



European Protected Species Risk Assessment

European Offshore Wind Deployment Centre
Operation and Maintenance Phase

Vattenfall

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1. Introduction

The European Offshore Wind Deployment Centre (EOWDC) received consent under Section 36 of the Electricity Act 1989 from the Scottish Ministers on 26 March 2013 (the S36 Consent) and was granted a Marine Licence from the Scottish Ministers on 15 August 2014 (reference 04309/16/0). A new Marine Licence was issued on 22 December 2022 (reference MS-00010195).

The EOWDC is currently in its Operation and Maintenance (O&M) Phase. Surveys using geophysical survey and positioning equipment are periodically undertaken across the Project (Wind Farm site and Export Cable Corridor (ECC)) for the purposes of Wind Turbine Generator (WTG) inspections and maintenance works, and seabed surveys in the cable corridor. The geophysical surveys provide an up-to-date understanding of seabed conditions across the works area.

An EPS licence (MS EPS 17/2019/0) was granted in July 2019 and an extension in April 2021 (EPS/BS 00009123) for this work, which permitted the disturbance of EPS from three types of equipment: Ultra-Short Baseline (USBL) system, Multi-beam Echo Sounder (MBES) and Side Scan Sonar (SSS). A variation request for use of a Sub-Bottom Imager (SBI) was submitted in November 2022. The current EPS Licence (EPS/BS 00009123) expires in April 2026; this Risk Assessment supports the application for a variation to the existing licence for ongoing work over the next five-year period.

The objective of this report is to provide an updated assessment of the potential impact of continued geophysical survey work at the EOWDC on European Protected Species (EPS) in Aberdeen Bay. This assessment uses new information on species distribution, abundance, hearing range, and thresholds for potential effect. No alteration to operations at the Project is proposed; the only change is an extension of the expiration date.

2. Proposed Work

2.1. Equipment Specifications

The vessels required for the O&M phase work are equipped with geophysical survey systems and positioning equipment that will be utilised during the works. Geophysical survey systems and positioning equipment increase levels of anthropogenic noise in the marine environment because they operate by producing and receiving sound. The works will utilise some or all of the following equipment:

- MBES to gather detailed bathymetry data;
- SBI to provide an understanding on subsea stratigraphy and geohazards;
- SSS to provide information on seabed debris/features; and
- USBL positioning systems and positioning transponders to monitor positioning of the remotely operated equipment such as a Remotely Operated Vehicle (ROV).

The vessel(s) undertaking the planned works is still to be confirmed. Because the precise details of the equipment (makes and models) will depend on the vessel used, assessment of the types of equipment that will be required has been undertaken based on a realistic worst-case scenario using representative equipment (see Table 2.1).

Table 2.1: Representative geophysical survey and positioning equipment

Representative Equipment	Operating Frequency (kHz)	Source Level (SPL) Reported by Manufacturer (dB re. 1 μ Pa)
Subsea Positioning USBL		
Sonardyne Ranger USBL	35 – 50	200 (peak), 188 (rms)
Sonardyne Ranger 2 USBL HPT 3000	19 – 34	194 (peak), 188 (rms)
Sonardyne Scout	30 – 35	193 (peak)
Easytrak Nexus 2 USBL	18 – 32	198 (peak), 192 (rms)
Ix Blue GAPS	19 – 30	191 (rms)
MBES		
Reason Seabat 7125	400	220 (rms)
R2 Sonic 2024 MBES	200 – 450	229 (peak), 162 (rms)
Kongsberg EM2040C Dual Head	200 – 400	210 (peak), 204.5 (rms)
SSS - dual frequency		
EdgeTech 4200	300 / 600	208 – 213 (peak), 205 – 210 (rms)
Klein 3900	445 / 900	226 (peak), 220 (rms)
EdgeTech 4125-MP	400 / 900	215 (rms)
SBI		
Pangeo SBI	4 - 14	190 (rms)

2.2. Duration

The expected duration of the individual work periods are expected to be short (~17 days) with a total of one survey required per year. This total excludes weather and technical downtime which is not anticipated to exceed 200% of estimated duration stated. The survey vessel will not be operating 24 hours per day.

