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MONA OFFSHORE WIND PROJECT

Annex 3.2 to the Applicant's response to Relevant Representation at the Procedural Deadline

Applicant's Response to Relevant Representation from Natural Resources Wales (NRW): Interrelated Effects

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Image of an offshore wind farm

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Prepared for:

Mona Offshore Wind Ltd.

Contents

Glossary

Term	Meaning
Applicant	Mona Offshore Wind Limited.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets, offshore and onshore transmission assets, and associated activities.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects.

Acronyms

Acronym	Description
ADD	Acoustic Deterrent Device
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
MMMP	Marine Mammal Mitigation Protocol
NRW	Natural Resources Wales
UWSMS	Underwater Sound Management Strategy
UXO	Unexploded Ordnance

Units

Unit	Description
Km	Kilometres

1 Applicant's Response to Relevant Representation from Natural Resources Wales (NRW): Interrelated Effects

1.1 Introduction

1.1.1.1 This document has been prepared by the Applicant in response to a point identified by Natural Resources Wales (NRW) as a key concern with respect to Volume 2, Chapter 4: Marine mammals (APP-056) for the Mona Offshore Wind Project. The key concern is as follows:

1.1.1.2 Para 2.2.5 Interrelated effect: There is inadequate justification for the conclusion that 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, or when considered in conjunction with other topics addressed in the ES. We advise that this is addressed.

1.2 Response

1.2.1.1 Further detail with respect to the assessment of inter-related effects from the Mona Offshore Wind Project, as presented in Volume 2, Chapter 11: Inter-related Effects Offshore (APP-063) of the Application and summarised in Volume 2, Chapter 4: Marine mammals (APP-056) of the Application, is provided below to support the conclusion that the effects are not anticipated to interact to produce a combined effect greater than when considered alone. The Applicant highlights that the inter-related assessment also considered effects in conjunction with other topics in the ES, specifically in relation to changes in fish and shellfish populations from multiple activities, and the effect this may have on marine mammals (and has therefore included relevant other topics). The response provided below adds further justification to support the conclusion presented in the Application, as requested by NRW.

1.2.1.2 Several of the impacts identified in Volume 2, Chapter 11: Inter-related Effects Offshore (APP-063) and summarised in Volume 2, Chapter 4: Marine mammals (APP-056) could potentially interact to cause an additive/synergistic/antagonistic effect on marine mammal receptors. Additive effects are those that combine to lead to an effect equal to the sum of individual effects; synergistic effects are those that combine to lead to an effect that is greater than the sum of individual effects; antagonistic effects are the opposite of synergistic effects and are where effects combine to potentially cancel one another out.

1.2.1.3 From the seven impacts assessed for marine mammals for the Mona Offshore Wind Project, there were three categories of impact (which can be termed 'stressors') that were identified:

- Injury or disturbance from elevated underwater sound (from different sources) (section 1.2.2)
- Injury due to collisions with vessels (section 1.2.3)
- Changes in prey communities (section 1.2.4).

1.2.1.4 Table 11.9 in Volume 2, Chapter 11: Inter-related Effects Offshore (APP-063) highlighted that several impacts from the Mona Offshore Wind Project may interact to contribute to elevations in underwater sound (i.e. a single stressor). In addition, the assessment of inter-related effects considered if there may be an effect of multiple activities interacting to contribute to a different, or greater effect on marine mammal

receptors than when the effects from each activity are considered in isolation (see section 1.2.6 of this response).

1.2.2 Injury or disturbance from elevated underwater sound

1.2.2.1 The EIA identified that during the pre-construction and construction phase, there were several activities that could result in elevated underwater sound including: piling, unexploded ordnance (UXO) clearance, site investigation surveys and vessel movements. The Mona Offshore Wind Project has committed to employing appropriate measures to mitigate the risk of injury for all activities through the Underwater Sound Management Strategy (UWSMS) and Marine Mammal Mitigation Protocol (MMMP) (for which an Outline UWSMS (APP-202) and Draft MMMP (APP-207) were submitted alongside the Mona Offshore Wind Project DCO application). However, there was predicted to be possible disturbance to marine mammals resulting from these activities. Such disturbance may be additive in nature if activities are synchronised, i.e. if there was a larger area ensonified at any one time from all activities compared to an activity considered in isolation. The assessment highlighted that regardless of the noise-producing activity, disturbance is likely to occur as short term, localised events for each activity within the pre-construction/construction phase. The effect of behavioural disturbance is reversible and receptors are expected to recover within hours/days following the cessation of the activity, therefore unlikely to lead to any long-term, additive effects on the individual. Piling, site investigation surveys and vessel movements were all of **minor** adverse significance in isolation, and with the adoption of the UWSMS any impacts from UXO clearance are also non-significant (see Table 4.65 in Volume 2, Chapter 4: Marine Mammals, APP-056).

