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RISK ASSESSMENT FOR ANNEX IV SPECIES

FS0007358 Statkraft North Irish Sea (NISA) Site Investigations for Export Cable Route

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Annex IV Species Risk Assessment
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1 INTRODUCTION

This Annex IV Risk Assessment has been prepared by RPS to assess whether the proposed site investigation works remove the system of strict protection established for Annex IV species, whether a derogation licence is required, and if so, whether the criteria for derogation are met.

1.1 Outline of the Proposed Works

North Irish Sea Array Windfarm Limited (NISA), a wholly owned subsidiary of Statkraft Ireland (Ltd), (Statkraft) has submitted a foreshore licence application to carry out site investigation works off the coasts of Co. Dublin and Co. Meath. The site investigations are necessary to establish the optimum design and location of the export cable(s) between the array site and the landfall, as well as determine an appropriate landfall location. Three potential cable route and landfall options will be investigated in order that a preferred option can be selected. The site investigation activities will include geophysical, geotechnical, ecological, and archaeological surveys.

These works will include geophysical, geotechnical, and environmental elements with the aim of informing the final export cable route for the proposed NISA offshore windfarm. The geophysical survey will investigate bathymetry using multibeam echo sounder (MBES), seabed obstructions and features using sidescan sonar (SSS) and composition of the seafloor using sub-bottom profiler (SBP). The geotechnical survey will investigate seabed properties throughout the survey area using core penetration test (CPT) and vibrocore samples while boreholes will be taken at each landfall option, and potentially along the export cable routes. The environmental survey will investigate macrofauna, sediment particle size and organic matter utilising benthic grabs for subtidal sampling and cores for intertidal sampling.

While this application is to determine the site location for the export cable lay area, Statkraft has previously submitted a foreshore licence application (FS007031) for site investigations on the array site, which is outside of the scope of the present document.

1.2 Legislation

Under Article 12 and 13 of the Habitats Directive, Member States must establish systems of strict protection for animal and plant species which are particularly threatened, and which are listed on Annex IV of the Habitats Directive. Article 16 provides for derogations from these provisions under limited circumstances. Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulations 51, 52 and 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. It is an offence to deliberately kill, injure or disturb a specimen in the wild, or damage or destroy a breeding site or resting place of an Annex IV animal species.

The granting of another statutory consent (e.g., a foreshore licence or lease) does not remove the obligation to obtain a derogation licence, and as such, an application for derogation may have to be made to the National Parks and Wildlife Service (NPWS) under Regulation 54, in addition to a foreshore licence or lease application. If satisfied that an application meets the criteria for derogation, the Minister may grant a derogation licence, which may be subject to such conditions, restrictions, limitations, and requirements as the Minister considers appropriate, and these will be specified in the licence.

1.3 Relevant Annex IV Species

It is noted that Chapter 7 of the applicant's NIS document provides a 'Marine Mammal Risk Assessment for Non-Qualifying Mammals', which identifies cetacean species which have not been considered during the Appropriate Assessment (AA) process as 'non-qualifying'. Only these 'non-qualifying' cetacean species were then subject to a rudimentary risk assessment. As the assessment of Annex IV species under Article 12 is separate to the AA process, this approach was considered inappropriate. All species listed under Annex IV with the potential to be impacted by the proposed site investigation works should be included, even if they have been separately assessed during the AA process.

Of the animal and plant species on Annex IV known to occur in Ireland[1], the following species were identified as relevant to the proposed development:

- All cetacean species;
- All turtle species;
- Otter.

Following a request for further information (RFI), the applicant has provided an 'Annex IV and Seals Species Risk Assessment' (hereafter referred to as NISA Annex IV Risk Assessment) and noise modelling exercise for the proposed development which assesses injury and disturbance to marine mammals based on a dual criteria approach (as set out in Southall *et al*. 2019) as requested within the RFI.

[1] https://www.npws.ie/legislation

2 BASELINE

2.1 Cetaceans

The Annex IV Species Risk Assessment provided by the applicant contains a detailed baseline for marine mammals present within the vicinity of the survey activities. It should be noted that the species of seal which occur in Irish waters (harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus*) are in fact, not listed on Annex IV, and as such are not considered further in this risk assessment.