3. Legal Requirement

3.1. EPS

All species of cetacean and marine turtles in waters around the UK are considered EPS under Annex IV of the Habitats Directive (Council Directive 92/43/EEC) animal and plant species of community interest in need of strict protection).

The need to consider EPS in waters off Scotland comes from two articles of legislation, these are:

- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) which transposes the Conservation of Natural Habitats and Wild Fauna and Flora Directive (Council Directive 92/43/EEC; referred to as the Habitats Directive) into Scottish law. This legislation covers Scottish Territorial Waters; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (known as the Offshore Regulations) which transpose the Habitats Directive into UK law for all offshore activities. This legislation covers UK waters beyond the 12 nm limit.

Both of these regulations (collectively known as the 'Habitat and Offshore Marine Regulations') provide for the designation of protected European sites (Special Areas of Conservation (SACs)) and the protection of EPS as designated.

The Offshore Regulations state in section 45, that it is an offence to:

- Deliberately capture, kill or injure any wild animal of a EPS, as listed under Annex IV of the Habitats Directive;
- Damage or destroy, or cause deterioration of the breeding sites or resting places of a EPS; and
- Deliberately disturb EPS (in particular disturbance which is likely to impair the ability of a significant group of animals of that species to survive, breed, rear, or nurture their young, or which might affect significantly their local distribution or abundance).

The Conservation of Habitats and Species Regulations 1994 (as amended in Scotland) state, under section 39, that it is an offence to:

- Deliberately or **recklessly** capture, kill or injure a wild animal of a EPS, as listed under Annex IV of the Habitats Directive;
- Damage or **recklessly** destroy, or cause deterioration of the breeding sites or resting places of a EPS; and
- Deliberately or **recklessly** disturb EPS (in particular disturbance which is likely to impair their ability to survive, breed, reproduce, nurture their young, migrate or hibernate, or which might affect significantly their local distribution or abundance).
- Disturb **any** EPS in a matter that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which is belongs;
- **Deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean) through Regulation 39 (2).**

The additional protection afforded by the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland) has been shown in **bold** in the list above. It is therefore an offence to deliberately or recklessly disturb a single cetacean or marine turtle in Scottish Territorial Waters.

In addition, any means of capturing or killing which is indiscriminate and capable of causing the local disappearance of - or serious disturbance to - any population of EPS is an offence.

Licences may be granted by the Secretary of State which would allow otherwise illegal activities to go ahead.

Three tests must be passed before a license can be granted:

1. The license must relate to one of the purposes referred to in Regulation 44;

2. There must be no satisfactory alternative (Regulation 44, 3a); and
3. The action authorised must not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS) in their natural range (Regulation 44, 3b).

FCS is defined in the Habitats Directive as the following:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable element of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

The EOWDC is located within the 12 nautical mile limit of Scotland's Territorial Waters and it is unlikely that any sound emitted from the proposed work will reach offshore waters. Therefore, for the proposed works only the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) applies.

3.2. Seals

Under the Wildlife and Countryside Act 1981, the Conservation of Seals Act 1970, and the Conservation of Habitats and Species Regulations 2017, it is an offence to take, injure or kill a seal out to 12 nm.

Under the Conservation of Offshore Marine Habitats and Species Regulations 2017, beyond 12 nm, it is an offence to capture or kill a seal.

The Marine (Scotland) Act 2010 provides the main legal framework for protecting seals in Scottish waters. The Act introduced a licensing system for killing or taking seals, making it an offence to do so without a licence.

3.3. Basking Sharks

In Scotland, it is considered an offence to disturb or injure a basking shark (*Cetorhinus maximus*). Basking sharks are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

3.4. Guidance

Marine Scotland (now Marine Directorate) and Scottish Natural Heritage (SNH; now NatureScot) produced guidance for Scottish inshore waters entitled 'The protection of Marine European Protected Species from injury and disturbance' in March 2014 (Marine Scotland and SNH, 2014). This guidance was updated in July 2020 (Marine Scotland and SNH, 2020). Marine Scotland recognises that the guidance represents a very precautionary approach to the interpretation of the Habitats Directive with regards to EPS '...This guidance reflects a precautionary approach...', and requires the careful examination of the potential impact of proposed offshore activities, and the resultant noise produced, on individual animals likely to be present at the location.

