Minesto UK Ltd

DP Vessel Noise Modelling Assessment

DP Thruster: Underwater Noise Assessment Holyhead Deep Project

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EXECUTIVE SUMMARY

Minesto UK Ltd (Minesto) instructed Xodus Group Ltd (Xodus) to undertake an underwater sound impact assessment for a vessel remaining on station at the Holyhead Deep Project site using only Dynamic Positioning (DP) thrusters for a period of up to 12-weeks. The assessment was conducted using Xodus' Xposure modelling tool as utilised for the underwater noise modelling completed for the Holyhead Deep Project 2016 EIA. The study was completed to account for updates to the threshold criteria for marine mammals (since the previous EIA undertaken in 2016) with respect to the proposed DP vessel operations. Noise assessment modelling for the kite based on the updated threshold criteria was not considered necessary as previous work confirmed the noise levels associated with the kite were well below the injury and disturbance thresholds for marine mammal species.

Details about the specific vessel to be contracted and used at the Holyhead Deep Project site were not available at the time of modelling, but Xodus was advised the vessel would have approximate dimensions of 58 m, 14 m and 4.5 m for the length over all, width and draft respectively. This vessel size equates to a small work-boat type vessel, with an approximately tonnage of up to 1,540 gross tonnes and was determined to generate similar noise source levels under DP operation as applied in the underwater noise modelling for the 2016 EIA.

The sound assessment indicates that high- and low-frequency cetaceans have the potential to experience the onset of potential injury (PTS) up to approximately 6 m from the source. For all other hearing groups this distance is predicted to less than 1 m. Mid-frequency cetaceans may also experience the onset of PTS if exposed to continuous thruster noise for a period of 22 hours, based on the criteria for non-impulsive sounds. This duration reduces to 1 hour if assessed under the impulsive sound criteria, although noise from vessels are predominantly non-impulsive and are only considered to be impulsive when weighted for high frequency mammal hearing.

Potential behavioural impact distances were assessed using a 120 dB threshold, the results predict a behavioural response (disturbance) up to approximately 4,805 m. The completed assessment identified that based on the JNCC (2020) significance assessment criteria, use of the DP vessel and operations as part of the Holyhead Deep Project would not have an adverse impact on harbour porpoise species and by proxy other marine mammal species.

1 INTRODUCTION

1.1 Study Background

To facilitate further commercial demonstration of the Deep Green technology, Minesto UK Ltd (Minesto) plans to continue testing of its' Deep Green Technology within the Holyhead Deep Project site. To enable this Minesto propose to use a vessel with Dynamic Positioning (DP) to support ongoing deployment, by housing the micro grid system (MGS) unit. Minesto propose to use the DP vessel for a period of up to 12-weeks per year.

Assessment of noise source levels from Project operations, including the use of vessels with DP, was considered as part of the underwater noise modelling completed for the Holyhead Deep Project 2016 EIA (Xodus, 2015c; Minesto, 2016). The completed modelling applied noise source levels of 188 dB re 1µPa@1m for vessels using DP and relevant marine mammal injury and disturbance thresholds. The modelling results identified the potential for injury and disturbance impacts, although these were assessed as not significant due to the close proximity required for injury to occur and the potential for marine mammals to swim away from the noise source. The applied marine mammal injury and disturbance thresholds have recently been updated, with the potential to influence the spatial extent of potential noise impacts (NMFS, 2018; Southall *et al.*, 2019). Therefore, to provide an update on the potential noise impacts during future deployment operations, Minesto has requested that Xodus Group Ltd (Xodus) revise the underwater noise modelling to reflect the new criteria thresholds, based on a vessel using DP during the proposed deployment operations for a period of up to 12-weeks.

Re-analysis of the potential noise from the Deep Dragon Unit (DGU) kite with respect to the updated injury and disturbance threshold criteria is not considered necessary. In the noise modelling assessments completed for the Holyhead Deep Project 2016 EIA (Xodus, 2015c; Minesto, 2016) and subsequent monitoring report submitted to Natural Resource Wales (NRW) (Xodus, 2020), the source noise levels from the kite under different operational modes were well below the injury and disturbance thresholds for marine mammal species. The revision in the threshold criteria entails a slight decrease in the sensitivity of marine mammal species to noise levels, which means that the injury and disturbance from the kite operations would be lower and therefore less likely.