1.2.2.2 During the pre-construction phase, UXO clearance could result in no more than 22 single clearance events and disturbance would occur as very short-term effects (resulting from the moderated use of an acoustic deterrent device (ADD) plus a single second detonation) (section 4.9.4 in Volume 2, Chapter 4: Marine Mammals, APP-056). As part of measures adopted as part of the Mona Offshore Wind Project, the Applicant has committed to the mitigation hierarchy with regard to UXO clearance that prioritises avoidance of UXO in the first instance then, if avoidance is not possible, clearance of UXO with low order techniques (in line with the position statement (DEFRA, 2021)). The EIA noted that low order techniques are not always feasible and are dependent upon the individual situations surrounding each UXO; consequently high order detonation may be used as a last option. Within the EIA, the maximum design scenario of high order clearance (i.e. in the absence of the ability to avoid or clear using low order techniques) found that there was a residual risk of injury to harbour porpoise although, as mentioned above, this would be mitigated via the implementation of the UWSMS and MMMP. Since Application submission, new evidence has come to light which demonstrates where the use of high-order techniques has been successfully avoided. Ocean Winds (2024) recently reported that clearance of all 81 UXOs within Moray West Offshore Wind Farm (up to a size of 700 kg) was achieved using the low-order 'deflagration' technique. Thus, the EIA is considered to be conservative and contribution of UXO clearance to interrelated effects would be minimal.

1.2.2.3 Also considered during pre-construction was elevations in underwater sound from site investigation surveys, but these elevations are considered to be short-term in nature as they will take place over a period of several months (section 4.9.7 in Volume 2, Chapter 4: Marine Mammals (APP-056)). In this response, the Applicant highlights that an objective of these surveys is to identify possible UXOs or other objects requiring clearance and consequently would be unlikely to occur at the same time as the UXO

clearance activities. Disturbance during vessel activity will occur intermittently throughout this phase with timings linked to the specific pre-construction activities (UXO and site-investigation surveys), and as discussed in paragraph 1.2.2.1 of this response, animals are expected to recover quickly following the cessation of activity.

1.2.2.4 During the construction phase, activities resulting in elevated underwater sound include piling, other construction activities (such as drilling, cable burial via trenching, ploughing and jetting and cable protection via dumping and mattressing) and vessel movements (section 4.9.5 in Volume 2, Chapter 4: Marine Mammals (APP-056)). Since injury to marine mammals will be mitigated through measures in the final MMMP (with an Outline MMMP (APP-207) included as part of the DCO Application), the key focus is on disturbance effects. Disturbance could occur intermittently from piling for up 114 days phased over a two year foundation installation period (within an overall offshore construction phase of four years) (Table 4.16 in Volume 2, Chapter 4: Marine Mammals (APP-056)). Other offshore construction activities (e.g. drilling and cable burial) and vessel movements would occur intermittently within the four year construction phase. When piling occurs, the disturbance effects are likely to be greater than for any of the other activities contributing to elevated underwater sound so there is less likely to be an additive or synergistic effect during piling and the effects would not be of any greater significance than if considered in isolation (Table 11.9 in Volume 2, Chapter 11: Inter-related Effects Offshore (APP-063). For other construction activities there may be some additive effect (e.g. spatially where two or more sound-producing activities occur in different parts of the Mona Offshore Wind Project), however, the EIA concluded that the magnitude of disturbance for each activity would be relatively small-scale and highly reversible with animals resuming baseline activity soon after the cessation of the activity. Such effects would be limited to within the Mona Offshore Wind Project Marine Mammal Study Area and, even where two or more activities occur at the same time, when measured against high baseline levels of sound within the area (e.g. from existing vessel traffic), the assessment concluded that there will be no significant inter-related effects.

