe Project was also considered as part of a quantitative assessment, together with NISA, Arklow, Codling, Dublin Array, and Oriel, Erebus, Awel y Mor and White Cross. iPCoD was conducted for the Irish projects. Following this, a qualitative assessment using reviews from

iPCoD at other projects led to the conclusion of a "*slight adverse effect significance*", which is not significant in EIA terms.

145. **Oriel -** The EIAR for Oriel (Parkwind & ESB, 2024) concluded that no estimates for affected animals from piling were available for Dublin Array, Arklow Bank, NISA and Codling at the time of writing, however a qualitative assessment concluded a slight adverse significance, which is not significant in EIA terms. A qualitative cumulative effect assessment was also conducted that included the Morecambe Project and other eastern Irish Sea projects (Morgan, Mona, Awel y Mor). It concluded that, based on the distance between Oriel and the eastern Irish Sea projects, the likelihood of any modelled disturbance range overlap would be negligible and highlighted that the proportion of the relevant populations for each project-alone assessment was relatively small. The significance of effect was deemed to be "*slight adverse"*, is not significant in EIA terms.

146. **Codling –** Cumulative iPCoD modelling for piling was undertaken for the Codling application (Sinclair, RR (2024) for Arklow, Dublin Array, NISA, and Oriel (and Codling). The cumulative population modelling showed no significant impacts to any marine mammal species resulting from disturbance from pile driving. The EIAR for Codling concluded that the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028 (including Morecambe) is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population.

147. The results of the Project's CEA do not identify any significant population effects as a result of piling at the Project, Awel y Mor, Erebus, Mona, Morgan, Transmission Assets and White Cross (considered the worst-case noise source). Other construction noise would be lower than noise levels from piling, and the results from the cumulative assessments presented in the EIARs for Arklow Bank, Codling, NISA and Oriel do not identify any significant effects for Irish projects or when considering construction noise at the Morecambe Project. Considering the distance between Irish projects and the eastern Irish Sea projects, the likelihood of any modelled disturbance range overlap would be negligible and the proportion of the relevant populations for each project-alone assessment is relatively small.

148. Based on the Project-alone assessments of auditory injury and disturbance from construction activities other than piling in Sections 11.6.3.3 and 11.6.3.4 of ES Chapter 11 Marine Mammals (APP-048), the impact and disturbance ranges would be significantly lower than those for piling. The expected effect from construction activities ongoing at potentially eight different Irish projects

would be much more localised and confined to the immediate vicinity of the noise source. Additionally, all eight Irish projects are over 200km from Morecambe OWF, with distances between each other ranging between 10-50km. Any disturbance effects are expected to be localised and would not significantly affect the marine mammal populations.

149. It is also noted that mitigation would be in place for the Irish projects as required through their consenting processes and as identified in the response from the Department of Housing Local Government and Heritage (OD-008) "*Project developers in the west Irish Sea have consulted with each other during the pre-planning stage and similar types of mitigation measures are emerging within project application documentation"*. This is also the case for Round 4 developers in the Irish Sea, who have each developed an outline UWSMS and MMMP. It has also been shown in the ES for the Project, through population modelling, that no significant long terms effects would result from the Project-alone or cumulatively (Project piling simultaneously with six projects (Awel y Mor, Erebus, Mona, Morgan, Transmission Assets[4], White Cross). Construction noise from the projects in Irish waters are not considered to elevate the magnitude as assessed in the ES, and cumulative effects would be limited to the 2.5-year construction period of the Project.

150. Considering the aforementioned information, the magnitude of impact would be temporary and limited to the Project's construction. Consequently, the magnitude of effect would not be worse than already assessed in the ES Chapter 11 Marine Mammals (APP-48), which was assessed as **medium** for harbour porpoise and **high** for bottlenose dolphin, **low** for grey seal, and **negligible** for all other marine mammal species.

#### 3.1.2.2 Significance of cumulative effect

151. Taking into account the medium sensitivity for all marine mammal receptors (raised from low to medium for dolphins and seals, as per NE request outlined in **Section 2.2**), the cumulative effect for disturbance from noise from construction activities when Project piling is ongoing, was determined as:

- major adverse (significant in EIA terms) for bottlenose dolphin;
- moderate adverse (significant in EIA terms) for harbour porpoise;
- minor adverse (not significant in EIA terms) for grey seal; and
- negligible adverse (not significant in EIA terms) for all remaining species.

152. The conclusions for harbour porpoise, common dolphin, white-beaked dolphin, Risso's dolphin, grey seal and minke whale as set out in Chapter 11 Marine Mammals (APP-048) remain unchanged when considering all eight Irish projects constructing at the same time as Project piling. However, due to

the change of sensitivity from low to medium, the significance of effect for bottlenose dolphin has been raised from moderate to major adverse.

153. Overall, while (as per as per paragraph 11.807 in ES Chapter 11 Marine Mammals (APP-048)) there is the potential for significant effects for harbour porpoise and bottlenose dolphin, population modelling identifies that there would be no long-term significant effects on the population as a result of piling for the Project. It is also noted the methods used to determine the number of animals disturbed in the ES does not account for mitigation proposed by the projects. It is also considered unrealistic to expect that eight projects in Irish waters and six (or seven, including the Project) in English waters would all be constructing and pilling at the same time. This is due to vessel availability and the different stages of the consenting process the projects are in, with some Irish projects facing uncertainty as to when an application would be made. It is also considered that, based on the distance between Irish projects and the eastern Irish Sea projects, the likelihood of any modelled disturbance range overlap would be negligible and the proportion of the relevant populations potentially impacted for each project-alone assessment was relatively small.

154. Considering all the information provided, an overall (at most) minor adverse effect (not significant in EIA terms) was concluded for the assessment of underwater noise impacts from construction activities (other than piling) at other OWFs at the same time as piling at the Project, in line with the CEA in ES Chapter 11 Marine Mammals (APP-048)).

#### 3.1.2.3 Conclusion

155. In response to NRW's comment regarding the exclusion of projects with unknown construction timelines from the CEA (REP1-099; comment WR-099-66 in REP2-027), the Applicant has provided a qualitative assessment of four Irish projects (Arklow, Shelmalere, IEMEP, Oriel) in addition to those originally screened in paragraph 11.797 in ES Chapter 11 Marine Mammals (APP-048), and considered information now available for Irish projects with a submitted EIAR. The Applicant confirms that adding these four projects would not cause a change in the overall assessment conclusion in ES Chapter 11 Marine Mammals (APP-048), which is considered to be minor adverse (not significant in EIA term). The CEA is considered to be sufficiently robust to cover currently known projects coming forward from information in the public domain about planned construction schedules. It is also noted that, as is standard in the EIA process, future projects would need to account for the Morecambe Project in their CEA. This has already been demonstrated for th Irish projects (Arklow, Codling, NISA, Oriel) that have been submitted after the Morecambe DCO Application, with results confirming no significant cumulative effects in CEAs including the Morecambe Project.

## 3.1.3 Shipping

156. This section provides additional information in response to NRW's written representation (REP1-099); comment WR-099-78 in REP2-027:

*"NRW (A) does not agree with the decision to screen out all shipping from further consideration, particularly given that it is expected that construction of other NSIPs in the vicinity will overlap with the Morecambe project. NRW (A) draw attention to the fact that PINS (2019) Advice Note 17 states that only projects expected to be completed before construction of the proposed NSIP should be considered part of the baseline*."

157. The cumulative risk of vessel collision has already been assessed in the ES Chapter 11 Marine Mammals (APP-048). The following assessment will evaluate the cumulative disturbance from vessel presence during construction, operation and decommissioning, which has the potential to lead to a significant effect to marine mammals.

158. Given the interconnected nature of the Project and its Transmission Assets, a separate 'combined' assessment of vessel disturbance had been provided within the CEA in ES Chapter 11 Marine Mammals (APP-048). However, the following **Section 3.1.3.1**, provides an updated assessment based on the recently submitted Transmission Assets DCO Application.

159. Following this, a further cumulative assessment considers all vessels associated with projects that could be either constructing or operating at the same time as activities at the Project (**Section 3.1.3.2**).