1.2 Proposed Operations

Minesto propose to use a manned vessel with DP to support ongoing deployment, by housing the micro grid system (MGS) unit. The proposed vessel would be similar to a small work-boat type vessel (see Section 3.2.1) with an approximate tonnage of up to 1,540 gross tonnes. Minesto propose to use the DP vessel for a period of up to 12-weeks per year.

1.3 Assessment Approach

The assessment was conducted using Xodus' Xposure modelling tool, which was also used to complete the underwater noise modelling for the Holyhead Deep Project 2016 EIA (Xodus, 2015c; Minesto, 2016). The injury and behavioural threshold criteria used within the assessment are based on the latest science and understanding of the impacts of underwater sound on marine mammals and have been used in similar assessment throughout the world, which accounts for the updates to the threshold criteria, considered further in Section 2.

The data are presented using sound level metrics and available threshold criteria, with distances calculated at which predicted sound levels decrease to below threshold values. The Peak Sound Pressure (SPL_{peak}), Root Mean Square (RMS) Sound Pressure Level (SPL_{rms}) and Sound Exposure Level (SEL) were calculated for the noise source level from the DP thrusters. The noise source levels were used to evaluate the potential for an injury either as a Permanent Threshold Shift (PTS) or Temporary Threshold Shift (TTS). The marine mammal species of particular interest to the Holyhead Deep Project, include bottlenose dolphins, harbour porpoise and seals.

2 MARINE MAMMAL IMPACT CRITERIA

Underwater sound has the potential to affect marine life in different ways depending on its sound level and characteristics. Richardson *et al.*, (1995) defined four zones of sound influence that varied with distance from the source and level, which included the zones of audibility, responsiveness, masking and hearing loss, discomfort, or injury.

For this assessment, the zone of injury in terms of PTS and behaviour response (disturbance) were addressed, while the masking zone was not assessed due to insufficient scientific. To determine the potential spatial range of injury and disturbance, a review was undertaken of available evidence, accounting for updated international guidance and scientific literature.

2.1 Injury (Physiological Damage)

Joint Nature Conservation Committee (JNCC) (2010) recommends using the injury criteria proposed by Southall *et al.*, (2007), which are based on a combination of linear (i.e. un-weighted) peak pressure levels and mammal hearing weighted (M-weighted) sound exposure level (SEL).

The National Marine Fisheries Service (NMFS) also provided details of the acoustic thresholds at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute, incidental exposure to all underwater anthropogenic sound sources (NMFS (2018). These new thresholds reflected the new/updated scientific information that has demonstrated differences between the marine mammal hearing groups first categorised in Southall *et al.*, (2007). In 2019, Southall *et al.*, (2019) revaluated their work in light of the scientific advances and as a result published a revised set of sound exposure criterion.

The only significant difference between Southall *et al.*, (2019) and NMFS (2018) is the re-categorisation of mid-frequency and high frequency groups to High Frequency (HF) and Very High Frequency (VHF) respectively i.e. very high frequency for greater clarity. This report retains the categorisation used in NMFS guidance, namely, Mid-Frequency (MF) and HF.

The hearing weighting functions used in NMFS are designed to represent the bandwidths of each group within which acoustic exposures may have auditory effects. This study uses the NMFS (2018) hearing group frequency categories, as illustrated in Figure 2-1:

- Low Frequency (LF) i.e. marine mammal species such as baleen whales with an estimated functional hearing range between 7 Hz and 35 kHz;
- MF i.e. marine mammal species such as dolphins, toothed whales, beaked whales and bottlenose whales with an estimated functional hearing range between 150 Hz and 160 kHz;
- HF i.e. marine mammal species such as true porpoises, river dolphins and cephalorhynchus with an estimated functional hearing range between 275 Hz and 160 kHz); and
- Pinnipeds in water (PW) – i.e. a suborder of carnivorous aquatic mammals that includes seals, walruses and other similar animals having finlike flippers with an estimated functional hearing range between 50 Hz and 86 kHz.