The guidance states that the two main potential causes of death or injury are physical contact (with a vessel) and anthropogenic noise. Likelihood of disturbance for individuals includes factors such as:

- Spatial and temporal distribution of the animal in relation to the activity;
- Any behaviour learned from prior experience with the activity;
- Similarity of the activity to biologically important signals (particularly important in relation to activities creating sound); and
- The motivation of the animal to remain within the areas (e.g. food availability).

Likelihood of potential impacts should include the following considerations:

- Type of activity;
- Duration and frequency of the activity;
- Extent of the activity;
- Timing and location of the activity; and
- Other known activities in the area at the same time.

4. EPS in the Region of the Project

4.1. Cetaceans

Four cetacean species are considered to occur on a relatively common basis in the vicinity of the EOWDC: Harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), white-beaked dolphin (*Lagenorhynchus albirostris*) and minke whale (*Balaenoptera acutorostrata*) (Gilles *et al.*, 2023, IAMMWG, 2023, Cheney *et al.*, 2024). Occasional visitors to the region include common dolphin (*Delphinus delphis*), Risso's dolphin (*Grampus griseus*), white-sided dolphin (*Lagenorhynchus acutus*), killer whale (*Orcinus orca*) and long-finned pilot whale (*Globicephala melas*). Sightings of humpback whale (*Megaptera novaeangliae*) and fin whale (*Balaenoptera physalus*) have also been recorded.

The EOWDC falls within Block NS-D of the SCANS-IV survey, the latest in a series of large-scale surveys for cetaceans in European Atlantic waters (Gilles *et al.*, 2023). Abundances and densities of the species commonly seen in the area are shown in Table 4.1. The Inter-Agency Marine Mammal Working Group (IAMMWG) marine mammal management unit (MU) abundances are also presented (IAMMWG, 2023).

The quantitative risk assessment is only able to consider the cetacean species commonly found in the vicinity of the EOWDC (i.e., those for which density estimates are available). Whilst not considered specifically in this assessment due to their low likelihood of occurrence, the assessment, including any mitigation measures put in place, is considered to be appropriate for/relevant to less common species of cetacean.

Table 4.1: Density and abundance estimates for species considered to occur on a relatively common basis in the vicinity of the EOWDC

Species	SCANS Block	SCANS density estimate (individuals km ²)	Management Unit (MU)	Abundance of animals in MU	Abundance of animals in UK portion of MU
Harbour porpoise	NS-D	0.5985	North Sea (NS)	346,601	159,632
Bottlenose dolphin *	R	0.0298	Greater North Sea (GNS) and Coastal East Scotland (CES)	2,248	2,111
White-beaked dolphin	NS-D	0.0799	Celtic and Greater North Seas (CGNS)	43,951	34,025
Minke whale	NS-D	0.0419	CGNS	20,118	10,288

Source: SCANS-IV densities (Gilles *et al.*, 2023), Management Unit abundances (IAMMWG, 2023), Coastal East Scotland MU abundance (Cheney *et al.*, 2024).

*SCANS III densities used for bottlenose dolphin as no density available for SCANS-IV.

4.1.1. Harbour Porpoise

The harbour porpoise is widespread around the UK, including the North Sea, Irish Sea, the seas west of Ireland and Scotland, and northwards to Orkney and Shetland. Since the 1990s it has become much less common around the Northern Isles, but it appears to be returning to the English Channel and southern North Sea, where it was infrequent in the late 1980s. The recent SCANS-IV survey results show that the harbour porpoise population in the North Sea is stable and there is very little difference in the estimated abundance from 2016 – 2022 (Gilles *et al.*, 2023).

Harbour porpoise density and abundance estimates in the vicinity of the EOWDC are provided in Table 4.1.