### 3.1.3.1 The Project and Transmission Assets (combined assessment)

160. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-70 in REP2-027

*"The conclusions on disturbance from vessel noise in paragraph 11.736 [APP-048] appear to have been based on estimates of numbers of animals disturbed at a single point in time. NRW (A) believe that this does not adequately capture the overall additional disturbance introduced by repeated disturbance events over the different phases of the project. While we understand that disturbance from vessel noise is relatively short lived, the fact that an animal recovers sometime after a disturbance event does not mean the event should no longer be counted as disturbance. Thus, if the intent is to calculate the cumulative number of animals disturbed, to propose basing the CEA on a snapshot estimate invites the risk of significant underestimates. There is a risk that impact pathways which consist of chronic, but individually relatively small (in terms of effect) disturbance events are overlooked on account of these individual disturbance events being short lived. NRW (A) believe it is important to consider the overall additional stressor load introduced when making a*

*conclusion on the magnitude of an impact pathway. NRW (A) advise that the Applicant should either revise the conclusions or provide mitigation measures which specifically address disturbance from vessel noise."*

161. The following assessment has addressed both NRW comments (WR-099-78 and WR-099-70).

### Sensitivity

162. As outlined above in **Section 2.2**, and as per NE's comment on the sensitivity of dolphin and seal species to disturbance effects (NE Ref D21, RR-061-185), the Applicant has increased the level of sensitivity (Medium increased from Low) for marine mammal assessments.

### Construction

### Magnitude

163. Since the publication of the Transmission Assets ES (Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd, 2024), information regarding the estimates, compared to what was originally presented in the ES Chapter 11 Marine Mammals (APP-048), has been updated. The combined vessel return trips for the Project (maximum of 2,583 in one year) and the Transmission Assets (up to 286 vessels over the 30-month construction phase, or 114 per year) would total up to 2,697 annually at the worst case. Subsequently, the Transmission Assets add, on average, 10 more vessel return trips per month to the 215 vessel trips already associated with the Project each month.

164. Disturbance estimates from vessel activity indicate that, during construction, the Transmission Assets could affect up to 35 harbour porpoise, five Risso's dolphins, four minke whales, 17 grey seals, and less than one individual of bottlenose dolphin, common dolphin, or harbour seal (Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd, 2024). In comparison, the Project estimated effects on up to 463 harbour porpoise, one Risso's dolphin, three minke whales, bottlenose and white-beaked dolphins, eight common dolphins, 29 grey seals, and less than one harbour seal. The total number of disturbed animals could be up to 498 harbour porpoise, six Risso's dolphin, seven minke whale, three white-beaked dolphin and bottlenose dolphin, eight common dolphin, 46 grey seal, and less than one individual harbour seal.

165. In addition to the number of animals that could be impacted at a point in time, the cumulative impact of increased disturbance from vessels over the construction period has been considered. Disturbance over the construction period is predicted to be of local spatial extent, intermittent (vessel activity will not be constant) and reversible (disturbance effects are temporary).

166. As a result of the total numbers of disturbed animals and the affected percentage of the relevant population, and in consideration of the spatial

scale, intermittent and reversible effect over construction, there remains a **low** magnitude of impacts on bottlenose dolphin, and **negligible** magnitude for all remaining marine mammal species. The magnitudes have not changed from those concluded in the ES and thus have not altered the effect significance conclusions as set out in Section 11.6.3.4 for the Project-alone assessment in ES Chapter 11 Marine Mammals (APP-048).

### Significance of effect

167. The effect of cumulative vessel disturbance on marine mammals with a medium sensitivity would result in a **minor adverse** effect significance for bottlenose dolphin and a **negligible adverse** significance for all other species, which are both not significant in EIA terms and in line with the conclusion presented in ES Chapter 11 Marine Mammals (APP-048).

168. This Applicant has not revised the conclusions and highlights the available measures to reduce the potential level of disturbance from vessels as stated in the Outline PEMP (REP1-054) and Outline VTMP (REP2-022) and secured in the draft DCO (dDCO) Schedule 6 Condition 9(1)e(v) and Condition 9(1)j, respectively.

**Operation and maintenance**

### Magnitude

169. Since the removal of key components for the Transmission Assets (booster stations and offshore substations), the number of vessels required during operation and maintenance has reduced from 1,155 to 77 annual vessel return trips. Similarly, as discussed for construction, the additional 77 annual vessel transfers, in addition to the 832 vessel transits for the Project, would not significantly change the overall conclusion. This is because the additional number of animals affected by vessels for the Transmission Assets has not altered the conclusion from the Project alone, which contributes more vessels in comparison.

170. However, a quantitative assessment, like those presented under 'Construction' earlier in this report (**paragraph 164**) represent a snapshot of the number of marine mammals potentially disturbed at a single point in time. Repeated disturbances throughout the Project's lifetime would occur which might have longer-term implications for marine mammal populations. While short-term behavioural responses to disturbances, such as boat approaches, can be observed, the long-term effects are more challenging to quantify. Susceptibility to disturbance may also be dependent on the characteristics of the population, such as its size and resource availability (New *et al.,* 2020).

171. A study by Hao *et al.* (2024) examined harbour porpoise reactions to small boats traveling at 10 and 20 knots in Danish waters, using drone footage. Porpoises typically responded within 200m of approaching vessels but

resumed natural behaviours within one minute after the boats passed. Wisniewska *et al.* (2018) also found that despite potential short-term effects on foraging, porpoises quickly recover from vessel interactions and remain in high-traffic areas despite temporary disruptions. A study on bottlenose dolphins indicated that they resumed normal behaviour after the disturbance from boats had ceased, but the exact timing varied based on several factors, including the intensity and duration of the disturbance (New *et al.,* 2020). Overall, while boats may cause short-term avoidance, the evidence suggests that marine mammals quickly return, making prolonged displacement unlikely. However, frequent and prolonged disturbances can lead to increased stress and potential long-term impacts on marine mammal well-being (Dyndo *et al*., 2015).

172. Although the study by Hao *et al.* (2024) focused on small boats, Wisniewska *et al.* (2018) included various sizes of vessels, primarily focusing on large ships such as tankers and bulk freighters, as well as smaller vessels, including fishing boats and fast passenger ferries. Larger vessels associated with offshore wind activities are, when on site, generally slow-moving or stationary, which reduces noise emissions. Stationary vessels emit less propulsion noise and experience reduced cavitation compared to moving vessels (Hildebrand, 2009; Ainslie, 2010). This difference may further minimise potential disturbance to marine mammals.

173. While the duration of impact is longer, the number of vessels expected on site at any one time during the operation and maintenance phase will be less than during construction. The cumulative impact of increased disturbance from vessels is predicted to be of local spatial extent, long-term duration (vessel presence is expected sporadically throughout the operational period), intermittent (vessel activity will not be constant) and reversible (disturbance effects are temporary).

174. The additional vessel traffic associated with the Transmission Assets does not significantly increase the overall volume of vessel activity over the lifetime of the Project. Despite limited data on the disturbance and recovery times of marine mammals to larger vessels, the available evidence (as stated above) suggests a low risk of prolonged displacement. As stated, the number of vessels is not significantly greater than that for the Project alone. As such, the Applicant considers the magnitude of disturbance to marine mammals from cumulative vessel activity associated with the Project and Transmission Assets to be **low** for all species.

### Significance of effect

175. As per **paragraph 168**, the mitigation to reduce the potential disturbance to acceptable levels would remain in place throughout the lifecycle of the Project.

176. The effect of cumulative vessel disturbance on marine mammals with a medium sensitivity would result in a **minor adverse** effect significance for all species, which is not significant in EIA terms.

**Decommissioning**

177. A detailed Offshore Decommissioning Programme will be developed individually for the Project and Transmission Assets, detailing the works required. The impact from decommissioning for each project has been assessed as the same as during the construction phase. As such, the effect of cumulative vessel disturbance on marine mammals with a medium sensitivity would result in a **minor adverse** effect significance for bottlenose dolphin and a **negligible adverse** significance for all other species, which are both not significant in EIA terms.

**Lifetime assessment**

178. Vessels will be used throughout all phases of the Project and therefore the impact to marine mammals from elevated underwater sound due to vessel activities throughout all phases could cause additional disturbance to marine mammals compared to considering each phase separately. However, for all phases, vessel movements will primarily be located within the windfarm site where vessels would be travelling at a reduced speed. Vessels will also follow the measures to minimise disturbance to marine mammals as secured within the Project PEMP and VTMP. Across the project lifetime, the effects on marine mammal receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.

### 3.1.3.2 Cumulative assessment – All plans and projects

179. It is difficult to quantify the level of increased disturbance to marine mammals resulting from increased vessel activity on a cumulative basis, given the large degree of temporal and spatial variation in vessel movements between projects and regions, coupled with the spatial and temporal variation in marine mammal movements across the region.

180. However, vessel routes to and from offshore windfarms and other offshore projects will, for the majority of trips, use existing vessel routes for pre-existing vessel traffic which marine mammals will be accustomed to. They may also have become habituated to the volume of regular vessel movements and therefore the additional risk would predominantly be confined to the array area. The vessel movements for offshore wind farms are likely to be limited and slow, resulting in less risk of disturbance to marine mammal receptors. In addition, most projects are likely to adopt measures to minimise any potential effects on marine mammals (such as measures secured in the VTMP), as this is considered standard mitigation across the offshore wind industry.