Twenty-five species of cetacean have been recorded in the waters around Ireland, many of which have been observed off the east coast and may be present in the survey area. The applicant undertook a desktop study using data provided by the Irish Marine Atlas (Marine Institute, 2019) and found that the following cetacean species have been recorded in the foreshore licence area and surrounding waters: bottlenose dolphin (*Tursiops truncatus*), short-beaked common dolphin (*Delphininus delphis*), Risso's dolphin (*Grampus greisus*), harbour porpoise (*Phocoena phocoena*), fin whale (*Balaenoptera physalus*), humpback whale (*Magaptera novaeangliae*), and minke whale (*Balaenoptera acutorostrata*).

The applicant provides density and abundance estimates from the Small Cetaceans in European Atlantic water and the North Sea (SCANS) III surveys (Hammond *et al.,* 2017). The NISA foreshore licence application area is within SCANS III Block E. Within this block, SCANS III found harbour porpoise, bottlenose dolphin, Risso's dolphin and minke whale, with harbour porpoise being the most common cetacean. This finding is supported by other sightings data (Berrow *et al*., 2018, Berrow *et al.,* 2008; DAHG, 2009). The ObSERVE Programme corroborated the SCANS III results, sighting harbour porpoise, Risso's harbour porpoise, bottlenose dolphin, Risso's dolphin and minke whale within ObSERVE stratum 5, within which the NISA foreshore licence area occurs (Rogan *et al.,* 2018). Again, harbour porpoise was the most sighted species, indicating that the Irish Sea is an important area for this species.

Other cetacean species are either transitional visitors or have only been documented from stranding data (O'Brien *et al.,* 2009; Wall *et al.,* 2013). Harbour porpoise, bottlenose dolphin and common dolphin are thought to be present year-round whilst minke whale are considered to be seasonal visitors during summer months (Wall *et al.,* 2013).

2.2 Turtles

Four Annex IV species of turtle are known to occur in Ireland (leatherback turtle, Kemp's ridley turtle, loggerhead turtle and hawksbill turtle)[2]. Leatherback turtle (*Dermochelys coriacea*) has been reported on a number of occasions around the Irish coastline and in the Irish Sea, most recently in 2020. Between 2000 and 2018, 198 observations of leatherback turtles were recorded in Irish waters (NPWS, 2019). Leatherbacks are known to have an 'atypical migration pattern', as while they must return to tropical waters to breed and reach preferred nesting grounds, they are known to spend the summer months in productive temperate waters, like Ireland's, feeding on jellyfish and sea squirts (Doyle, 2007). Other turtle species have been less commonly observed in Irish waters.

2.3 Otters

Otter is listed on Annex IV and occurs throughout Ireland, including along the coast of Co. Dublin and Co. Meath (NPWS, 2019).

In Ireland otter populations are found along rivers, lakes, and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover. The otter is an opportunistic predator with a broad and varied diet. In coastal areas fish, crabs and molluscs are known to be eaten.

Although otters are a mobile species, they have defined territories. Females have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability (Reid *et al*., 2013).

[2] https://www.npws.ie/legislation Accessed online 30 November 2021

The main threats to otter include pollution, particularly organic pollution resulting in fish kills; and accidental deaths (road traffic and fishing gear. The most recent Article 17 conservation assessment for otters in the Republic of Ireland deemed the species as being in favourable conservation status) (NPWS, 2019).

Otters may interact with small section of the landfalls of the cable routes to be investigated, however, otter typically do not forage >80m from coastal shores (Kruuk & Moorhouse, 1991), therefore it is not likely that there will be any overlap between otter foraging grounds and the vast majority of the site investigations.

3 ASSESSMENT OF POTENTIAL IMPACTS TO ANNEX IV SPECIES

A rudimentary marine mammal risk assessment was provided in Chapter 7 of the applicant's NIS document, and following an RFI, the applicant provided a detailed Annex IV Species Risk Assessment. The following assessment of potential impacts has been carried out using relevant details provided in the Annex IV Species Risk Assessment, other application documents (i.e., the Schedule of Works and NIS documents) and publicly available data and thresholds.

3.1 Cetaceans

Potential impacts to cetaceans associated with the proposed site investigations are:

- Underwater noise generated during the geophysical and geotechnical surveys, resulting in injury and/or disturbance,
- Collision risk with survey vessels and/or equipment, resulting in injury; and
- Pollution event.