4.1.2. Bottlenose Dolphin

Both inshore and offshore bottlenose dolphin ecotypes are recognised in UK waters and are likely to occur in the vicinity of EOWDC. Due to the social structure and behaviour of bottlenose dolphins, which tend to occur in clusters or groups rather than singly (e.g. Cheney *et al.*, 2024), density estimates for large areas are not always representative because an even distribution is assumed. Nonetheless, bottlenose dolphin density and abundance estimates in the vicinity of the EOWDC are provided in Table 4.1 (Gilles *et al.*, 2023). The density estimate provided has been obtained from SCANS-III block R due to no density available for SCANS-IV. SCANS-III methods used for obtaining density estimates are the same as that of SCANS-IV.

4.1.3. White-Beaked Dolphin

White-beaked dolphins are detected predominantly offshore in UK waters and their highest densities have been estimated around the Shetland Islands, northern North Sea and northwest Scotland (Gilles *et al.*, 2023). The density and abundance of white-beaked dolphins in the vicinity of the EOWDC, from SCANS-IV, is provided in Table 4.1.

4.1.4. Minke Whale

Minke whales are the smallest of the baleen whales and are widespread around the UK. There is some evidence that minke whale distribution in the North Sea was shifting south between 1994 and 2005 (Hammond *et al.*, 2013). In sequential surveys the distribution seemed to stay the same until the observed distribution from the recent SCANS-IV survey showed many sightings further south in the North Sea than previously seen. There is no evidence of a change in abundance for minke whales in the North Sea from 1989-2022 (Gilles *et al.*, 2023).

Minke whale density and abundance in the vicinity of the EOWDC, from SCANS-IV, is provided in Table 4.1.

4.2. Marine Turtles

Up to five species of marine turtle (which are also EPS) have been recorded in British waters. Leatherback turtles (*Dermochelys coriacea*) are the most commonly recorded turtle species however the species is thought to be at the most extreme northern limit of its natural range in UK waters (BEIS, 2016). Sightings in the North Sea are uncommon with most UK sightings occurring in the Irish Sea (BEIS, 2016). Due to their low likelihood of occurrence, this EPS Risk Assessment does not assess potential effects on turtles. However, any mitigation proposed (see section 6) will be applied to all marine megafauna species including turtles.

4.3. Other (Non-EPS) Species

4.3.1. Seals

Two seal species occur on a relatively common basis in the North Sea: Grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) (Carter *et al.*, 2025).

Grey seals are among the rarest seals in the world; the UK population represents about 40% of the world population and 95% of the EU population. Grey seals spend most of the year at sea and may range widely in search of prey. They come ashore in autumn to form breeding colonies on rocky shores, beaches, in caves, occasionally on sandbanks, and on small largely uninhabited islands.

Compared to the rest of Scotland the density of grey seals in the vicinity of the EOWDC is average (Carter *et al.*, 2025; Figure 4.1). The closest designated seal haul out site for grey seals to the EOWDC is the Ythan River Mouth (6.2 km at its closest point).

Harbour seals have a near-circumpolar distribution, with at least four subspecies recognised. Only the eastern Atlantic subspecies occurs in Europe. The UK population represents about 5% of the world population and approximately 50% of the EU population. Harbour seals are the characteristic seal of sandflats and estuaries but are also found on rocky shores. As pups swim almost immediately after birth, seals can breed on sheltered tidal areas where banks allow access to deep water. Seals may range widely in search of prey, but individuals often return to favoured haul-out sites.

Compared to the rest of Scotland the density of harbour seals in the vicinity of the EOWDC is low (Carter *et al.*, 2025) (Figure 4.2). There are no designated seal haul out sites for harbour seals near the EOWDC.

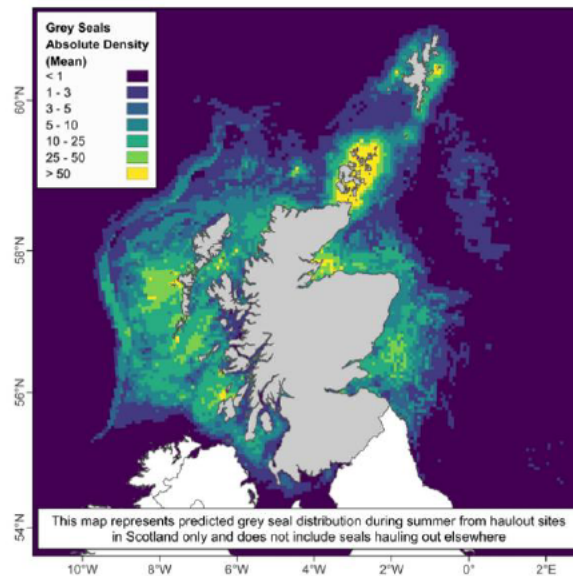


Figure 4.1 Grey seal absolute density map (image taken from Carter *et al.*, 2025)