1.2.2.5 During the operations and maintenance phase, activities resulting in elevated underwater sound include vessel use and underwater sound from wind turbine operation. These activities have the potential to result in disturbance to marine mammals which may be additive if activities are synchronised, as it could lead to a larger area being disturbed at any one time. Disturbance from vessel activity is likely to occur as short-term localised events over the operations and maintenance phase. The disturbance from operational sound, whilst longer term, is expected to be very minimal. As described above, such effects would be limited to within the Mona Offshore Wind Project Marine Mammal Study Area and, even where two or more sound-producing activities occur at the same time, when measured against high baseline levels of sound within the area, the assessment concluded that there will be no significant inter-related effects.

1.2.2.6 Decommissioning activities (such as removal of foundations, cables and cable protection) and associated vessel movements will result in some elevated underwater sound which could lead to disturbance to marine mammals. Disturbance from vessels and decommissioning activities are likely to occur as short term, localised events and animals are expected to recover quickly. There may be an additive effect spatially, where vessels are carrying out decommissioning activities in different parts of the Mona Offshore Wind Project area, or temporally due to ongoing disturbance throughout the decommissioning phase, though it is expected to be intermittent and highly localised. As described above, when measured against high baseline levels of

sound within the area, the assessment concluded that there will be no significant inter-related effects during the decommissioning phase.

1.2.2.7 Therefore, whilst marine mammal receptors have the potential to experience ongoing disturbance due to elevations in underwater sound from different sources at all phases of the Mona Offshore Wind Project due to the short-term and localised nature of the effects there was determined to be no greater significance when compared to activities in isolation. The sensitivity of key species will be linked to both their ability to tolerate the underwater sound stressor and the extent to which they are able to function normally (e.g. forage, reproduce, communicate, avoid predators) despite the impedance. The assessment, which adopts a highly precautionary approach has demonstrated that for all impacts, with appropriate measures adopted via the Final MMMP and Final UWSMS, that there will be no residual effect for the Mona Offshore Wind Project (such as from elevated underwater sound during UXO clearance) that would amount to a significant inter-related effect. The measures committed to in these documents seek to reduce the magnitude of effects from each activity and therefore both injury and disturbance will be reduced through appropriate measures. Both documents are secured within the deemed marine licence in Schedule 14 of the draft DCO (APP-023) and expected to be secured within the standalone NRW marine licence.

1.2.2.8 To support the conclusions of no significant inter-related effects, this response expands on the description of the sensitivity of marine mammals to underwater sound based on the published literature. Benhemma-Le Gall *et al.* (2021) found that piling was the main cause of displacement during construction with observed responses at distances of up to 10 to 15 km at Beatrice and Moray East Offshore Wind Farms and without piling, there was still a disturbance response due to vessel activity and other construction, but that the effect ranges (up to 4 km) were less compared to piling. This demonstrates that the main driver for disturbance will be piling and that there would less potential for additive or synergistic, inter-related effects from other activities during this time. Indeed, the effect of piling may be antagonistic with effects from other sound-producing activities as it dominates the soundscape and therefore may 'cancel out' any other effects that could occur. It is highlighted that the assessment adopted a conservative approach assuming the maximum extent of effects throughout each phase with no allowance for any acclimatisation to, or compensation for elevated levels of sound. Whilst it is acknowledged that this approach is appropriate due to inherent uncertainties in undertaking such assessments, it may lead to overestimates of the effects. Graham *et al.* (2019), for example, showed that the proportional response of harbour porpoise to elevated sound decreased over the piling phase, with the proportion of animals disturbed at a received level of 160 dB re 1 µPa, reducing from 91.5% to 49.2% from the first pile to the last pile. Kastelein *et al.* (2019) suggest that harbour porpoise (a species with high daily energy requirements) may be able to compensate for period of disturbance as they can dramatically increase their food intake in a period following fasting within out any detriment to their health. In the Moray Firth, buzzing activity of harbour porpoise (representing foraging) was higher compared to baseline levels during the construction of Moray East offshore wind farm, possibly in relation to increased prey availability as a result of introduction of hard substrates (e.g. jacket foundations and scour protection) (Benhemma-Le Gall *et al.*, 2021).