3.1.1 Underwater noise

Underwater noise has the potential to affect marine life in different ways depending on its noise level and characteristics. Assessment criteria generally separate sound into two distinct types: impulsive sounds and non-impulsive (continuous) sounds. Underwater sound arising from the geophysical survey produced by MBES, SSS and SBP (chirp/pinger) are non-impulsive (continuous) sound sources with directional, short duration output which is attenuated within a short distance from the sound source. They typically do not have the high peak sound pressure with rapid rise/decay time that impulsive sounds do. The geotechnical surveys will also produce non-impulsive sound from drilling and vibrocoring. Impulsive sounds are typically transient, brief and consist of high peak sound pressure with high rise time and rapid decay (ANSI 1986; NIOSH, 1998; ANSI, 2005). Examples of impulsive noise types are seismic air guns (including boomer system to be utilised in the proposed site investigations), impact piling or underwater explosions.

Following the request for further information the applicant provided a desk-based review of underwater sound changes associated with the proposed survey activities (geophysical and geotechnical) and predicted effects on marine mammals. The NISA Annex IV Risk Assessment provided a summary of the frequency ranges and sound pressure levels (SPLs) associated with the acoustic equipment to be used for these site investigations was provided by the applicant (Tables 3.3 and 3.4 of the NISA Annex IV Risk Assessment document). Table 5-7 of the NISA Annex IV Risk Assessment provided SPL These are considered industry standard for scientific surveys and are provided here in **Table 3.1**.

Table 3.1 Summary of noise sources generated by the proposed geophysical and geotechnical surveys

Noise Source	Frequency Range	Maximum SPL (dB re 1 µPa @1m)	SPL_{peak} used in modelling (dB re 1 µPa @1m)	1s SEL source level (dB re 1 $\mu Pa^2 s$ @1m)
Shipping noise	0.05 - 0.3			
MBES	200 - 400 kHz (700 kHz optional)	200 - 228	205	168.7
SSS	300 - 900 kHz	228	203.2	166.2
SBP (Innomar)	85 - 115 kHz	247 (typically operated at <200)	210.7	203.7
SBP (pinger)	3.5 - 7.0 kHz	220	220	193.8
Ultra high resolution seismic survey (UHRS)(sparker)	Around 1.4 kHz	211	211	203.0
Vibrocore	30 Hz	187.4	N/A	

Noise Source	Frequency Range	Maximum SPL (dB re 1 µPa @1m)	SPL_{peak} used in modelling (dB re 1 µPa @1m)	1s SEL source level (dB re 1 μPa^2s @1m)
Cone Penetration Testing (CPT)	28 Hz	118-145	N/A	
Boreholes	120 Hz	145	N/A	159.7

Auditory injury in marine mammals can be defined as a permanent threshold shift (PTS) leading to non-reversible auditory injury, or as a temporary threshold shift (TTS) in hearing sensitivity, which can have negative effects on the ability to use natural sounds (e.g., to communicate, navigate, locate prey) for a period of minutes, hours, or days. With increasing distance from the sound source, where it is audible to the animal, the effect is expected to diminish through identifiable stages (i.e., PTS or TTS in hearing, avoidance, masking, reduced vocalisation) to a point where no significant response occurs. Factors such as local propagation and individual hearing ability can influence the actual effect (DAHG, 2014).

Marine mammal species can be split into functional hearing groupings, according to their frequency-specific hearing sensitivity. In their updated Species Risk Assessment, the applicant makes use of functional marine mammal hearing groups as outlined in Southall *et al.* (2019). See **Table 3.2** for a list of species contained within each functional hearing group.

Table 3.2: Functional marine mammal hearing groups for marine mammal species

Southall *et al.* (2019) hearing group name	Species included in group
Low-frequency cetaceans (LF)	Baleen whales (minke, fin and humpback whale)
High-frequency cetaceans (HF)	Most toothed whales and dolphins (bottlenose, common and Risso's dolphin, killer, and pilot whales)
Very high-frequency cetaceans (VHF)	Certain toothed whales and porpoises (harbour porpoise)
Other marine carnivores in water (OCW)	Includes sea lions, walrus, otters
Phocid carnivores in water (PCW)	Earless seals (including harbour and grey seal)

The applicant undertook a noise modelling exercise for the proposed survey activities, which assesses injury and disturbance ranges to marine mammals based on a dual criteria approach (as set out in Southall *et al.* 2019).