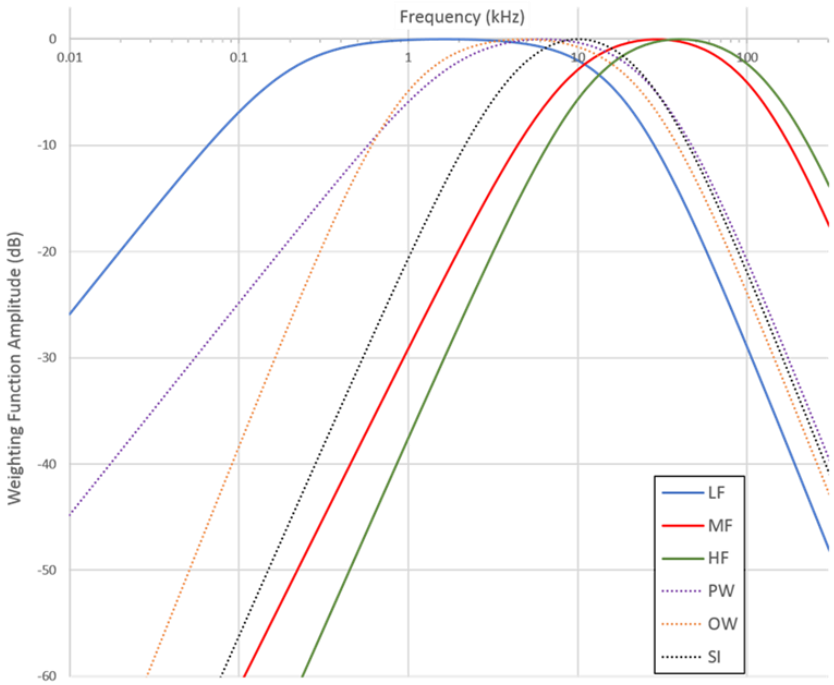

Figure 2-1: Auditory weighting functions for Cetaceans and Pinnipeds (NMFS, 2018)[1]

The species of particular interest to the Holyhead Deep Project, include bottlenose dolphins, harbour porpoise and seals. The dolphins are characterised as MF cetaceans, the porpoise as HF cetaceans, while seals are categorised as PW.

2.2 Behaviour Response (Disturbance)

The JNCC guidance (JNCC, 2010) proposes that a disturbance offence may occur when there is a risk of a significant group of animals incurring sustained or chronic disruption of behaviour or when a significant group of animals are displaced from an area, with subsequent redistribution being significantly different from that occurring due to natural variation.

There is much intra-hearing group category as well as intra-species variability in behavioural response. This assessment adopts a simplified approach in the absence of further scientific information and uses the NMFS (2013) Level B harassment threshold of 160 dB re 1 µPa (rms) as an indicator of behavioural impact.

Level B Harassment is defined as having the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioural patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal

[1] *Sirenians (SI) and Otarids in Water (OW) are not relevant to the current study.*

stock in the wild. This is similar to the JNCC (2008) description of non-trivial disturbance and has therefore been adopted as the basis for onset of behavioural change in this assessment.

It is important to understand that exposure to sound levels in excess of the behavioural change threshold stated above does not necessarily imply that the sound will result in significant disturbance as defined in The Conservation of Species and Habitats Regulations 2010, which is derived from the European Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ("Habitats Directive"). As noted previously, it is also necessary to assess the likelihood that the sensitive receptors will be exposed to that sound and whether the numbers exposed are likely to be significant at the population level.

2.3 Criteria Summary

The PTS criteria adopted within the study were the updated criteria thresholds presented in NMFS (2018) for non-impulsive (continuous sound) and impulsive sound. These have been reproduced in Table 4.1.