1.2.2.9 Volume 2, Chapter 11: Inter-related effects (APP-63) concluded the significance of the inter-related effect for marine mammals is considered to be **minor** adverse and therefore not significant in EIA terms, and is expanded upon in paragraphs 1.2.2.1 to 1.2.2.9 of this response to reiterate the reasoning for the conclusions presented.

1.2.3 Injury due to collisions with vessels

1.2.3.1 Increased vessel movement is associated with potential for injury due to collisions. The effect from different types of vessels and each phase of the Mona Offshore Wind Project was assessed in isolation (Section 4.9.6 in Volume 2, Chapter 4: Marine Mammals (APP-056)). Over the lifetime of the Mona Offshore Wind Project (and all phases considered together) there will be a longer term risk to marine mammal receptors from this stressor, however, with the measures adopted as part of the Mona Offshore Wind Project (e.g. Offshore EMP including measures to minimise disturbance to marine mammals and rafting birds from transiting vessels (APP-203)), the potential for injury is likely to be reduced in all phases, and therefore it is not anticipated that an additive effect will occur. Furthermore, not all collisions that do occur are lethal (e.g. dependent depth of laceration, anatomical site of injury, health of animal (Combs, 2018, Conn and Silber, 2013, Rommel *et al.*, 2007, Vanderlaan and Taggart, 2007, Wiley *et al.*, 2016)) and is highly species dependent, and therefore the assessment precautionarily considered recovery potential to be medium from vessel collisions. However crucially, to some extent the sound from the vessels themselves (paragraph 1.2.2.1 *et seq.*) would act antagonistically with this impact by deterring animals away from vessels and thereby further reducing the risk of injury due to collision. Furthermore, marine mammals in this area are already accustomed to high level of vessel activity (as discussed in section 4.9.5 of Volume 2, Chapter 4: Marine mammals (APP-056) and in the Applicant's Long Response to the Relevant Representation on Vessel Use from NRW (Document Reference S_PD_3.1). For example, Buckstaff (2004) demonstrated that bottlenose dolphins increased their rate of whistle production at the onset of a vessel approach, and then decreased production during and after it had passed. This increased whistle production may be a tactic to reduce signal degradation to ensure that information is being communicated in elevated noisy environment, but it also demonstrates that animals are aware of approaching vessel from a distance. This corroborates the previous research of Nowacek *et al.* (2001) that found that bottlenose dolphins swim in tighter aggregated groups during vessel approaches. Therefore, if a vessel is loud enough to be detected by an animal for which it adjusts its behaviour, the likelihood of collision decreases.

1.2.3.2 Therefore, the significance of the inter-related effect is considered to be **minor** adverse and therefore not significant in EIA terms.

1.2.4 Changes in prey communities

1.2.4.1 The EIA considered the overall effect on fish and shellfish communities from a range of impacts (see Volume 2, Chapter 3: Fish and shellfish ecology (APP-055)) and subsequently the indirect effects on marine mammals as a result of changes in fish and shellfish communities as a result of all impacts (see Volume 2, Chapter 4: Marine Mammals (APP-056)). In this respect, the EIA has taken an ecosystem-based approach which considers marine mammals in conjunction with other topics addressed in the Environmental Statement.

1.2.4.2 For some impacts, such as those that lead to underwater sound elevations, the effects on fish and shellfish will be over the same timescales as for marine mammals, whilst for others, such as temporary habitat loss, timescales may be different to those assessed for marine mammals (e.g. low mobility or sessile species may recover slowly). Changes in fish and shellfish communities as prey items were considered for each phase of the Mona Offshore Wind Project in isolation. The assessment of effects demonstrated that, due to the high mobility of marine mammals, generalist feeding strategy and ability to exploit different prey species, combined with the small scale of

potential changes in context of wider available habitat, the changes to fish and shellfish communities are unlikely to have an effect on marine mammal receptors during any phase of the Mona Offshore Wind Project.