In Section 5.3.1 of the NISA Annex IV Risk Assessment document, the applicant provided injury criteria for PTS and TTS for groupings of marine mammals from Southall *et al.* (2019) addressing both peak sound pressure levels (SPL) and Sound Exposure Levels (SEL). SEL is recommended for assessing the impacts of non-impulsive (continuous) noise, while a dual approach using SEL and SPL is recommended for impulsive noise (Southall *et al.* 2019). The hearing-weighted function is designed to represent the bandwidth for each group within which acoustic exposures can have auditory effects. SEL is a measure of total sound energy of an event or a number of events (e.g., over the course of a day) normalised to one second. This allows the total acoustic energy contained in events lasting a different amount of time to be compared on a like for like basis. Using SEL for continuous sounds allows exposure duration and the effect of exposure to multiple events over a 24-hour period to be taken into account. Although the DAHG (2014) guidance refers to Southall *et al.* (2007), the more recent Southall *et al.* (2019) outlines more precautionary thresholds than those outlined in 2007 for PTS and TTS. These criteria are set out here in **Table 3.3**. The criteria for phocid carnivores (seals) are included for information, although not relevant to the current assessment.

Table 3.3 Summary of PTS and TTS onset thresholds (Southall *et al.,* 2019)

Hearing Group	Parameter	Impulsive		Non-impulsive	
		TTS	PTS	TTS	PTS
Low-frequency (LF) cetaceans	SPL, dB re 1 µPa (unweighted)	213	219	-	-
	SEL, dB re 1 µPa^{2}s (LF weighted)	168	183	179	199
High-frequency (HF) cetaceans	SPL, dB re 1 µPa (unweighted)	224	230	-	-
	SEL, dB re 1 µPa^{2}s (HF weighted)	170	185	178	198
Very High-frequency (VHF) cetaceans	SPL, dB re 1 µPa (unweighted)	196	202	-	-
	SEL, dB re 1 µPa^{2}s (VHF weighted)	140	155	153	173
Phocid carnivores in water (PCW)	SPL, dB re 1 µPa (unweighted)	212	218	-	-
	SEL, dB re 1 µPa^{2}s (PCW weighted)	170	185	181	201

The survey equipment expected to be used is either multiple pulse (MBES, SSS and SBPs) or continuous (boring and coring) and is also expected that several of the noise sources will be operational at the same time. Criteria from Nedwell *et al* (2007 and 2008) were utilised by the application in the development of the noise model to access disturbance/behavioural response to marine mammals. The dB_{ht} (species) metric as applied is defined as an objective measurement of the amount a noise is above the threshold of hearing of an animal. For each modelling scenario it has been assumed that the noise source is located 5 m below the water surface, except for boring and coring where the source is on the seabed. Where cumulative exposure is being calculated, constant operation over 24-hours has been assumed. Table 5.8 of the NISA Annex IV Risk Assessment document provides the summary of the modelled maximum PTS and TTS impact ranges from all sound sources. Table 3.4summarises the results presented in the NISA Annex IV Risk Assessment Document.

Table 3.4 Summary of the modelled Southall *et al*. (2019) maximum PTS and TTS impact ranges for marine mammals from all sound sources. LF = Low-frequency cetaceans (LF), HF = High-frequency cetaceans, VHF = Very high-frequency cetaceans and PCW = Phocid carnivores in water

Sound source	Max. PTS impact ranges				Max. TTS impact ranges			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
MBES	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	170 m	< 100 m
SSS	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	130 m	< 100 m
Innomar	< 100 m	< 100 m	720 m	< 100 m	< 100 m	370 m	1.1 km	< 100 m
Concurrent	< 100 m	< 100 m	720 m	< 100 m	< 100 m	370 m	1.1 km	< 100 m
Pinger	< 100 m	< 100 m	2.5 km	160 m	2.3 km	830 m	6.2 km	2.3 km
Sparker	1.1 km	< 100 m	2.9 km	730 m	6.3 km	1.1 km	6.9 km	4.3 km
Boring and Coring	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m	< 100 m