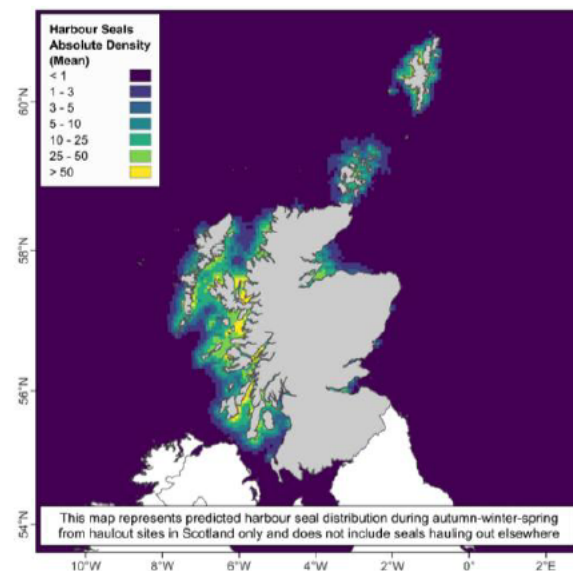


Figure 4.2 Harbour seal absolute density map (image taken from Carter *et al.*, 2025)

4.3.2. Basking Sharks

There are normally few sightings of basking sharks in the North Sea (Drewery, 2012; Wilson *et al.*, 2020) which indicates a low abundance in the vicinity of the EOWDC. Due to their habit of feeding at slow speed very close to the surface, basking sharks are potentially at risk from collision with boat traffic (Wilson *et al.*, 2020). In contrast, although there is little information on sound detection in basking sharks, there is no direct evidence of sound causing basking shark mortality or stress (Wilson *et al.*, 2020). Although the potential effects of noise on basking sharks have not therefore been assessed in the assessment, any mitigation measures proposed will also be applied to basking sharks.

4.4. Designated Sites and Protected Areas

Four marine mammal species (two of which are EPS) are listed under Annex II of the Habitats Directive (European Union Council Directive 92/43/EEC), for which Special Areas of Conservation (SACs) have been designated:

- Bottlenose dolphin;
- Harbour porpoise;
- Grey seal; and
- Harbour seal.

Although not Annex II species, minke whales, Risso's dolphin and basking sharks are protected features of some Nature Conservation Marine Protected Areas (MPAs). At present there are no protected areas for white-beaked dolphins or turtle species in Scottish inshore or offshore waters.

The closest designated sites and protected areas for each species relevant to the EOWDC is presented in Table 4.2.

Table 4.2: Closest designated sites and protected areas to the EOWDC for each relevant marine EPS, seal species and basking shark

Relevant Marine Megafauna Species*	Closest Designated Site	Closest Distance to the EOWDC (km)
Harbour porpoise	Southern North Sea SAC	257
Bottlenose dolphin	Moray Firth SAC	134
Risso's dolphin	NE Lewis MPA	350
Minke whale	Southern Trench MPA	34
Grey seal	Isle of May SAC	116
Harbour seal	Firth of Tay and Eden Estuary SAC	90
Basking shark	Sea of the Hebrides MPA	>400

*Relevant marine megafauna species include marine EPS, seals and basking sharks which are qualifying or protected features of sites.

5. EPS Risk Assessment

During the O&M geophysical surveys at the EOWDC there is potential for marine EPS, seals and basking sharks to be impacted. The main activities associated with the work which may impact these species are:

- Increased anthropogenic noise from geophysical survey and positioning equipment; and
- Collision risk (with maintenance and survey vessel(s)).