Table 2-1: Marine mammal criteria for onset of PTS and behavioural change (NMFS, 2018 and NMFS, 2013)

Marine mammal group	Type of sound	PTS threshold criteria	
		SPL_{peak}, dB re 1 µpa (unweighted)	SEL, dB re 1 μPa^2s (weighted)
LF Cetaceans	Single or multiple pulses e.g. impulsive	219	183
	Non-impulsive e.g. continuous sound	-	199
MF Cetaceans	Single or multiple pulses e.g. impulsive	230	185
	Non-impulsive e.g. continuous sound	-	198
HF Cetaceans	Single or multiple pulses e.g. impulsive	202	155
	Non-impulsive e.g. continuous sound	-	173
Phocid Pinnipeds (underwater)	Single or multiple pulses e.g. impulsive	218	185
	Non-impulsive e.g. continuous sound	-	201
Behavioural change (disturbance)	Single or multiple pulses e.g. impulsive	SPL_{rms} > 160 dB re 1µPa	
	Non-impulsive e.g. continuous sound	SPLrms > 120 dB re 1µPa	

3 METHODOLOGY

3.1 Approach

The underwater sound assessment was conducted using Xodus' Xposure model, as applied in the underwater modelling for the Holyhead Deep Project 2016 EIA (Xodus, 2015c; Minesto, 2016). The same assumptions of the M-weightings and average swim speed of 1.5 m/s for a marine mammal swimming away from a noise source was also applied in this re-analysis. It should be noted that the sound exposure calculations were based on the simplistic assumption that the source is active continuously over a 24-hour period and that the animal will continue to swim away at a constant relative speed. The real-world situation is more complex, and the noise source will vary in space and time and the animal is likely to move in a more complex manner.

3.2 Model Inputs

3.2.1 Vessel Properties

It is considered that the vessel will be on station for up to a period of up to 12-weeks, during which it will maintain station through the use of DP thrusters only. Details about the vessel to be used were not available although an appropriate vessel would likely have the following approximate dimensions:

- Length over all (LOA): 58 m;
- Width: 14 m;
- Draft: 4.5 m; and
- Tonnage: 1,540 Gross Tonnes (GT)

Sound levels from DP vessels do not vary significantly with speed, as DP systems rely on all thrusters working simultaneously, regardless of whether the vessel is moving or holding station. However, the sound levels will vary with climatic and metocean conditions, which affect a vessels ability to maintain position, since these factors change the amount of thrust required to keep the vessel in position and / or moving as required. Table 3-1 summarises the sound levels for vessels operating under DP thrusters identified during a literature search. The SPL_{rms} levels are typically reported as being around 188 dB re 1µPa@1m. The only value identified for the SEL was 237 dB re 1µPa^2s@1m based on a 24-hour measurement. Therefore, the sound source levels used for the Holyhead Deep Project 2016 EIA were considered to be applicable as presented in Table 3-2.

This assessment considers the DP thrusters operating continuously, at what is assumed to be at 100%. However, in reality, the DP thrusters would be operating throughout their power range to maintain station which would result in variations to the sound levels. Therefore, the assessment considers a worst-case condition where sound levels are consistently high throughout the vessel's duration on station.

Table 3-1: Reported underwater sound levels for vessels using DP thruster

Vessel	Length (m)	Tonnage (t)	Source level (re 1µPa@1m)	Notes	Source
Tug/ Supply vessel (Maersk Rover)	67	1,894	181.8 dB_{rms}	Thrusters @ 100%	Wyatt (2008)
Support Vessel (Pompei)	-	-	184 dB_{rms}	Nominal operations on DP	Wyatt (2008)
Semi-submersible drill rig (Jack Bates)	-	-	188.4 dB_{rms} re 1µPa@1m 151dB_{rms} re 1µPa@ 40 m	Thrusters active (no drilling)	Wyatt (2008)
	-	-	188 dB@ 1m 143 dB@100m	DP thruster	Nedwell & Edwards (2004)
Semi-submersible drill rig (Jack Bates)	-	-	188.4 dB_{rms}	Thruster active	Nedwell & Edwards (2004)
FPSO under DP (Fu Lai)	-	-	183.6 dB	Under DP	McPerson *et.al.*, (2016)
Rock placement vessel	-	-	188 dB_{rms} 191 dB_{peak} 237 SEL(24-hour) dB re 1µPa^2s	Assumed under DP	Xodus (2015)
Gerardus Mercator trailer hopper suction dredger using DP	-	-	188 dB_{rms} 191 dB_{peak} 237 SEL(24-hour) dB re 1µPa^2s	Assumed under DP	Xodus (2015b)