1.2.4.3 Whilst there may be some potential for an additive effect of longer-term changes over the lifetime of the Mona Offshore Wind Project, there is evidence that marine mammal populations return to offshore wind farms quickly following construction (discussed in more detail in section 1.2.5 of this response), which suggests prey availability is not a critical factor. Additional literature was reviewed to support the conclusions of the assessment of inter-related effects. Tougaard *et al.* (2003) used ship-based surveys and acoustic dataloggers (PODs) to assess the short-term effects of construction on behaviour and abundance of harbour porpoise, and indicated whilst there was a decrease in porpoise acoustic activity within the wind farm at the onset of piling operations, there was subsequent recovery to higher levels a few hours after each piling operation was completed. Similarly, Teilmann *et al.* (2008) reported that during the operation and maintenance phase porpoise activity was higher in both the wind farm and reference area compared to baseline levels. Recovery of fish and shellfish populations following offshore wind farm construction is presented in detail in Volume 2, Chapter 3: Fish and shellfish ecology (APP-055), and some fish species will benefit from the addition of hard structures. This may lead to more foraging opportunities for marine mammals as a result of reef effects (Benhemma-Le Gall *et al.*, 2021). Given the high mobility, generalist feeding strategy and ability to exploit different prey species of marine mammals, this may benefit marine mammal populations.

1.2.4.4 Some marine mammals have specific prey requirements, including the reliance on sandeel as a key prey item within the diet of minke whale. Effects of offshore wind farm construction (Jensen *et al.*, 2004) and operations and maintenance (i.e. post-construction) activities (Van Deurs *et al.*, 2012) on sandeel populations have been examined through short term and long term monitoring studies at the Horns Rev offshore wind farm in the Baltic Sea, Denmark and shown that offshore wind farm construction and operations and maintenance activities have not led to significant adverse effects on sandeel populations and that recovery of sandeel occurs quickly following construction activities. Beatrice Offshore Wind Farm Limited (2021) showed initial results of a pre- to post-construction monitoring study have reported that in some areas of the Beatrice Offshore Wind Farm, located in the northwest of the North Sea, there was an increase in sandeel abundance. Monitoring at Belgian offshore wind farms has reported that fish assemblages undergo no drastic changes due to the presence of offshore wind farms.

1.2.4.5 A recent study by Watson *et al.* (2024) that reviewed the global impact of offshore wind farms on ecosystem services showed operational phase impacts were variable and detailed investigations into fish and shellfish recorded a net positive effect of wind farm operations on these species groups. Studies have found that the foundations of offshore wind farms act as artificial reefs and fish aggregation devices (Degraer *et al.*, 2020, Langhamer, 2012) by providing space for the settlement, shelter and foraging (including pelagic and demersal fish and marine mammals). Equally, offshore wind farms can act as an de-facto marine-protected areas (MPAs) by limiting activities that can negatively affect the environment, which can potentially enhance both biodiversity and fisheries in surrounding areas (Ashley *et al.*, 2014, Buyse *et al.*, 2022).

1.2.4.6 The above studies suggest therefore, when considered together, the inter-related effects of different impacts on fish and shellfish is unlikely to combine additively or synergistically to affect marine mammals. Most marine mammal exploit a range of different fish and shellfish as prey items and can therefore shift their diet opportunistically. In addition, the highly mobile nature of marine mammals means that

they are not restricted to foraging in particular areas and their distribution is correlated to the distribution of prey species.

1.2.4.7 Therefore, the significance of the inter-related effect is considered to be **minor** adverse and therefore not significant in EIA terms.

1.2.5 Multiple impacts: inter-related effect of all stressors

1.2.5.1 Arrigo *et al.* (2020) suggests that large organisms at higher trophic levels, such as marine mammals, may be generally negatively impacted by increasing interaction strength between stressors from different activities, but the variability in the response to such interactions is small and therefore unlikely to lead to population level effects.