Increased anthropogenic noise from the maintenance and survey vessels themselves has been considered as a potential impact but has not been assessed individually. This is because noise from the vessel(s) is unlikely to significantly increase vessel noise in this area and any displacement due to noise from the vessels alone is likely to be small-scale and temporary. The vessels will be on survey, and therefore emitting other sounds for the majority of the time they are at sea. This potential impact (increased anthropogenic noise from geophysical survey and positioning equipment) has been assessed.

5.1. Overview of the Potential Effects of Anthropogenic Noise on Marine Mammals

It is widely documented that marine mammals are sensitive to underwater noise with the level of sensitivity depending on the hearing ability of the species (Table 5.1).

Potential effects of underwater noise on marine mammals can be summarised as:

- Auditory injury; and
- Behavioural responses.

Table 5.1: Hearing range of marine mammal groups

Functional Hearing Group	Example Species	Generalised Hearing Range (kHz)
Low frequency (LF) cetaceans	Minke whales	0.007 - 36
High frequency (HF) cetaceans	Bottlenose dolphin, white-beaked dolphin	0.15 - 160
Very high-frequency (VHF) cetaceans	Harbour porpoise	0.2 - 165
Phocid pinnipeds (PW)	Grey seal, harbour seal	0.04 - 90

Source: NMFS (2024).

5.1.1. Auditory Injury

In 2024 the US National Marine Fisheries Service (NMFS) published updated guidance identifying the received levels and auditory weighting functions, or criteria, at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute (≤ 24 hours) exposure to underwater anthropogenic sound sources. The thresholds used in this assessment (taken from NMFS, 2024) are detailed in Table 5.2 (for the onset of auditory injury¹). Sound from geophysical survey and positioning equipment is generally impulsive (whereas sound from other sources (e.g., vessels) is non-impulsive i.e., continuous). Use of NMFS (2024) is considered to constitute best

¹ Defined by NMFS (2024) as damage to the inner ear that can result in destruction of tissue. Auditory injury may or may not result in a Permanent Threshold Shift (PTS). PTS (as defined by NMFS, 2024) is a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level. Temporary Threshold Shift (TTS) has not been used to determine auditory injury because it is a temporary loss in hearing sensitivity from which animals completely recover.

practice because it supersedes earlier guidance from the NMFS and publications by Brandon Southall and colleagues on this topic.

Table 5.2: Marine mammal auditory injury onset criteria for impulsive noise

Functional Hearing Group	Impulsive peak Sound Pressure Level (SPL _{peak}) Auditory Injury Onset Criteria (dB re. 1 µPa at 1 m)
LF cetaceans	222
HF cetaceans	230
VHF cetaceans	202
PW	223

Source: NMFS (2024).

5.1.2. Behavioural Responses

Behavioural responses may arise where an activity is audible (Table 5.1) and at a level above ambient noise. However, the most likely response will be temporary, for example, there is evidence that short-term disturbance caused by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoises (Thompson *et al.*, 2013).

For harbour porpoises, it is recommended that a 5 km effective deterrence range (EDR) for geophysical survey equipment is used (JNCC, 2020, JNCC, 2025a)². Using this value the number of individuals that may potentially show a behavioural response to geophysical survey and positioning equipment can be calculated. Without suitable alternative data being available the same deterrence range has been applied to the other marine EPS assessed here. This approach is likely conservative because harbour porpoise are particularly sensitive to underwater noise (JNCC, 2020).

The JNCC Marine Noise Registry Help and Guidance (JNCC, 2025a) also recommends a daily disturbance footprint for some geophysical survey equipment (i.e. Sub-bottom Profilers (SBP) and MBES) of 256 km². Due to the nature of the proposed geophysical survey work (i.e. for WTG inspections and maintenance works, and seabed surveys in the cable corridor) it is deemed very unlikely that an area of this size will be impacted (the survey vessel will not be operating 24 hours per day). Therefore, the number of individuals that may potentially show a behavioural response to sound from geophysical surveys over a 24-hour period has not been calculated.