181. Of all the screened-in projects overlapping with the Project, **Table 3.1** presents the maximum number of vessels at any one time and vessel trips for those projects less than 100km away from the Project. The distances between the Project and some of the other projects are quite significant, dispersing the additional shipping volume across the entire Irish Sea and so it is reasonable to consider that only those projects that are nearby (<100km) would have the potential for a cumulative effect with the Project given the localised disturbance effects from vessels.

*Table 3.1 Summary of number of construction / operation and maintenance vessels for the screened-in projects (<100km distance from the Project) that are overlapping with Project construction*

| Project | Phase screened in for | Maximum number of vessels at any one time | Vessel transfers | Distance to Project (km) |
|---|---|---|---|---|
| Transmission Assets[5] | Construction | Construction: 19<br><br>O&M: 14 | 286 over the 30-month construction phase =114/year; and<br>77 O&M trips each year | 0 |
| Mona[6] | Construction | Construction: 96<br><br>O&M: 21 | 849 over the construction phase of four years =221/year; and<br>849 O&M return trips annually | 10 |
| Morgan[7] | Construction | Construction: 69<br><br>O&M: 16 | 1,929 over the construction phase of four years =482/year; and<br>719 O&M return trips annually. | 17 |
| Awel y Mor[8] | Construction | Construction: 35<br>O&M: 4 | n/a | 29 |
| Morlais[9] | O&M | Construction:16<br>O&M: 16 | n/a | 83 |

[5] Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd, 2024
[6] Mona Offshore Wind Ltd, 2024
7 Morgan Offshore Wind Limited, 2024
8 RWE, 2023
9 Menter Mon Morlais Limited, 2019

## Sensitivity

182. The sensitivity for marine mammals is outlined above in **paragraph 162**.

### Construction

## Magnitude

183. While the numbers presented reflect the absolute worst-case scenario of vessel presence, the actual number of vessels is likely to be much smaller. The data in **Table 3.1** indicates that for projects with available data (and within 100km of the Project), the number of construction vessels on-site at any given time could range from 16 to 96 per project, with annual return trips ranging from 114 to 482.

184. It is unrealistic to assume that the maximum number of vessels at each project would be present at the construction site simultaneously with all 37 vessels at the Project. Therefore, providing a quantified assessment is not representative. This snapshot would give an unreasonable estimate of the total number of vessels, not accounting for any potential overlap in disturbance ranges.

185. While there is evidence that marine mammals can become habituated to vessel traffic to some degree (Nowacek *et al*., 2007; Hudson, 2014; Onoufriou *et al*., 2016; Jones *et al*., 2017; Koroza & Evans, 2022), a possible response to vessels is temporary displacement from the area. Marine mammals will be exposed to a short-term fluctuation of vessel traffic during the respective project construction phase but may return once the vessel has passed (see review in **paragraph 171 - 173**). Therefore, a low magnitude was assigned to construction vessel effects, as any impact from vessel presence would be both localised, temporary and limited to the 2.5-year construction phase.

## Significance of effect

186. Available measures to reduce the potential level of disturbance from vessels are included in the Outline PEMP (REP1-054) and Outline VTMP (REP2-022) which have been secured in the dDCO Schedule 6 Condition 9(1)e(v) and Condition 9(1)j, respectively. Best practise measures have also been outlined for other projects as further detailed in the Operation and Maintenance section below.

187. The effect of cumulative vessel disturbance on marine mammals during the 2.5-year construction phase of the Project with a medium sensitivity and a **low** magnitude result in a **minor adverse** effect significance for all marine mammal receptors, which is not significant in EIA terms.

### Operation and maintenance

### Magnitude

188. During the 35-year operational period of the Project, there are several projects that could overlap in their operational phase, meaning that an increase in vessel traffic has the potential to disturb marine mammals in the area. However, there is uncertainty whether vessel traffic movement for each project will coincide during operation.

189. The data in **Table 3.1** indicates that for projects with available data (and within 100km of the Project), the number of vessels on-site at any given time could range from 4 to 21 per project, with annual return trips ranging from 77 to 719. As described above during 'Construction', the total number of vessels expected to be transiting or on site at any one time at each project would not reflect the maximum number of vessels assessed. Firstly, the numbers present the maximum worst-case for each project, and secondly, vessels conducting maintenance will likely be undertaking trips on different days annually over the 35-year period. Additionally, considering the distances between the projects and their potential O&M ports or bases, it is highly unlikely that all vessels would frequently operate simultaneously in the same sea region on the same day. Such occurrences would likely be rare during O&M activities.

190. In reality, the maximum number of operation and maintenance vessels are at each of the projects are highly unlikely to be working on the same day at all of the windfarms assessed.

191. While the disturbance from vessels during construction is considered a temporary impact (as assessed for Project-alone in Table 11.52 in ES Chapter 11 Marine Mammals (APP-048)), vessel impacts during the O&M phase would be long-term (as assessed Project-alone in Table 11.72 in ES Chapter 11 Marine Mammals (APP-048). This means that marine mammals would be affected by repetitive exposure to vessel disturbance over the lifetime of each individual project. However, the scientific evidence, as discussed in **paragraphs 171-172**, highlights that the long-term effects of shipping disturbance is difficult to quantify and that short-term effects are likely to occur but recovery has been observed (Wisniewska *et al.*, 2018, New *et al.,* 2020, Hao *et al*., 2024).

192. Currently available monitoring studies for operational wind farms suggest that marine mammals are not significantly disturbed by vessel traffic, and that any impact is localised and temporary (e.g. Diederichs *et al*. 2008; Teilmann *et al*. 2006; McConnell *et al*. 2012). Harbour porpoise and seals have also been found to continue to forage within operational wind farm sites (Lindeboom *et al.* 2011; Russell *et al.* 2014; Leemans & Fijn, 2023). These monitoring studies suggest that there is no significant disturbance from operational wind farms, which may have a number of vessels present at any one time.

193. Vessels associated with operation and maintenance activities are more likely to undertake similar or smaller scale activities compared to those undertaken for construction. Russel (2016) found that harbour seal foraged within an area undergoing OWF construction. Where possible, vessel movements to the screened in projects, and from any port, would be expected to be largely incorporated within existing vessel routes and therefore to areas where marine mammals may already be accustomed to their presence.

194. Best practice measures, as implemented for the Project (see Section 11.3.3 in ES Chapter 11 Marine Mammals (APP-048)), have been secured for all other projects considered, further limiting the potential for disturbance:

- **Morgan and Morecambe OWF Transmission Assets**: "*Detailed Vessel Traffic Management Plan(s) (VTMP) will be developed pre-construction in line with legislation, guidance and industry best practice which will: • determine vessel routing to and from construction areas and ports; • include vessel standards and a code of conduct for vessel operators; and • minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks. These plans will be developed in accordance with the Outline VTMP prepared and submitted with the application for development consent."* (Table 4.12; Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Ltd, 2024).
- **Morgan and Mona Offshore Wind Project:** "*The Offshore EMPs* [Environmental Management Plans] *(CoT65) (Table 4.12) outlines instructions for vessel behaviour and vessel operators, including advice to operators to not deliberately approach marine mammals and to avoid sudden changes in course or speed*" and "*The Offshore EMP will include a commitment that the site induction processes will incorporate the principles of the Wildlife Safe (WiSe) Scheme to ensure that key personnel are aware of the need to follow the WiSe Code of Conduct. The WiSe Scheme (https://www.wisescheme.org/), which is a UK national training scheme for minimising disturbance to marine life, key measures from the scheme will reduce the disturbance of vessel transits on marine mammals and rafting birds visible at the water surface, or as otherwise agreed with the Statutory Nature Conservation Bodies (SNCB*s) (paragraph 4.11.4.14 and Table 4.17; Mona Offshore Wind Limited, 2024; Morgan Offshore Wind Limited, 2024)
- **Awel y Mor:** *"The adoption of best practice vessel handing protocols (e.g. following the Codes of Conduct provided by the WiSe Scheme, Scottish Marine Wildlife Watching Code or Guide to Best Practice for Watching Marine Wildlife) will minimise the potential for any impact. The final codes of conduct will be discussed and agreed with NRW and JNCC."* (Table 19; RWE, 2023).

- **Morlais**: "*Where possible, all vessel movements will be kept to the minimum number that is required to reduce any potential collision risk. Additionally, vessel operators will use good practice to reduce any risk of collisions with marine mammals*." (paragraph 510; Menter Môn Morlais Limited, 2019).