1.2.5.2 For elevated underwater sound, there is the potential for marine mammals to forage in different habitats and compensate for reduced foraging time. As such the viability of displaced animals will depend on the availability of prey resources in the habitat to which the animals are displaced. Studies have shown that for small, localised marine mammal populations with high site fidelity, there may be biological risks posed by displacement (Forney *et al.*, 2017). However, animals may be highly motivated to remain in a areas that are important for survival (e.g. high resource availability or important breeding areas) despite adverse impacts which may increase stress (Rolland *et al.*, 2012). For example, grey seals that were exposed to pile-driving, continued to return to the vicinity of the wind farms on subsequent trips and thus likely received multiple exposures to the piling sound (Aarts *et al.*, 2018). Aarts *et al.* (2018) suggested this area contained easily available prey resources and seals might choose to accept the risk of being exposed to elevated sound during pile-driving rather than risk leaving a known foraging area to seek prey elsewhere. The assessment found that impacts on fish and shellfish prey resources (section 1.2.4) were predicted to be localised and short-term and therefore unlikely to contribute to an inter-related effect where marine mammals are displaced. Within the boundaries of the Mona Offshore Wind Project, however, there may be short term inter-related effects of underwater sound disturbance and reduced fish and shellfish prey resources. For marine mammals remaining in proximity to the Mona Offshore Wind Project, disruptions in foraging may not be easy to compensate for if there are shifts in the species composition or localised reductions of fish and shellfish communities. It has been suggested it may be possible that damaged or disoriented prey could attract marine mammals to an area of impact due to providing short term feeding opportunities, at the risk of increasing levels of exposure to an impact (Gordon *et al.*, 2003), however, there is currently little evidence available to investigate such indirect effects on marine mammals.

1.2.5.3 The assessment has largely described potential adverse effects but there is also potential for some beneficial effects on marine mammal receptors. Construction of offshore wind farms can lead to the introduction of hard substrates which can lead to the establishment of new species and new fauna communities, and this may in turn attract marine mammals (Fowler *et al.*, 2018, Lindeboom *et al.*, 2011, Raoux *et al.*, 2017). Consequently, even where there is potential for an inter-related effect between ongoing vessel noise during the operations and maintenance phase this may be compensated for, to some extent, by an increase in available prey resources. Russell *et al.* (2014) and Russell and McConnell (2014) demonstrated that harbour seals and grey seals moved between hard structures at two operational wind farms and used space-state models to predict where animals were remaining at these locations to actively forage and where they were travelling to the next foundation structure. Lindeboom *et al.* (2011) studied the ecological effects of the Egmond aan Zee Offshore Wind Farm and found that even though the fish community was highly dynamic in time

and space, with only minor effects upon fish assemblages observed during the operation and maintenance phase, some fish species (e.g. cod) benefited from the 'shelter' within the wind farm. This is likely due to reduced fishing activity and the new hard substratum with associated fauna which attracts predator species. Lindeboom *et al.* (2011) suggested the observed increase in echolocation activity of harbour porpoise within the wind farm may be correlated with presence of additional increased food sources compared to reference areas (Lindeboom *et al.,* 2011). As discussed in 1.2.4.5, Watson *et al.* (2024) found net positive effect of wind farm operations on fish and shellfish groups. The potential inter-related effects between underwater noise and collision risk have been discussed previously (in paragraph 1.2.3.1) and it is considered likely that marine mammals will move away from moving vessels in response to the sound from engines, therefore reducing the risk of collision (classed as an antagonistic interaction). Alternatively, marine mammals may tolerate and persist in a highly stressed state (as a result of injury caused by underwater noise) while the vessels are approaching (Muto *et al.*, 2018). Animals could also become habituated to vessel noise and not move away from the vessel (McWhinnie *et al.*, 2018) which would result in a synergistic interaction (Wright and Weilgart, 2011). Therefore, the outcome will depend on the degree of habituation and prior-experience and a number of acoustical properties that allow an approaching vessel to be detected by a marine mammal species (Gerstein *et al.*, 2005). However, as described in the impact assessment, with designed in measures adopted as part of the project (Offshore EMP including measures to minimise disturbance to marine mammals and rafting birds from transiting vessels (APP-203)) it is likely that any risk of injury from collision with vessels will be negligible.

1.2.5.4 Evidence for the potential long-term effects of offshore wind farms on marine mammals (related to all potential stressors) comes from monitoring programmes which compare baseline levels of abundance to those during the construction and post-construction (operations and maintenance) phases. These monitoring studies regarding impacts on marine mammals are limited to date, given the infancy of the industry.