5.2. Increased Anthropogenic Noise from Geophysical Survey and Positioning Equipment

Use of geophysical survey and positioning equipment will increase levels of anthropogenic noise in the marine environment as it operates by producing and receiving sound and therefore has the potential to induce the onset of auditory injury or behavioural responses in marine mammals. Representative technical specifications for each equipment type are provided in Table 2.1.

5.2.1. Prediction of Potential Impact from MBES and SSS

The high frequency sounds produced by the MBES and SSS fall outside the hearing range of the marine mammals assessed (Table 2.1, Table 5.1). Therefore, there is no risk of auditory injury or behavioural responses from the use of this equipment and no mitigation is required. This is supported by the advice from the JNCC, who do not

² Updated EDRs have recently been published by the JNCC for use in English, Welsh and Northern Irish waters including a new 3 km EDR for some geophysical survey equipment (JNCC, 2025b). However, these have yet to be adopted in Scottish waters and have therefore not been used in this assessment. As the EDR applied here is larger than those in the updated guidance, this assessment is considered to be conservative.

recommend mitigation for the use of MBES in shallow waters (<200 m) (JNCC, 2017). This is because it is thought that the high frequency sounds produced by MBES attenuate more quickly than the lower frequencies used in deeper waters. This is likely to also be the case for the SSS.

5.2.2. Prediction of Potential Impact from SBI and USBL

5.2.2.1. Auditory Injury

The sounds produced by the USBL and SBI equipment fall within the hearing range of the marine mammals assessed (Table 2.1, Table 5.1). However, these sounds will not reach the SPL thresholds for any of the marine mammal hearing groups (Table 5.2), therefore, there is no risk of auditory injury onset from the use of this equipment and no mitigation is required.

5.2.2.2. Behavioural Responses

It is possible that the sounds produced by the USBL and SBI systems may be audible to marine mammals of all hearing groups and therefore their use may have the potential to result in behavioural responses. The most likely response will be temporary behavioural avoidance (there is evidence that short-term disturbance caused by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoises (Thompson *et al.*, 2013)).

Using the EDR of 5 km recommended for geophysical surveys for harbour porpoise (JNCC, 2020, JNCC, 2025a), the number of individuals for each marine EPS assessed which have the potential to be affected has been estimated (Table 5.3). The area of potential effect was estimated using the formula: $\text{area} = \pi r^2 = 78.54 \text{ km}^2$ (where $r = 5 \text{ km}$). For all marine EPS, the number of individuals and the percentage of the reference population estimated to be disturbed was calculated using the density estimates and reference population abundance estimates presented in Section 4 (Table 4.1).

There is potential for temporary behavioural avoidance by a small number of individuals as a result of the use of USBL or SBI equipment during the O&M geophysical surveys at the EOWDC. However, any response is unlikely to significantly affect the local distribution or abundance of any species in Scottish inshore waters (even when assessing against the UK portions of the MUs). It should be noted that (a) the bottlenose dolphin estimate is likely to be conservative because their distribution is not even as assumed here (see section 4.1.2) and (b) the estimates are likely to be conservative because the EDRs are designed for harbour porpoise (which are more sensitive to underwater noise than minke whales and the dolphin species).

Table 5.3: The maximum number of individuals estimated to have the potential to be disturbed by sound emitted by geophysical survey and positioning equipment during the O&M phase of the EOWDC

Marine EPS	No. Individuals Disturbed	% of MU	% UK portion of MU
Harbour porpoise	47	0.014	0.029
Bottlenose dolphin	2	0.104	0.111
White-beaked dolphin	6	0.014	0.018
Minke whale	3	0.016	0.032

Note: Density estimates and reference populations for each species are provided in section 4.

5.3. Collision Risk

Vessel strikes are a known cause of mortality in marine EPS and basking sharks (Laist *et al.*, 2001, Wilson *et al.*, 2020). Non-lethal collisions have also been documented (Laist *et al.*, 2001; Van Waerebeek *et al.*, 2007, Wilson *et al.*, 2020). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections or predation.