195. Once on-site, vessels would be stationary or slow moving while undertaking their activities, minimising the potential for disturbance. However, in a worst-case scenario, projects' array areas could become areas of disturbance if several vessels were to be present across multiple projects simultaneously. This type of scenario was presented in an illustration in Plate 11.9 in ES Chapter 11 Marine Mammals (APP-048), The space between the individual projects and corridors within the array sites would allow sufficient space for marine mammals to travel in between, reaching their foraging grounds, haul-out sites or migration routes.

196. The magnitude of impact is therefore considered to be **low** but is considered a long-term impact due to the presence of operation vessels as a continuous impact.

### Significance of effect

197. Available measures to reduce the potential level of disturbance from vessels are included in the Outline PEMP (REP1-054) and Outline VTMP (REP2-022) which have been secured in the dDCO Schedule 6 Condition 9(1)e(v) and Condition 9(1)j, respectively.

198. The effect of cumulative vessel disturbance on marine mammals during the 35-year operational phase of the Project with a medium sensitivity and a **low** magnitude result in a **minor adverse** effect significance, which is not significant in EIA terms.

### Decommissioning

199. A detailed Offshore Decommissioning Programme will be developed individually for the Project and other projects, detailing the vessels required for this phase. The impact from decommissioning is expected to be the same as assessed during the construction phase. As such, the effect of cumulative vessel disturbance on marine mammals with a medium sensitivity would result in a **minor adverse** effect significance for all marine mammal receptors, which is not significant in EIA terms.

### Lifetime assessment

200. Vessels will be used throughout all phases of the Project and therefore the impact from elevated underwater sound due to vessel activities throughout all phases could cause additional disturbance to marine mammals compared to considering each stage separately. However, for all phases, vessel movements will primarily be located within the windfarm site and travelling at

a reduced speed. Vessels will also follow the measures to minimise disturbance to marine mammals within the PEMP (REP1-054) and VTMP (REP2-022). Across the project lifetime, the effects on marine mammal receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.

#### 3.1.3.3 Conclusion

201. In response to NRW's comment regarding the exclusion of shipping effects from projects from the CEA (REP1-099; WR-099-78 in REP2-027), the Applicant has provided a qualitative assessment between the Project and the Transmission Assets as a combined assessment, and an assessment that included all the project-related vessel traffic from the screened-in projects that have the potential to overlap with the Project phases. It has been concluded that there would be a **minor adverse** effect (not significant in EIA terms) on the marine mammal populations from the impact of all additional shipping traffic associated with the projects. While the Applicant acknowledges that the vessel traffic would increase in the area, mitigation measures are secured for each project, committing to reduce disturbance and the risk of collision (as presented for the Project in the Outline PEMP (REP1-054) and Outline VTMP (REP2-022)).

### 3.1.4 Cumulative effect of repeated disturbance events

202. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-61 in REP2-027.

*"Other than the section on Population modelling for cumulative disturbance from OWF projects, assessments appear to have been based on numbers disturbed from a single event of a given activity. Thus the (potential) cumulative impact of repeated disturbance events on the same population over time has not been captured."*

203. The Applicant acknowledges that a scenario of cumulative disturbance over the long term for noisy activities other than piling has not been presented in the ES Chapter 11 Marine Mammals (APP-048). Repeated cumulative disturbance events can be caused by:

- OWFs;
  - Piling events throughout the 2.5-year construction period (already been assessed using iPCoD modelling in the ES Chapter 11 Marine Mammals (APP-048);
  - Construction, operation and maintenance, or decommissioning activities (other than piling) throughout the 35-year lifetime;

- Presence of vessels throughout the 35-year lifetime (assessed in Section 3.1.3.2); and
    - Operational turbine noise throughout the 35-year lifetime.
- Oil and gas seismic surveys and geophysical surveys;
- UXO clearance;
- Other offshore projects (such as subsea cables, disposal activities, and aggregates and dredging projects); and
- Decommissioning activities.

204. From the list of disturbance impacts, piling represents the worst-case disturbance scenario for marine mammals during construction. Consequently, activities that produce much lower levels of noise, such as other construction activities, are expected to have comparatively less impact on marine mammal populations.

205. With regard to repeated disturbance from cumulative activities, **Section 2.8** presents a quantitative assessment of effects from all overlapping piling and construction at other OWFs, as well as other industry noisy activities occurring simultaneously to piling at the Project. The result of this assessment presents a snapshot of the cumulative effect on the marine mammal populations, but the text in **Section 2.8** highlights that the likelihood of this effect to occur on the same day is very low. However, throughout the Project duration, any of these activities may occur at one point. The effect would therefore be spatially and temporally dispersed.

#### 3.1.4.1 OWFs

##### Piling

206. As quantitative methods on long-term effects are lacking the iPCoD model was used, which simulates the changes in a population following disturbance from piling over time for both a disturbed and an undisturbed population, as described in **Section 2.6.2.** The population used is the relevant management unit presented in Table 11.14 in ES Chapter 11 Marine Mammals (APP-048). This provides a comparison of the type of changes that could occur resulting from natural environmental variation, demographic stochasticity (i.e. variability in population growth rates) and disturbance from piling (Harwood *et al*., 2014; King *et al.,* 2015).

207. The potential for prolonged exposure to noisy activities to affect marine mammals is not well understood, with a limited number of studies mainly focusing on harbour porpoise. Nabe-Neilson *et al.* (2018) found that harbour porpoise densities returned to normal levels between two and six hours following piling, and Brandt *et al.* (2011) found that porpoise densities recovered between 2.5 and 11.5 hours post piling.

208. Graham *et al*. (2019) found that the level of response of harbour porpoise to piling reduced over time (i.e. as the piling campaign continued, the response and recovery time of harbour porpoise reduced). At the beginning of the piling campaign (in the Moray Firth), there was more than a 50% chance of harbour porpoise responding to piling in the 24 hours directly following the cessation of piling up to 7.4km (95% CI = 5.7–9.4) away from the noise source. By the middle of the piling campaign, this 50% response distance had decreased to 4.0km (95% CI = 2.7–5.2), and decreased to 1.3km (95% CI = 0.2–2.8) by the end of the piling campaign. This indicates that for this piling campaign, harbour porpoise recovery was shown to be within 24 hours at a closer range to the piling itself by the end of the piling, indicating a level of habituation, and of decreased disturbance over time.

### Construction, operation and maintenance, and decommissioning activities (other than piling)

209. During the lifetime of the Project and other projects, there is a requirement for maintenance activities to take place, primarily conducted via vessels. The effect of repeated and cumulative vessel disturbance has already been discussed in **Section 3.1.3.2**. The evidence provided in this section found that while repeated disturbance events would be likely to occur, there would be no long-term effect to marine mammals. This is due to the fact that individual events such as maintenance work or vessel presence would be temporary and intermittent and not continuously present throughout the 35 years.

210. As the worst-case disturbance impacts from piling at several projects within the same time window have assessed no significant effects on the relevant marine mammal populations, it can be expected that any noisy activities (other than piling) that are quieter, and/or non-impulsive would result in lower numbers of disturbed marine mammals. Further, the Project has outlined mitigation measures to reduce its contribution to cumulative effects in the MMMP (REP2-018) and an UWSMS (REP2-026).

211. While seismic surveys are not a good proxy for construction noise, due to their comparatively high levels of underwater noise, the evidence (Taormina *et al.*, 2018) shows that marine mammals returned to natural behaviour shortly after the noise dissipated, similar to the results from studies on piling impacts cited above.

212. In contrast to loud activities such as seismic surveys and piling, one study by Taormina *et al.* (2018) concluded that the effects of cable-laying activities are insignificant, as the noise is likely to be masked by the noise emitted from the vessels conducting the work. Taormina *et al.* (2018) stated that noise from submarine cable installation has a negligible to weak impact on marine mammals, as the underwater noise associated with undersea cables remains

low. Cable installation is a spatially localised, temporary event, so the impact of noise on marine communities is expected to be minor and brief.

213. While the long-term effects of construction activities (other than piling) are unknown, the evidence provided above and in **Section 3.1.4.2** suggests that disturbance from comparatively loud sources such as piling or seismic surveys is unlikely to have a significant long-term impact, and therefore it is considered unlikely that other construction activities would have a long-term impact on any marine mammal population.

### Operational noise

214. During the 35-year operational lifetime of the project, there is the possibility that recurring disturbances have the potential to affect marine mammal populations. Piling activities and other construction noise from all screened-in projects would have ceased, with the operational turbine noises then commencing at the Project and the other screened-in projects. This effect has been assessed quantitatively in the ES Chapter 11 Marine Mammals (APP-048) and concluded a minor adverse effect (not significant in EIA terms).