Table 3-2: DP source sound levels used within the modelling assessment as applied within the underwater modelling for the Holyhead Deep Project 2016 EIA (Xodus, 2015c; Minesto, 2016)

Source sound levels at 1m		
SPLrms, dB re 1µPa	SPL_{peak}, dB re 1µPa	SEL (24-hour), dB re 1µPa^2s
188	191	237

3.2.2 Bathymetry

The seabed elevation over the site varies between 65 m LAT and 91 m LAT (Minesto, 2016). Previous noise modelling completed for the Holyhead Deep Project has been at 80 m. Water depths noted at the deployed foundation location ranged between 78 – 82 m, therefore the 80 m applied in the previous noise modelling is considered to be applicable to this modelling assessment.

3.3 Assessing the Significance of Noise Disturbance

The assessment of the significance of noise disturbance is based on the latest Statutory Nature Conservation Body (SNCB) guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs in England, Wales & Northern Ireland (JNCC *et al.*, 2020). The JNCC guidance considers noise disturbance impact on the basis that the activity would not exclude harbour porpoise for more than:

1. 20% of the relevant area of the site in any given day; or
2. an average of 10% of the relevant area of the site over a season.

The Holyhead Deep Project is located within the North Anglesey Marine / Gogledd Môn Forol Special Area of Conservation (SAC). The SAC has an area of 3,249 km^2 and is designated for harbour porpoise. The completed assessment is based on project specific activities only, in relation to the operation of the manned DP vessel.

4 NOISE MODELLING RESULTS

4.1 Marine Mammal

4.1.1 Injury

Sounds from vessels are normally considered non-impulsive, including from DP thrusters; however, recorded sound levels have been reported as impulsive when weighted for high frequency mammal hearing. Therefore, the predicted distances at which the sound levels decreased below the non-impulsive and impulsive threshold values were calculated, Table 4-1 and Table 4-2 respectively.

Table 4-1: Predicted distances at which sound levels reduce below the non-impulsive sound threshold criteria.

Non-impulsive sound	Predicted distance at which sound levels decrease to below threshold values, m			
	Low-frequency cetaceans	Mid-frequency cetaceans	High-frequency cetaceans	Pinnipeds
SEL weighted PTS	0	0	0	0

Table 4-2: Predicted distances at which sound levels reduce below the impulsive sound threshold criteria

Impulsive sound	Predicted distance at which sound levels decrease to below threshold values, m			
	Low-frequency cetaceans	Mid-frequency cetaceans	High-frequency cetaceans	Pinnipeds
SEL weighted (PTS)	5	0	6	1
Peak Pressure SPL (PTS)	0	0	0	0

Table 4-1 and

Table 4-2 indicate that based on an animal swimming at a constant speed of 1.5 m/s from the source the predicted DP thruster noise levels could potentially impact both Low- and High-Frequency cetaceans up to a distance of approximately 6 m from the source. It should be noted that this is a worst-case result, given that movement speeds for marine mammals have been recorded well in excess of the 1.5 m/s modelled here.

A reported SEL injury zone radius of 0 m indicates that the mammal be present at the closest possible distance from the source of the noise and not experience injury providing it swims away from the source – i.e. there is no risk of injury for a mammal which moves away from the source at the onset of noise. Table 4-3 provides estimated periods for which these mammals may remain within 10 m of the vessel before exceeding the injury criteria.

Table 4-3: Estimated times to reach SEL injury threshold for stationary mammals located 10 m from the source.