Smaller marine mammals (including minke whale, the dolphin species, harbour porpoise and seals) are agile and have been shown to avoid vessels e.g., Palka and Hammond (2001). Avoidance behaviour is often associated with fast, unpredictable boats such as speedboats and jet-skis (Bristow and Reeves, 2001; Gregory and Rowden, 2001; Buckstaff, 2004), while neutral or positive reactions for other species have been observed with larger, slower moving vessels such as cargo ships (Sini *et al.*, 2005). Unlike marine mammals, basking sharks have been recorded to be relatively unaware of vessels (Wilson *et al.*, 2020).

The proposed survey work will require a small number of vessels either following predetermined lines (e.g. for geophysical surveys of the cable corridor) or transiting to the WTGs before being stationary (e.g. surveying and maintaining the WTGs). There is no risk of collision when the vessels are stationary. The consistent speed and direction of travel employed by transiting and surveying vessels will mean that animals can predict the path of vessels and potentially alter their direction of travel, thus reducing the risk of collision. Additionally, the presence of the survey vessel(s) is unlikely to significantly increase the vessel traffic in the area. Therefore, the increase in potential collision risk for marine EPS and basking sharks is considered to be negligible. Nonetheless, during transits, when vessel speed may be greater, transit watches (see section 6) will be conducted.

6. Mitigation

As concluded from the EPS risk assessment (Section 5) there is no risk of auditory injury onset to marine EPS from the O&M geophysical surveys at the EOWDC. Therefore, there is no requirement for mitigation for use of any of the geophysical survey and positioning equipment proposed to be used.

6.1. Transit Watches

An observer on all survey vessels will keep watch for marine EPS, basking sharks and seals during all transits to and from the work sites. Any sightings will be communicated to the Officer on watch as soon as is practicable who will ensure that marine EPS, basking sharks and seals are avoided where safe to do so. At all times the Officer on watch will minimise high powered manoeuvres or rapid changes of course, where this does not impair safety, to avoid collisions.

The observer may be the Master of the vessel or a member of the ship's crew as appropriate. Observers and the vessel operator will be briefed on the Scottish Marine Wildlife Watching Code³ and Basking Shark Code of Conduct⁴.

³ [Scottish Marine Wildlife Watching Code | NatureScot](#)

⁴ [Download.ashx \(sharktrust.org\)](#)

7. Conclusions

7.1. Potential to Injure or Disturb Marine EPS

7.1.1. Geophysical Survey Equipment

The proposed geophysical survey work will utilise some or all of the following equipment: MBES, SBI, SSS and USBL.

MBES and SSS

The findings of the assessment for effects as a result of increased anthropogenic noise from the use of MBES and SSS geophysical survey equipment are that:

- There is no potential for auditory injury to EPS; and
- There is no potential for EPS to respond behaviourally (see section 5.2.1).

SBI and USBL

The findings of the assessment for effects as a result of increased anthropogenic noise from the use of SBI and USBL geophysical survey and positioning equipment are that:

- There is no potential for auditory injury to EPS (see section 5.2.2.1); and
- There is the potential for EPS to respond behaviourally (see section 5.2.2.2). However, any disturbance is deemed short-term, sporadic, reversible, and without any likely negative effect on the FCS of the species assessed.

In conclusion, there will be no impact to the maintenance of the populations of the species concerned at a FCS in their natural range therefore an EPS licence (to disturb) for the proposed geophysical survey work at the EOWDC can be awarded should it be required.

7.1.2. Collision Risk

The risk of collision with vessels involved in the proposed survey work is negligible for the species likely to be present in this area. Nonetheless, watches will be undertaken during transits whilst vessels will be moving more quickly (see section 6.1). Considering that the presence of several survey vessels is unlikely to significantly increase the vessel traffic in the area then it is concluded that an EPS Licence and basking shark licence will not be required for this aspect of the proposed work in all assessed jurisdictions.

7.2. Potential for Likely Significant Effects on Designated Sites and Protected Areas

The closest designated site or protected area for a marine EPS, seal species or basking shark is 34 km from the EOWDC. Given the conclusion of no risk of auditory injury onset and a potential maximum disturbance range from the proposed works of 5 km, it is concluded that there is also no potential for likely significant effects (LSE) on any marine EPS, seal or basking shark qualifying or protected feature from the proposed work.

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