215. In addition to the literary evidence provided the ES Chapter 11 Marine Mammals (APP-048), disturbance at operational windfarms has been identified to be limited to the array sites themselves (Leemans & Fijn, 2023), and as such there would be no overlapping areas of disturbance with other projects.

216. However, even within the array areas themselves, marine mammals would not be excluded as several studies have shown (Diederichs *et al*. 2008; Lindeboom *et al*. 2011; Marine Scotland, 2012; McConnell *et al*. 2012; Russell *et al*. 2014; Scheidat *et al*. 2011; Teilmann *et al*. 2006; Tougaard *et al*. 2005, 2009a, 2009b). The level of noise from the operational turbines does not appear to deter marine mammals, in fact research studies have recorded harbour porpoise and seals foraging within operational windfarm sites (e.g., Lindeboom *et al*. 2011; Russell *et al*. 2014, Leemans & Fijn, 2023).

217. It can therefore be concluded that operational noise from turbines is not likely to have a repeated effect on marine mammals as the evidence suggests that the noise does not affect them.

## 3.1.4.2 Oil and gas seismic surveys and geophysical surveys

218. Similarly to what has been discussed in **Section 3.1.3**, longer-term consequences of exposure to noise from activities other than piling, such as shipping or seismic surveys, are not well studied and are difficult to quantify (Gordon *et al*., 2003). For example, the effects from seismic surveys are more studied than those from other construction activities. As for piling, the evidence

of cumulative effects, which may have biologically significant impacts, are poorly understood.

219. Continuous exposure to any noise source could lead to chronic stress in marine mammals, potentially weakening their immune systems and making them more susceptible to diseases (Gordon *et al.,* 2003). The authors give more evidence that there is the potential implication for social organisation among marine mammals, for social bonds and survival. Disruptions can affect communication and cohesion within groups, potentially leading to effects on population dynamics.

220. In contrast, Thompson *et al*. (2013) found that seismic surveys cause short-term disturbances, but these effects are minor compared to natural variations. Porpoises were detected at affected sites within a few hours of a seismic survey ceasing, indicating that the seismic survey did not result in long-term displacement into suboptimal or higher-risk habitats. The animals typically returned to impacted sites shortly after the disturbance, and their response to the noise decreased over the 10-day survey period.

221. The evidence provided above suggests that disturbance from seismic surveys is unlikely to have a significant long-term impact on any marine mammal population.

#### 3.1.4.3 UXO Clearance

222. UXO clearances are by their nature single pulse events, with limited potential for ongoing disturbance. While there are plenty of studies that conducted UXO clearance noise measurements, there is currently a paucity of information available on the impact of disturbance from UXO clearance onf marine mammals. The latest guidance for assessing disturbance to harbour porpoise suggests the use of known piling disturbance as a proxy in lieu of further information (JNCC *et al*., 2020).

#### 3.1.4.4 Decommissioning

223. While at the current stage, the exact timings and end-of-life procedures for offshore infrastructures are not yet detailed, it is unknown which projects would be overlapping with their decommissioning activities. Consequently, any anticipated cumulative disturbance events are not yet known. It can however be expected that some decommissioning activities such as cutting, as well as increased vessel traffic have the potential to have a repeated disturbance effect. As construction is considered to be the worst-case phase of a project, it can be presumed that impacts on marine mammals would be the same as assessed for this phase.

224. **Section 3.1.7.2** provides a more detailed assessment of cumulative decommissioning activities with the Project.

225. In conclusion, and in line with similarly noisy activities assessed above (**Section 3.1.4.2 0** and **Section 3.1.4.3**), while the long-term effects of these activities are unknown, the evidence provided above suggests that disturbance from comparatively loud sources such as piling or seismic surveys are unlikely to have a significant long-term impact, and therefore is it considered unlikely that these activities would have a long-term impact on any marine mammal population.

#### 3.1.4.5 Conclusion

226. In response to NRW's comment regarding the potential impact of repeated disturbances on marine mammals (WR-099-61), the Applicant has provided additional information on disturbance effects in each phase of the Project's life cycle. It was concluded that long-term effects would be unlikely, as indicated by literary evidence and population modelling showing that piling disturbance represents the worst-case scenario for marine mammals. Given the lack of other methods to assess long-term consequences from disturbance, population modelling yielded insignificant results for all species from which it can be inferred that all other noisy activities would have even less disturbance effects if it were possible to assess in the same way (as noted above, the iPCoD modelling is only currently suitable for assessing disturbance impacts from piling).

### 3.1.5 Additive effects of Transmission Assets and the Project

227. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-69 in REP2-027:

*"The conclusions in paragraph 11.715 [APP-048] indicate that "while all effects are additive between the Project and the Transmission Assets, due to the localised effects there is no material change in significance of effects when considering the majority of impacts together (see impact screening summary)." Here, the additive nature of the impacts does not appear to have been considered, and a conclusion of no material change has been made based on "localised effects". NRW (A) advise that the assessment should either be based on a summation of the effects, or a much stronger justification should be provided."*

228. The Applicant notes that the limited piling that was included in the Transmission Assets provides the reasoning for the fact that the additive effects are not materially different to the Project alone magnitude. The Applicant also notes that since submission of the ES Chapter 11 Marine Mammals (APP-048) a decision has been taken that the OSPs for the two projects and the Morgan offshore booster station would not be included within the DCO Application for the Morgan and Morecambe Offshore Wind Farms

Transmission Assets, removing the requirement for piling altogether from the Transmission Assets application. This change affects the combined assessment which captures both the PTS/TTS and disturbance assessments for the key noisy components, which have now been removed. As a result of this change, the cumulative effect of injury and disturbance from underwater noise during piling can be screened out from further assessment.

229. **Table 3.2** below is an updated version of Table 11.83 in ES Chapter 11 Marine Mammals (APP-048), providing a summary of the project-alone effects from the Transmission Assets and the Project, taking into account the change noted above. The table summarises the effect significances the Applicant has drawn from assessing both projects, Transmission Assets and the Project, as a combined project. The rationales and subsequent sections will outline additional information to justify the conclusions reached.

*Table 3.2 Updates to Table 11.83 in ES Chapter 11 Marine Mammals (APP-048) showing a summary of impacts from the Project and Transmission Assets alone and combined[10] [differences when compared to the ES as submitted (APP-048) are shown in red.*

| Impact | Residual significance of effect | | Combined assessment |
|---|---|---|---|
| | Transmission Assets (ES) | Project | |
| **Construction / decommissioning phases** | | | |
| Auditory injury from piling | n/a<br>[Previously assessed as Not significant (Minor adverse)] | Not Significant (Minor adverse) | Auditory injury: Not assessed further<br>Disturbance: Not assessed further<br>[Previously assessed as Not significant (Minor adverse)] |
| Disturbance from piling | | Not significant (Minor adverse) | |
| Auditory injury and disturbance from other construction noise | Not significant (Minor adverse) (incl. vessels) | Not significant (Minor to negligible adverse) (excl. vessels) | See **Section 3.1.5.1** in which the additive nature is further discussed, deriving at a conclusion of:<br>Not significant (Minor adverse) |
| TTS and disturbance through vessels | Assessed under 'other construction noise' | Not significant (Minor adverse) | See **Section 3.1.3.1** in which the additive nature is further discussed, in response to NRW comment (WR-099-78 in REP2-027), deriving a conclusion of:<br>Not significant (Minor adverse) |
| Vessel collision risk | Not significant (Minor adverse) | Not Significant (Minor adverse) | See **Section 3.1.5.2** in which the additive nature is further discussed, deriving a conclusion of:<br>Not significant (Minor adverse) |