1.2.5.5 With the rapid expansion of offshore wind farms, post-construction monitoring programmes are being implemented at various developments in Europe. Tougaard *et al.* (2003) studied short term effects of the construction of wind turbines on harbour porpoises at Horns Reef Offshore Wind Farm. The study showed a decrease in porpoise acoustic activity within the wind farm at the onset of piling operations and subsequent recovery to higher levels a few hours after each piling operation was completed (Tougaard *et al.*, 2003). Tougaard *et al.* (2003) also showed that over the entire construction phase at Horns Reef there was no significant change in the abundance of harbour porpoise in the wind farm area compared to reference areas. Teilmann *et al.* (2008) also reported that during the operation and maintenance phase porpoise activity was higher in both the wind farm and reference area compared to baseline levels.

1.2.5.6 Nabe-Nielsen *et al.* (2011) suggested, using simulations of the response of harbour porpoise to wind farm construction, that wind farms already existing off Danish coast do not have impact on harbour porpoise population dynamics and that the that construction of new wind farms is not expected to cause any changes in the long-term dynamics of the population. Likewise, Edrén *et al.* (2010) and McConnell *et al.* (2012) investigated possible interactions between seals and Danish offshore wind farms (Nysted Wind Farm and Rødsand II) and found that although there was a temporary reduction in the number of seals hauled out during construction operations (i.e. piling), there was no long-term effect on haul-out behaviour trends (Edrén *et al.*, 2010).

1.2.5.7 In contrast, some monitoring programmes have reported medium-term reductions in marine mammals as a result of wind farm construction. For example, as a result of monitoring at Nysted Offshore Wind Farm, it was demonstrated initially during construction and the first two years of operation that there were lower acoustic detections of harbour porpoises in the wind farm area. However, recovery started to occur within two years after the end of construction and it was suggested that animals were gradually habituating and returning to the wind farm area (Teilmann *et al.*, 2006).. Similarly, aerial survey haul-out counts conducted before, during and after the construction phases at Scroby Sands Offshore Wind Farm, 2.5 km off the coast of Norfolk, found a decline in harbour seal numbers during construction, with numbers remaining lower over several subsequent years (2004/2005) before starting to recover in 2006 (Skeate *et al.*, 2012). In the same time period, the numbers of grey seals increased dramatically year after year throughout the construction and early operational periods. It was suggested that the changes in harbour seal numbers were linked to rapid colonisation of competing grey seal (Skeate *et al.*, 2012). In addition, it was noted that whilst regional changes in patterns of haul-outs of harbour seal in the Wash coincided with the construction of the Scroby Sands Offshore Wind Farm (potentially due to its proximity to harbour seal haul-outs), such changes in harbour seal number could also have been part of wider regional dynamics (Verfuss *et al.*, 2016). This highlights that context is important when drawing comparisons across other wind farms (e.g. Scroby Sands Wind Farm is located 2.5 km off the coast of Great Yarmouth whereas the Mona Offshore Wind Project is located 28.8 km offshore) and the population of harbour seal was showing a general wider-scale pattern of decline that coincided with the construction of Scroby Sands Wind Farm.

1.2.5.8 Therefore, the examples of available monitoring studies given in paragraphs 1.2.6.6 to 1.2.5.6 suggest that, in the context of the Mona Offshore Wind Project, marine mammal receptors are likely to quickly recover and return to the impacted area, despite the potential effects from multiple stressors associated with offshore wind farms. Therefore, as detailed in paragraphs 1.2.5.1 to 1.2.5.6 (and assessed in Table 11.9 in Volume 2, Chapter 11: Inter-related Effects (APP-063)) significance is considered to be **minor** adverse and therefore not significant in EIA terms.

1.2.6 Summary

1.2.6.1 The Applicant has provided additional information and justification for the conclusion that 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. Consequently, the conclusions of the interrelated assessment presented in the inter-related effects assessment in Volume 2, Chapter 11: Inter-related Effects Offshore (APP-063) and summarised in Volume 2, Chapter 4: Marine mammals (APP-056) remain valid, with the significance considered to be **minor** adverse and therefore not significant in EIA terms.

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