	Time taken to reach SEL injury threshold at 10 m from the source for stationary mammals			
	Low-frequency cetaceans	Mid-frequency cetaceans	High-frequency cetaceans	Pinnipeds
Non-impulsive sound	*	22 hrs	*	1 hr
Impulsive sound	*	1 hr	*	*

** The threshold for these marine mammals will be reached within minutes due to an exceedance of the threshold criteria in Tables Table 4-1 and Table 4-2.*

Table 4-3 indicates that mid-frequency cetaceans (bottlenose dolphins) and pinnipeds (seals) which utilise the area would need to remain within the injury impact zone for a period of time for the onset of injury. For the high frequency cetacean (harbour porpoise), the period for the onset of injury is very short, but at the same time the injury zone is very small at up to 6 m, which would require the cetacean to be in very close proximity to the operating thruster. For all cetacean and pinniped species, the reality is that the species are not expected to remain stationary or in proximity to the noise source and instead would swim away from it.

The potential ranges presented for injury should not be interpreted as a hard and fast distance or boundary within which an impact will occur. The predicted distances at which sound levels reduce below the sound thresholds (Table 4-1 and Table 4-2) provides a conservative distance estimate at which sound levels will decrease to below SEL threshold values for PTS, which in reality is a probabilistic; combination of a range of variables; exposure dependency in PTS onset, individual variations in hearing, uncertainties regarding behavioural response and swim speed / direction.

4.1.2 Behaviour Response (Disturbance)

For the assessment of behaviour response (disturbance effects) this noise modelling and assessment considered the generalised 120 (non-impulsive sound) and 160 dB (impulsive sound) SPL_{rms} thresholds proposed by NMFS (2013) as an indicator of potential behavioural impact zones. This indicated that sound levels could potentially elicit a behavioural response within a radius of 4,805 m from the noise source, equating to an area of 72.5 km^2 around the noise source (Table 4-4).

Table 4-4: Predicted distances at which sound levels reduce below behavioural response thresholds

Marine mammal group	Type of sound	Predicted distance at which sound levels decrease to below threshold values, m
Behavioural change (disturbance)	Single or multiple pulses e.g. impulsive	48 m
	Non-impulsive e.g. continuous sound	4,805 m

Exceeding the criteria for potential onset of disturbance effects does not in itself mean that disturbance will occur. Therefore, the zone of behavioural change will not be a zone from which animals are necessarily excluded, but rather one in which normal behaviour might be affected across a range of potential responses, from a simple noticing of the sound, to a startle response and return to normal behaviour, through to exclusion from an area. For the onset of PTS to occur the marine mammal would have to be within a distance of the noise source for a period of time as discussed in Section 4.1.1. The behavioural impact zone would act as a deterrent, precluding the marine mammal from intersecting with the injury zone.

4.2 Considerations

During the literature search phase, in many of the reported sound source levels (Table 3-1) the number of thrusters operated at the time of measurement was not stated. Therefore, it has been assumed that the numbers presented represent a generalised source sound level. If it's assumed that a second thruster could produce the same sound level, sound energy and that it was in phase, then this could increase the source levels by 3 dB. This in turn would increase the predicted distances at which the sound levels decreased to below the threshold values for injury and disturbance. However, the predicted distances presented in this report are relatively small and it is not considered that the resulting radius increase will represent a significant impact area.

The sound impact assessment has been based on installed water depth of 80 m LAT, based on the foundation being located at a water depth of 78 – 82 m.

5 RELEVANCE TO THE HOLYHEAD DEEP PROJECT

To enable the Minesto deployment at the Holyhead Deep Project site, a DP vessel will be utilised with the potential to introduce noise into the environment. The noise generated will be continuous or non-impulsive sound, due to the nature of the vessel DP system. Noise modelling identified source noise levels of around 188 dB re 1 µPa for DP thrusters operating at full capacity and associated with vessels of a similar size to that which could be used at the Project site. However, it is noted full capacity operation will not be required all the time. Instead the loudest noise would likely occur for short periods, during certain tidal states (such as the fastest part of the tide) in order to keep the vessel on station. For the rest of the time, the potential noise from the supporting vessel would be lower. For example, within the Holyhead Deep Project site, current speeds of up to 1.5 m/s only occur during spring tides; these speeds are exceeded around 10% in any given spring-neap cycle and throughout the year. Therefore, depending of the DP capacity of the contracted vessel, the maximum noise associated with the DP thruster at full power is only likely to occur for short periods and infrequently.