[10] Note: wording of impacts has been summarised to encompass both projects. Where impacts were not considered or scoped out = n/a

| Impact | Residual significance of effect | | Combined assessment |
|---|---|---|---|
| | Transmission Assets (ES) | Project | |
| Injury and disturbance from UXO detonation | Significant (Moderate adverse) for harbour porpoise<br>[Previously assessed as Not significant (Minor adverse)]<br>Not significant (Minor adverse) for all other species | Not Significant (Minor adverse).<br>(see Appendix 11.3 Marine Mammal Unexploded Ordnance Assessment (APP-067); and ES Chapter 11 Marine Mammals (APP-048), Section 11.7.3.2, paragraph 11.845) | See Section **3.1.5.3** in which the additive nature is further discussed, deriving a conclusion of:<br>Not significant (Minor adverse)<br>This conclusion is based on the mitigation available, and alternative detonation (low order) being used in preference of high order. |
| Barrier effects as result of UWN | n/a | Not significant (Minor to negligible adverse) | Not assessed further |
| Changes to prey resources/ availability | Not significant (Minor adverse) | Not significant (Minor to negligible adverse) | See **Section 3.1.5.4** in which the additive nature is further discussed, deriving at a conclusion of:<br>Not significant (Minor to Negligible adverse).<br>[Previously not assessed] |
| Changes to water quality | n/a | Not significant (Negligible adverse) | Not assessed further |
| Disturbance of seals at haul-out sites | n/a | Not significant (Minor to negligible adverse) | Not assessed further |
| **Operation and maintenance phase** | | | |
| Auditory injury & disturbance from operational WTG | n/a | Not significant (Minor adverse) | Not assessed further<br>[Previously assessed as Not significant (Minor adverse)] |
| Auditory injury and disturbance from other operational activities | Not significant (Minor adverse) (incl. vessels) | Not significant (Minor to negligible adverse) (excl. vessels, assessed separately below) | See **Section 3.1.5.1** in which the additive nature is further discussed, deriving at a conclusion of: |

| Impact | Residual significance of effect | | Combined assessment |
|---|---|---|---|
| | Transmission Assets (ES) | Project | |
| | | | Not significant<br>(Minor adverse) |
| TTS and disturbance through vessels | Assessed under 'other operational noise' | Not significant (Minor to negligible adverse) | See **Section 3.1.3.1** in which the additive nature is further discussed, deriving at a conclusion of:<br>Not significant (Minor adverse) |
| Vessel collision risk | Not significant (Minor adverse) | Not significant (Minor to negligible adverse) | See **Section 3.1.5.2** in which the additive nature is further discussed, deriving at a conclusion of:<br>Not significant (Minor adverse)<br>[Previously assessed as Not significant (Minor to negligible adverse)] |
| Barrier effects as result of UWN | n/a | Not significant (Minor adverse) | Not assessed further. |
| Changes to prey resources/ availability | Not significant (Minor adverse) | Not significant (Minor to negligible adverse) | See **Section 3.1.5.4** in which the additive nature is further discussed, deriving at a conclusion of:<br>Not significant (Minor to Negligible adverse).<br>[Previously not assessed] |
| Changes to water quality | n/a | Not significant (Negligible adverse) | Not assessed further |
| Disturbance of seals at haul-out sites | n/a | Not significant (Minor to negligible adverse) | Not assessed further |

#### 3.1.5.1 Injury and disturbance from other construction or operational activities

230. The Project has assessed auditory injury for vessels and other (non-piling) construction activities separately, while for the Transmission Assets the assessment was undertaken in combination.

231. Since the decision has been taken to remove key components of the planned infrastructure with regard to the Transmission Assets (see **paragraph 228**), the requirement for any major additional construction activities associated with the preparation for foundations was removed. During construction, the Transmission Assets expects the burial of offshore export cables via trenching, jetting, ploughing (including pre-lay ploughing), and mechanical cutting. During operation and maintenance, the activities at the Transmission Assets that will be carried out include routine inspections, geophysical surveys, and cable repair or reburial. The number of vessels from which operation and maintenance activities will conducted at any one time has been assessed under the effect of vessel presence (the combined effect with the Project has been outlined in Section **3.1.3.1**).

232. As assessed in ES Chapter 11 Marine Mammals (APP-048) Section 11.6.3.3 the impact magnitude for undertaking two (non-piling) Project construction activities at the same time was assessed as negligible for all marine mammal species. Considering the scientific evidence provided in **paragraph 192**, cable laying or activities of similar source level (see Table 5-2 in Appendix 11.1 Underwater Noise Assessment (APP-067)) is not considered to cause additional effects that would result in change of effect significances. When adding the number of animals affected from construction vessel disturbance for the Transmission Assets (see paragraph 164) and the amount of animals disturbed by two construction activities at the Project (Table 11.48; ES Chapter 11 Marine Mammals (APP-048)), the total number of affected animals could be up to 198 harbour porpoise, 5 Risso's dolphin, 5 minke whale, 3 common dolphin, 1 white-beaked dolphin and bottlenose dolphin, 17 grey seal, and less than one individual harbour seal (numbers were rounded up where animals were less than one individual).

233. As a result of that, the affected percentage of the relevant population remains under 0.5% of the relevant population and is therefore negligible for all species. The magnitudes have not changed and thus have not altered the effect significance conclusions as set out in Section 11.6.3.3 for the Project-alone assessment in ES Chapter 11 Marine Mammals (APP-048).

234. Therefore, the significance of effect for other construction activities remains as minor adverse (not significant in EIA terms), in line with ES Chapter 11 Marine Mammals (APP-048) and the result of the combined vessel disturbance assessment in **Section 3.1.3.1**. The magnitude of impact as a

result of underwater noise from operation and maintenance activities is expected to be less than that assessed for construction. Vessels are however considered a long-term impact (see Table 11.72 in ES Chapter 11 Marine Mammals (APP-048)) for marine mammals, thus a minor adverse effect (not significant in EIA terms) presents a precautionary approach, having taken repeated vessel disturbance into consideration.

#### 3.1.5.2 Injury to marine mammals due to collision with vessels

##### Construction

235. As mentioned in **Section 3.1.3.1**, vessel activity during construction is likely to increase minimally within the cumulative marine mammal study area.

236. Most vessels, with the exception of crew transfer vessels, will travel at slow speeds, well below 14–15 knots, minimising collision risks for marine mammals (Laist *et al*., 2001; Wilson *et al*., 2007). Studies have shown that vessel speed is one of the most critical factors influencing collision risk, with speeds below 10 knots posing minimal threat (Vanderlaan & Taggart, 2007; Gende *et al*., 2011; Conn & Silber, 2013).

237. Both projects have committed to implementing VTMPs and PEMPs to reduce potential disturbances and collision risks. VTMPs are widely recognised as effective tools for minimising vessel-related impacts on marine mammals, as demonstrated in previous offshore projects (Dolman & Simmonds, 2010).

238. Sound emissions from vessels may temporarily deter animals from the immediate area (Benhemma-Le Gall *et al.,* 2023), reducing collision likelihood. Studies indicate that marine mammals, including harbour porpoises, often respond to vessel noise by maintaining safe distances, particularly in high-traffic areas (Wisniewska *et al*., 2018; Nowacek *et al*., 2001). Vessel movements are expected to remain localised within project areas and along established shipping routes, consistent with existing traffic patterns.

239. Construction activities occur in regions already characterised by high levels of marine traffic. Mitigation measures, including avoidance protocols, have been successfully implemented in similar contexts to minimise risks to marine life (Silber *et al*., 2010).

240. Overall, vessel activity will be intermittent over the construction phase. With established mitigation measures in place, cumulative impacts are predicted to be of limited spatial extent, and **low** in magnitude, with minimal risk of collisions.

241. As described in paragraph 11.474 of ES Chapter 11 Marine Mammals (APP-048), the sensitivity of all marine mammals to collision risk is low, with the exception of minke whale with a sensitivity of medium, leading to an overall effect of **minor adverse** for all species (not significant in EIA terms).

## Operation & Maintenance

242. As outlined in ES Chapter 11 Marine Mammals (APP-048), the vessel traffic during operation and maintenance reduces at both the Project and Transmission Assets. The Transmission Assets are expected to use a maximum of 14 vessels, while the Project may have up to 10 vessels in the wind farm site.

243. Unlike during construction, the presence of maintenance vessels is considered long-term, spanning the entire lifecycle of the projects. Maintenance activities will occur intermittently, with up to 24 vessels on-site at any given time. Although the overall number of vessels has decreased, the longevity of their presence must be considered. However, given the baseline levels of shipping in the area, the Applicant does not believe that an additional 24 vessels will significantly increase the collision risk to marine mammals.

244. Taking a precautionary approach, vessel activity will be intermittent throughout the lifetime of the projects. With established mitigation measures in place, cumulative impacts are predicted to be of limited spatial extent, long-term in duration, and **low** in magnitude, with minimal risk of collisions impacting sensitive receptors.

245. As described in paragraph 11.474 of ES Chapter 11 Marine Mammals (APP-048), the sensitivity of all marine mammals to collision risk is low, with the exception of minke whale with a sensitivity of medium, leading to an overall effect of **minor adverse** for all species (not significant in EIA terms).