Table 3.5 Number of individuals and percentage of reference population estimated to have the potential to be disturbed by geophysical survey equipment

Species	Potential impact		No. of individuals within the area of potential impact	% of reference population with potential to be affected
	Range (km)	Area (km^2)		
Harbour porpoise	5	78.5	23	0.02
Minke whale	5	78.5	1	0.01
Bottlenose dolphin	5	78.5	3	0.7
Risso's dolphin	5	78.5	0	0.01

Source: SCANS III (Hammond et al., 2017) and ObSERVE (Rogan et al., 2018) density estimates and reference population abundance estimates used in calculations from IAMMWG (2015)

- For bathymetric survey (MBES) the maximum impact range was estimated for TTS at 170 m for very high frequency cetaceans (e.g. harbour porpoise). For PTS and all other cetacean groups, the injury ranges were estimated at <100 m.
- For SSS the maximum impact range was estimated for TTS at 130 m for very high frequency cetaceans (e.g. harbour porpoise). For PTS and all other cetacean groups, the injury ranges were estimated at <100 m.
- For the Innomar SBP, the maximum impact range for PTS was estimated as 720 m for very high frequency cetaceans and the maximum impact range for TSS was 1.1 km for very high frequency cetaceans.
- The applicant considered concurrent operation of the above equipment (MBES, SSS and Innomar SBP) and found that the maximum impact ranges were similar to those estimated for the Innomar SBP (i.e. 720 m for PTS and 1.1 km for TTS for very high frequency cetaceans).
- For the pinger, the modelling found that due to the lower frequencies, the noise spreads to greater distances, with maximum impact ranges estimated as 2.5 km for PTS and 6.2 km for TTS for very high frequency cetaceans.
- For the sparker, due to a combination of a high source level and lower frequency components, the predicted noise from this equipment spreads further than the other geophysical survey sources. The maximum impact ranges were estimated as 2.9 km for PTS and 6.9 km for TTS. Information received from the manufacturer indicated that noise levels should be expected to decrease considerably with distance from the sound source.
- For geotechnical noise sources (drilling and vibrocore surveys) PTS is unlikely in any cetacean species due to the low frequency of these sources. TTS could potentially occur within a few hundred metres for very high frequency cetaceans (i.e., harbour porpoise). Impact ranges for all cetacean groups are estimated to be <100m.
- While there is potential for the proposed geophysical survey equipment to cause disturbance in cetaceans, the most likely response will be temporary behavioural avoidance. Table 5-9 in the NISA Annex IV Risk Assessment outlined the number of individuals likely to be within the potential zone of disturbance. These numbers are considered to be low as a proportion of their respective reference populations.

There is a low likelihood that cetaceans will be present within these likely zones of influence for PTS and TTS as the presence of the vessel is likely to disturb animals beyond these distances and cause them to leave the area. In addition, the risk of injury will be further reduced by the implementation of appropriate mitigation as described by the applicant in the NIS document and in **Section 3.4** of this Risk Assessment.

3.1.2 Collision risk

There is a risk of injury due to collision between cetaceans and survey vessels (most likely when in transit) and sampling equipment. The main drivers influencing collision risk are vessel type, speed, and ambient noise levels (Wilson *et al.,* 2007). Vessels travelling at a speed of 14 knots or over appear to cause the most severe injuries with sick or juvenile animals being the most vulnerable (Laist *et al*., 2001). The applicant states that a maximum of two vessels will undertake the site investigations at any one time and that these vessels are likely to be either stationary or travelling slowly at 5 knots or below in a predefined trajectory which will allow animals to predict the movement of the vessels and avoid collisions. While cetaceans have the potential to collide with vessels, there is a high likelihood that an animal will display avoidance behaviour in response to vessel noise and presence.

In conclusion, the risk of vessel and equipment collision with cetaceans is considered to be low. The proposed survey works do not offend the system of strict protection of cetaceans under Article 12 of the Habitats Directive due to collision risk.