The marine mammals which utilise the Holyhead Deep Project site include bottlenose dolphins (MF cetacean), harbour porpoise (HF cetacean) and seals (pinnipeds). The worst-case estimated PTS injury impact zone, based on impulsive sound and an animal swimming at a constant speed of 1.5 m/s from the noise source was assessed to be approximately 6 m for harbour porpoise. This distance means that there is a risk of PTS injury to harbour porpoise species that use the Project site. However, it is noted that the distance is really localised to the DP thruster and would entail the mammal to be right next to the vessel. The assessment also assumes an average swim speed, whereas much faster speeds have been recorded for marine mammal species. For the non-impulsive continuous sound, the PTS injury impact zone is a lot smaller, with no risk of injury for species which move away from the source at the onset of noise. This is particularly the case for the dolphin and seal species.

For the assessment of behaviour response or disturbance effects, the noise level from the DP thrusters at full capacity could elicit a behavioural response within a radius of 4.8 km from the noise source. This equates to an approximate area of 72.5 km^2 around the DP thrusters. The disturbance extent equates to approximately 2% of the North Anglesey Marine / Gogledd Môn Forol SAC. Consistent operation over the proposed 12-week deployment period per year would equate to an average of 1% of the SAC area over a season (taken to be 183-days or approximately six-months), based on JNCC (2020) criteria 2 (see Section 3.3). As the estimate is well below the 10% threshold set by JNCC (2020), the proposed operations using a DP vessel would not have an adverse impact on harbour porpoise species and by proxy other marine mammal species.

The completed assessment is on the basis of the DP operating at full capacity over the proposed 12-week period. In reality the DP thrusters would not be operating at full capacity all the time and only during periods of the fastest flow speeds or larger wave conditions, which require more thrust to keep the barge vessel on station. Therefore, the estimated impact area and duration would be less than the assessed worst case. The presence of the behavioural response zone also means marine mammals are more likely to move away from the noise source and PTS injury impact zone rather to it. The DP thrusters would always be operational, albeit at varying capacities and noise outputs, which means there would always be noise in the environment. With increasing DP thruster capacity towards full power and associated rise in noise levels, the disturbance effect threshold would likely be exceeded, thereby causing a localised deterrent from the noise source. Therefore, based on guidance from JNCC (2020) for harbour porpoise, the

operation is not considered to have an adverse impact on marine mammals associated with the extent and duration of noise effects during the deployment period.

6 CONCLUSIONS

Minesto UK Ltd (Minesto) instructed Xodus Group Ltd (Xodus) to undertake an underwater sound impact assessment for a vessel remaining on station at the Holyhead Deep Project site using only Dynamic Positioning (DP) thrusters for a period of up to 12-weeks. The assessment was conducted using Xodus' Xposure modelling tool as utilised for the underwater noise modelling completed for the Holyhead Deep Project 2016 EIA. The study was completed to account for updates to the threshold criteria for marine mammals (since the previous EIA undertaken in 2016) with respect to the proposed DP vessel operations. Noise assessment modelling for the kite based on the updated threshold criteria was not considered necessary as previous work confirmed the noise levels associated with the kite were well below the injury and disturbance thresholds for marine mammal species

This updated underwater noise assessment has been completed on the basis of the revised injury and disturbance threshold criteria proposed by NMFS (2018). These indicated that the predicted distance at which sound levels will reduce below the PTS threshold criteria is approximately 6 m for high-frequency cetaceans, and 5 m for low-frequency cetaceans. Potential marine mammal behavioural impact distances have been assessed based on a 120 dB threshold for a non-impulsive sound source and the RMS behavioural distance is predicted to be approximately 4,805 m.

The completed assessment identified that based on the JNCC (2020) significance assessment criteria, use of the DP vessel and operations as part of the Holyhead Deep Project would not have an adverse impact on harbour porpoise species and by proxy other marine mammal species.

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