### 3.1.5.3 Injury and disturbance from UXO detonation

## Injury

246. The number of animals that experience PTS or TTS from UXO clearance at the Transmission Assets led to the conclusion of a moderate significance for harbour porpoise and minor significance for all other species. The assessment for the Project (noting information was provided only for information as a separate marine license application would be made for any UXO clearance required) led to the conclusion that the effect significance would be major adverse for harbour porpoise and grey seal (significant in EIA terms); major to minor adverse for harbour seal (significant in EIA terms); moderate adverse (significant in EIA terms) for bottlenose dolphin; and minor adverse (not significant in EIA terms) for all other species. For the Project, the affected animals are based on the worst-case scenario with no mitigation measures applied. As such, it is expected that the residual level of significance would be reduced to **minor adverse**, once mitigation as per the draft MMMP is in place.

247. High-order clearance is the last resort in the mitigation hierarchy. In addition, the MMMPs of both projects would be designed to ensure any potential for

PTS is reduced as far as is practicable. As a combined effect, a minor adverse effect can be expected to occur with regard to auditory injury from mitigated UXO clearance.

#### Disturbance

248. The Applicant concluded that two UXO clearances, at the same time as piling at the Project, would result in a high magnitude impact for bottlenose dolphin, medium for harbour porpoise, low for minke whale or grey seal, and negligible for the remaining dolphins and harbour seal (see cumulative assessment in ES Chapter 11 Marine Mammals (APP-048), Section 11.7.3.2, paragraph 11.845).

249. The assessment was carried out on a precautionary basis as the number of UXOs at either project had not been confirmed at the time of writing. As such, re assessment and mitigation will be secured via the final MMMPs (and marine wildlife license applications) for each project and the separate Marine License application that will be applied for the Project's UXO clearance if necessary.

250. As mentioned above, both projects must adhere to a MMMP for UXO. Mitigation strategies will secure measures to reduce auditory impacts on marine mammals, thereby also mitigating disturbance. Furthermore, the position statement by the UK Regulators (UK Government *et al*., 2022) supports the use of lower noise alternatives to high order detonations of UXO. Where low noise alternatives are not feasible, suitable mitigation such as noise abatement system would be considered. Consequently, the conclusion from a combined assessment of UXO clearance at Transmission and piling at the Project is that the impact is of **minor adverse** significance (not significant in EIA terms).

### 3.1.5.4 Effects on marine mammals due to changes in prey availability

251. The Applicant acknowledges that the ES Chapter 11 Marine Mammals (APP-048) does not include a specific combined assessment for any potential changes in prey availability. However, the Applicant signposts the assessment of Cumulative effect 5 in the same chapter (paragraph 11.911), which explores the matter in greater detail. This assessment concluded that the cumulative effects, including all projects overlapping with the proposed Project, would result in a negligible significance of impact. While the effect interactions would be additive in nature across the study area, their overall significance is not elevated beyond the levels assessed individually within the ES Chapter 11 Marine Mammals (APP-048). This is considered to be suitably precautionary given that no significant effects have been identified in ES Chapter 10 Fish and Shellfish (REP1-028). Detailed information about marine mammal feeding ecology has been provided for each species in Appendix 11.2 Marine Mammal Information and Survey Data (APP-066), which indicated that most species

have a wide range of common prey species that they can rely on. Any impact that might affect fish would be mitigated by marine mammals' extensive swimming ranges, which allow them to forage away from their usual or nearest feeding locations. Over the lifetime of the Project and Transmission Assets, prey is unlikely to be affected significantly by ongoing events. In fact, both seal and harbour porpoise have been seen feeding in operational windfarms, leading to the assumption that prey availability is plentiful (e.g., Lindeboom *et al*. 2011; Russell *et al*. 2014, Leemans & Fijn, 2023).

#### 3.1.5.5 Injury and Disturbance Conclusion

252. In response to NRW's concern regarding the overall conclusion of the combined effects between the Project and the Transmission Assets (REP1-099; WR-099-69 in REP2-027), the Applicant has provided additional information to further justify the conclusions drawn in ES Chapter 11 Marine Mammals (APP-048). As shown in **Table 3.2** the overall significances of effect have not changed, and therefore the conclusions of the ES remain valid.

### 3.1.6 Residual PTS

253. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-99 in REP2-027:

*"NRW (A) do not agree that PTS should be screened out of the CEA. The Project has identified a residual PTS impact that it has not committed to fully mitigate at this stage. It is not sufficient to say that mitigation for the Project would be put in place post-consent, as this is not guaranteed or secured. If the Project can take the approach of not mitigating the full PTS zone, then it follows that other projects can take the same approach, hence other projects' PTS risk should be assessed in the CEA too. NRW (A) advise that the Applicant assess cumulative PTS impact in the CEA or commit to sufficient mitigation to reduce the risk of a residual PTS impact further. "*

254. Natural England has also raised concerns about the mitigation of residual PTS. The following information is also provided in response to NE's comment (NE Ref D38, RR-061-202 in PD1-011):

*"The Project has identified a residual PTS impact that it has not commited to fully mitigate at this stage. It is not sufficient to say that mitigation for the Project would be put in place post-consent, as this is not secured. Natural England advises that this should be secured as a commitment. The PTS risk of other relevant projects should be assessed cumulatively in the CEA."*

255. Although this has not been explicitly mentioned in the ES Chapter 11 Marine Mammals (APP-048), the potential risk of (residual) PTS from other OWF projects has been incorporated in the cumulative disturbance assessment using population modelling (iPCoD). The iPCoD approach is a tool for

assessing both PTS and disturbance on marine mammal populations (Sinclair *et al*., 2019).

256. PTS is considered in the iPCoD as a critical factor affecting marine mammal populations. The iPCoD framework was developed, using expert opinion, to forecast the potential effects of disturbances, including PTS, on vital rates such as survival and reproduction in marine mammals (Booth & Heinis, 2018). The model incorporates statistical distributions generated from expert opinion to simulate the impacts of PTS on the population. The model also allows for comparisons between impacted and unimpacted populations, using modified survival and birth rates for animals that have experienced disturbance and PTS, while maintaining baseline rates for unimpacted populations (Sinclair *et al*., 2019).

257. The Applicant acknowledges that iPCoD is only applicable to certain species (UK priority species), and this method cannot be used for common dolphins and white-beaked dolphins due to, among other reasons, the absence of species-specific sensitivity assessments (Sinclair *et al*., 2019). However, the PTS ranges for high-frequency cetaceans, such as dolphins, are relatively small compared to those of other species, e.g. the PTS $SEL_{cum}$ impact range for dolphin species, for the installation of one or multiple monopiles is 100m (Table 11.21 of ES Chapter 11 Marine Mammals (APP-048)), making the risk of residual PTS negligible given that a minimum monitoring zone of 500m is required by JNCC guidance (JNCC, 2010).

### 3.1.6.1 Conclusion

258. In response to NRW's comment (WR-099-88 in REP2-027) and NE's concerns (NE Ref D38, RR-061-202 in PD1-011) about the risk of residual PTS and its mitigation, the Applicant has provided additional information on how PTS has been addressed in the ES Chapter 11 Marine Mammals (APP-048) using iPCoD modelling. While PTS is considered to be localised to each project with regard to the modelled impact ranges, with the introduction of the UWSMS (REP2-026) and the measures outlined in the current outline MMMP (REP2-018), which will be further developed post-consent and pre-construction, the Applicant is confident that PTS has been appropriately considered within the CEA. The results of the cumulative population modelling, taking into account the number of animals at risk of PTS and those being disturbed, was deemed not significant (in EIA terms) for all species. Furthermore, all other projects that were screened in for an overlap in piling, committed to mitigate PTS with measures detailed in their respective MMMPs.

259. Evidence that projects committed to reduce PTS via MMMP:

- **Awel y Mor**: submitted a Draft Marine Mammal Mitigation Protocol with their DCO to PINS under REP8-069;

- **Erebus**: submitted a Draft Marine Mammal Mitigation Protocol to NRW under licence: ORML2170
- **Transmission Assets**: submitted an Outline Marine Mammal Mitigation Protocol with their DCO to PINS under APP-223;
- **Morgan**: submitted an Outline Marine Mammal Mitigation Protocol with their DCO to PINS under REP4-018;
- **Mona**: submitted an Outline Marine Mammal Mitigation Protocol to NRW under licence: ORML2429T J21; and
- **White Cross**: submitted a Draft Marine Mammal Mitigation Protocol; accessible via developer website.