3.1.3 Pollution

The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78). It aims to prevent both operational and accidental discharge into the marine from sea going vessels. Ireland ratified the various elements of the MARPOL Convention through the Sea

Pollution Act 1991, the Sea Pollution (Amendment) Act 1999 and the Sea Pollution (Miscellaneous Provisions) Act 2006. It was given further legal effect through several Statutory Instruments under these Acts. The Acts place a legal obligation upon operators of vessels to implement measures to prevent both operational and accidental discharges from ships of substances, which may damage the marine environment as well as human health. While the site investigation activities will result in a temporary increase in vessels using the area, which would therefore theoretically increase the risk of accidents and resultant fuel spills, in light of the legal obligations outlined above an incidence of pollution, whether from operational activities or from an accidental occurrence, is considered unlikely.

All vessels used during the survey campaign shall, as required by law, be MARPOL compliant and fully certified by the Maritime Safety Office. This is standard practice for all survey activities irrespective of the survey operator. Therefore, it is considered not likely that there would be any occurrence of a pollution event, either accidental or otherwise, that could directly or indirectly affect Annex IV species.

3.2 Turtles

Although potential impacts to turtles are not assessed in the application documents, it is stated that any mitigation proposed for cetacean species will also be applied to turtles. Data on turtle hearing is limited, however, turtles are adapted to detect sound in water and are known to detect sound at less than 1,000 Hz (Popper *et al*., 2014). As the majority of the survey equipment to be used operates across higher frequency range (see **Table 3.1**), injury and disturbance to turtles due to noise impacts appears unlikely. Given the rarity of occurrence of turtles in Irish waters, and the relatively limited scale and duration of the survey activities, it is concluded that there will be no significant disturbance, injury, or death of turtle species as a result of the survey activities. There will be no deterioration or destruction of breeding sites or resting places. The proposed works do not offend the system of strict protection of turtles under Article 12 of the Habitats Directive.

3.3 Otters

3.3.1 Potential Impacts

Impacts to otters can occur as a result of permanent loss of breeding or resting sites, habitat loss, disturbance/displacement, and injury/mortality. An otter survey has not been carried out in support of this application, therefore, the presence of otter or otter habitat within and around the foreshore licence area cannot be ruled out. There is potential for otter to occur within the intertidal zone, commuting or foraging on fish, crabs, and molluscs.

Geotechnical survey activities in this area are likely to comprise co-located borehole drilling and CPTs (six at each of the three potential landfall locations). According to the applicant's Schedule of Works, a rotary drilling rig onboard a jack-up barge will be located in 'shallow water depths', although these are not defined. Sound pressure levels from rotary drilling are given as 190 dB re 1µPa @ 1m with a frequency range of 2Hz to 50kHz (see **Table 3.1**). It is not clear whether this value refers to under or above water noise. Vibro-coring will not take place at the landfall sampling locations. An ecological walkover survey to enable habitat classification will be carried out at the chosen landfall location.

Given the nature of activities to be carried out within the intertidal zone, it is considered that no deterioration or destruction of otter breeding sites will occur. There is a low potential for slight noise disturbance of otters using the landfall areas to rest, commute or forage in, however, given the temporary nature of the works, the highly mobile and crepuscular nature of the species, and their favourable conservation status, it is highly unlikely that significant disturbance will occur.

No significant disturbance, injury or death of otters is predicted as a result of the proposed surveying activities. In addition, there will be no deterioration or destruction of breeding sites or resting places. The proposed works do not offend the system of strict protection of otters under Article 12 of the Habitats Directive.

3.4 Mitigation Measures

Mitigation measures for marine mammals were provided by the applicant in the NIS, however these have been updated by those provided in the NISA Annex IV Risk Assessment. The applicant has proposed the following updated measures to mitigate potential impacts on marine mammal species:

1. The document "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters (DAHG, 2014)" will be followed at all times. This entails, *inter alia*, that acoustic surveying shall not commence if marine mammals are detected by an experienced marine mammal observer (MMO) within a defined monitored zone of the sound source.
2. A qualified and experienced MMO will be appointed to monitor for marine mammals and to log all relevant events using standardised data forms provided by the DAHG. During daylight hours the MMO(s) will carry out visual observations to monitor for the presence of cetaceans before the soft start commences and will recommend delays in the commencement of the geophysical operations should any species be detected within the appropriate monitored zone.
3. The applicant states that, in order to allow 24-hour operation, or for work to commence when visual observation is not possible due to weather conditions or sea state, a proven Passive Acoustic Monitoring (PAM) system and experienced operator(s) will be employed to undertake pre-start surveys during these times. It is noted that use of PAM for pre-start monitoring is not recommended in the DAHG (2014) guidelines, and therefore, agreement should be sought with NPWS in this regard.
4. Pre-start monitoring will be conducted for a pre-soft start search of 30 minutes i.e. prior to the commencement of marine geophysical and geotechnical operations (MBES, SSS, sub-bottom profiling, geotechnical seabed sampling). This will involve a visual assessment to determine if any cetaceans are within 1000 m of the activities for the geophysical survey activities and 500m of the activities for geotechnical surveys. It is noted that the applicant intends to use PAM for night-time or poor visibility. As above, it is recommended that agreement is sought with NPWS in this regard. It is considered that due to the relatively wide impact ranges provided by the applicant, it is suitably precautionary to apply a monitored zone of 1,000m for geophysical surveys instead of the standard 500m, in line with the DAHG (2014) guidelines for seismic surveys. A monitored zone of 500m is considered appropriate for geotechnical activities.
5. Should any cetaceans be detected within a radial distance of 1000 m of the survey vessel, commencement of marine geophysical operations will be delayed until their passage, or the transit of the vessel, results in the cetaceans being more than 1000 m away from the vessel. In both cases, there will be a 30-minute delay from the time of the last sighting within 1000 m of the source to the commencement / recommencement of the operations. The MMO will use a distance measuring stick or reticule binoculars to ascertain distances to marine mammals. Note: once started, geophysical/geotechnical operations will not cease should cetaceans approach the survey vessel.
6. Soft-start procedures will be implemented in line with DAHG (2014) guidance. A soft start is the gradual ramping of power over a set period of time, to give any cetaceans adequate time to leave the area.

It is noted that the Irish Whale and Dolphin Group (IWDG) submitted a response on the application stating that the intended mitigation measures have no poor visibility or darkness capability and therefore it needs to be clear that surveys cannot operate in fog, rain, sea state 5 or greater and darkness without additional measures. IWDG recommend that a detailed mitigation plan is submitted. It is further noted that the DAHG (2014) guidelines do not include provision for passive acoustic monitoring (PAM) to allow for detection of marine mammals at night/in poor visibility conditions. The applicant has included provision for PAM in the updated NISA Annex IV Risk Assessment, however, it is recommended that the applicant engages with NPWS to discuss and agree any such measures which are outside of the DAHG (2014) guidelines.

There is no requirement under Article 12 to consider cumulative or in-combination effects, however it is noted the Marine Institute recommend that DHLGH should identify any similar geophysical surveys that may be carried out along the east coast and that they should not coincide with this survey so as to avoid potential cumulative effects on marine mammals.

Based on this assessment and the conditions proposed by statutory consultees, RPS considers that the following conditions should be attached to a decision to consent the proposed project. Conditions which do not relate specifically to mitigation of impacts to Annex IV species are recommended in the Environmental Report which accompanies this Annex IV Risk Assessment.

The following measures should be implemented by the licensee in order to avoid and/or reduce impacts to marine mammals from underwater noise generation:

a. The licensee shall adhere to the project-specific guidance outlined in DAHG (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters" and will ensure that a suitably qualified visual observer is present for the duration of all acoustic surveying to minimise risk to marine mammals in the local environment. A monitored zone of 1,000m should

be surveyed for geophysical surveys, while a monitored zone of 500m should be surveyed for geotechnical surveys.

b. The licensee should consult with NPWS regarding the development of a marine mammal mitigation plan and regarding the use of acoustic monitoring. During site investigations, the marine mammal observer should ensure the protocols specified in the marine mammal mitigation plan are fully implemented.

4 CONCLUSION

Following review of the information submitted by the applicant relevant to Annex IV species, it is the opinion of RPS that the proposed project complies with the system of strict protections afforded by Article 12 of the Habitats Directive to the following species found in Ireland:

- All cetacean species
- All turtle species
- Otter.

It is noted that formal determination of whether further assessment of Annex IV species is required will be made by the Minister of the DHLGH. The Minister's determination shall not be prejudiced by this review.

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