### 3.1.7 Additional impact load: operation and decommissioning

260. This section provides additional information in response to NRW's written representation (REP1-099); comment as noted as WR-099-76 in REP2-027:

*"NRW (A) does not agree with the decision to screen out underwater noise from OWFs maintenance activities and decommissioning activities. Here, the Applicant has argued that the impact footprint from the construction phase will exceed the impact footprint from the operational phase concluding that this makes inclusion of the operational phase unnecessary. However, a cumulative assessment should consider the entire one point. Thus, although the construction phase may have a larger impact footprint, the Applicant is not currently assessing the additional (largely chronic) impact load introduced over the operational phase of other projects. There is a risk that the resulting CEA is under precautionary."*

261. In addition to the above, this section will also address NRW's comment in response to NRW's written representation (REP1-099); comment as noted as WR-099-77 in REP2-027:

*"The Applicant further argues that a lack of information on impacts from decommissioning justifies the decision to screen out impacts from this phase. However, a lack of information does not preclude the possibility of making precautionary assumptions about the impact load that might be expected. The Applicant is not currently including any additional impact load introduced over the decommissioning phase of other projects, and there is a risk that the resulting CEA is under precautionary."*

#### 3.1.7.1 Operational OWFs

##### Disturbance from operational wind turbines

262. The noise levels associated with operational OWF wind turbines is relatively low, with recorded levels of between 141 and 146dB re 1µPs-m (RMS SPL) at four UK OWFs (MMO, 2015; Cheesman, 2016), and levels of 106 and 126dB re 1µPa-m (RMS SPL) at three operational OWFs in Sweden and Denmark, which was not audible for harbour porpoise at a distance of 70m from a wind turbine (Tougaard *et al*., 2009). It has also been predicted that

within a few hundred metres of a wind turbine, noise would be comparable to background noise levels (MMO, 2015). While the wind turbines at the Project (and at other OWFs) have the potential to be larger in size and in generation capacity than these studies, Bellman *et al.,* (2023) found that noise levels from larger turbines were no greater for larger newer turbines than that of existing and smaller turbines.

263. Currently available monitoring studies for operational wind farms suggests that marine mammals are not significantly disturbed, and that any impact is localised and temporary (e.g. Diederichs *et al.,* 2008; Teilmann *et al.,* 2006; McConnell *et al.,* 2012). Harbour porpoise and seals have also been found to continue to forage within operational wind farm sites (Lindeboom *et al.,* 2011; Russell *et al.,* 2014).

264. Due to the low noise levels associated with operational OWFs, the Department for Business, Energy & Industrial Strategy (BEIS) (2020) Review of Consents (RoC) Habitats Regulation Assessment (HRA) for the Southern North Sea Special Area of Conservation (SAC) concluded that there would no potential for significant effect from the operation of OWFs, alongside the construction of OWFs (BEIS, 2020).

265. Within the ES Chapter 11 Marine Mammals (APP-048) (Table 11.65), the potential for disturbance due to operational turbine noise was assessed as minor adverse for the Project alone, due to the recorded presence of marine mammals within operational wind farms, and the low level of noise associated with operational turbines. Based on the above, it is considered that the potential for disturbance from all other OWFs that are operational at the same time as the Project would have an equally minimal potential for effect. Therefore, the potential for cumulative disturbance due to construction at the Project as well as from other operational OWFs is expected to be minimal, especially when considering the distance to other OWFs.

#### Effect significance

266. Based on the above, the potential magnitude of effect due to the construction, operation and maintenance or decommissioning of the Poject at the same time as operation of other OWFs is not expected to be higher than the worst-case of those individually as it is not expected that there would be any kind of material additive effect when considered together.

267. Therefore, the magnitude of effect is considered to be low, and with a sensitivity of medium due to disturbance, the overall effect significance is **minor adverse**.

### Disturbance from maintenance activities

268. Vessels associated with offshore wind farm operation are likely to undertake similar activities to those for construction, albeit with much lower frequency.

Russel (2016) found that harbour seal foraged within an area undergoing offshore wind farm construction, and Benhemma-Le Gall *et al*., (2021) found that harbour porpoise could be disturbed up to 4km from construction related vessels, although a higher proportion are disturbed at 2km.

269. Maintenance activities at OWFs, such as such as additional rock placement or cable re-burial, will be infrequent, very localised, short in duration and temporary.

270. They Once on-site, OWF vessels would be stationary or slow moving, as they undertake the activity they are associated with, and therefore the potential for disturbance would be minimal. The potential for disturbance is considered to be localised and temporary, and marine mammals are expected to return to the project areas shortly after vessels have completed their works and left the area.

271. Within the ES Chapter 11 Marine Mammals (APP-048), the potential for disturbance due to maintenance activities was assessed as minor adverse for the Project alone, and it is considered that the potential for disturbance from all other OWFs that are operational at the same time as the Project would have an equally low potential for effect. Therefore, a magnitude of low (as a precautionary basis) is appropriate.

**Effect significance**

272. With the sensitivity of medium for all marine mammal species, a magnitude of low would result in an overall effect significance of **minor adverse**.

### Disturbance from increased vessel presence

273. There is the potential for vessels to be present throughout the operational phase of OWFs, in order to undertake maintenance activities. While the number of vessel present are likely to be less than during the construction phase, they are also likely to be present for longer periods of time, with the operational phases of OWFs being upwards of 25 years.

274. It is expected that the vessel movements to an operational OWF, and from any port, will be incorporated within existing vessel routes where possible and therefore to areas where marine mammals may already be accustomed to their presence. The increase in vessel presence from operational OWFs is expected to be relatively small compared to the baseline levels of vessel movements in the area. It is also expected that good practice measures, as implemented for the Project and secured in the VTMP, would be in place for all operational OWFs, further limiting the potential for disturbance.

275. **Section 3.1.3.2** above provides a detailed assessment of the potential for disturbance from vessels across multiple projects, with a resultant magnitude of effect of low.

**Effect significance**

276. With the sensitivity of medium for all marine mammal species, a magnitude of low would result in an overall effect significance of **minor adverse**.

### 3.1.7.2 Decommissioning activities

277. Given their age and expected operational lifetime, the decommissioning of existing UK and European OWFs could overlap with the Project duration. There is also potential for overlap of decommissioning with oil and gas infrastructure in the vicinity of the windfarm site.

278. Based on currently available information, underwater noise during decommissioning of oil and gas installations would be less than levels for PTS to occur and any disturbance would be localised and not be significantly greater than that arising from vessels (Fernandez-Betelu *et al.,* 2024). Therefore, potential cumulative effects from decommissioning activities, such as cutting equipment are not considered to have any potential for significant levels of disturbance.

279. There is currently limited information available on the potential for underwater noise and disturbance effects to marine mammals as a result of OWF decommissioning activities, as very few OWFs have yet to undertake this stage. However, it is expected that activities required would be similar to that undertaken for the decommissioning of oil and gas infrastructure as described above, and therefore it is not expected that there would be any risk of PTS onset, and that any disturbance would be localised and in line with noise levels associated with vessel presence. Any underwater noise levels due to the decommissioning of OWFs would be less than that of construction (as pile driving noise and UXO clearance, the most significant activities in terms of underwater noise levels, would not occur).

280. Regarding the potential for cumulative effects from vessels associated with the decommissioning of oil and gas installations, while there would be in increase in vessels, the majority would consist of jack up barges in the close vicinity of oil and gas infrastructure.

281. Further, in respect of the oil and gas infrastructure in the vicinity of the windfarm site the Applicant is in discussion with these operators to agree simultaneous activity management, whereby the likelihood of project activities (such as piling) occurring at the same time as major decommissioning activities are limited.

282. Therefore, as above, potential cumulative effects from decommissioning vessels are not considered to have any potential for significant levels of disturbance over the lifetime of the Project.

**Effect significance**

283. Based on the above, the potential magnitude of effect due to the construction of Morecambe at the same time as decommissioning activities is not expected to be higher than the worst-case of the Project under construction, as it is not expected that there would be any kind of materially additive effect when considered together.

284. Therefore, the magnitude of effect is considered to be low, and with a sensitivity of medium due to disturbance, the overall effect significance is **minor adverse**.

#### 3.1.7.3 Disturbance from all construction, operation, and decommissioning activities

285. Taken all together, the construction of the Project at the same time as the operation of other OWFs, and any decommissioning activities is not expected to generate any additive effect over and above what has been assessed for the construction of the Project itself. This is also the case during the operation and maintenance phase and decommissioning phase of the Project (where noise disturbance for the Project would be less). This is due to the minimal potential for disturbance from these activities and noise sources individually, as well as the distance between each potential project considered. In addition, it is expected that all projects would have mitigation measures in place, which would ensure disturbance is kept to the minimal level practicable.

286. Based on the above, the potential magnitude of effect due to the construction of the Project at the same time as both the operation and decommissioning of other OWFs is not expected to be higher than the worst-case of the Project under construction, as it is not expected that there would be any kind of additive effect when considered together.

287. Therefore, the magnitude of effect is considered to be low, and with a sensitivity of medium due to disturbance, the overall effect significance would be **minor adverse**.

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