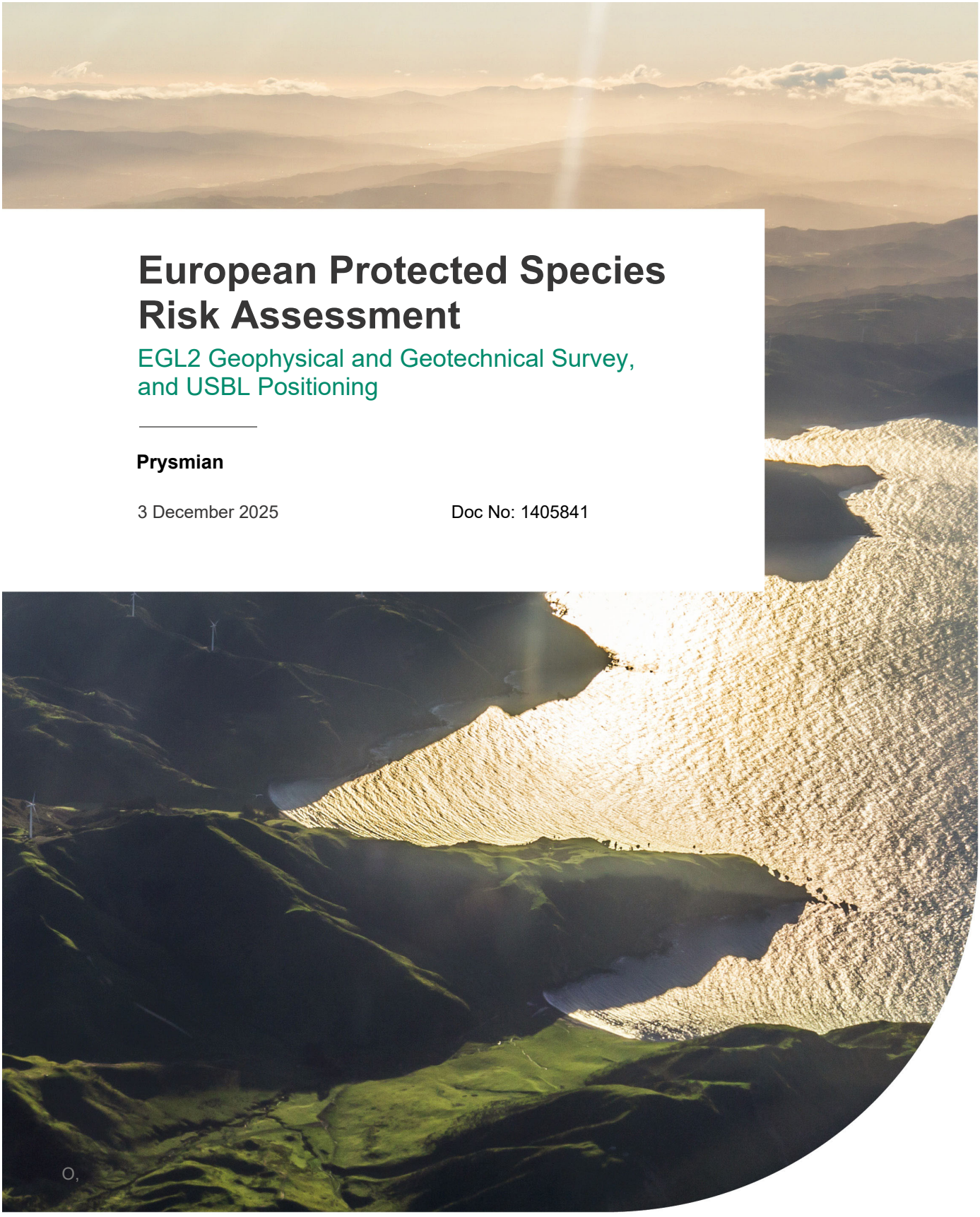

European Protected Species Risk Assessment

EGL2 Geophysical and Geotechnical Survey, and USBL Positioning

Prysmian

3 December 2025

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Contents

Acronyms and Abbreviations

Acronym	Meaning
CES	Coastal East Scotland
CGNS	Celtic and Greater North Seas
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPT	Cone Penetration Test
dB	Decibel
DVL	Doppler Velocity Log
EDR	Effective Deterrence Range
EGL2	Eastern Green Link 2
EPS	European Protected Species
FCS	Favourable Conservation Status
GB	Great Britain
GNS	Greater North Sea
GW	Gigawatt
HF	High Frequency
HRA	Habitats Regulations Assessment
HVDC	High Voltage Direct Current
IAMMWG	Inter-Agency Marine Mammal Working Group
LF	Low Frequency
LSE	Likely significant effect
km	Kilometre
kHz	Kilohertz
KV	Kilovolt
m	Metre
MAG	Magnetometer
MBES	Multi Beam Echo Sounder
MCT	Marine Conservation Team
MD-LOT	Marine Directorate – Licencing Operations Team
MHWS	Mean High Water Springs
MMO	Marine Mammal Observer
MNR	Marine Noise Registry
MU	Management Unit
NCMPA	Nature Conservation Marine Protected Area
NGET	National Grid Electricity Transmission
NM	Nautical mile
NS	North Sea
OAS	Obstacle Avoidance Sonar

Acronym	Meaning
PAM	Passive Acoustic Monitoring
PCW	Phocid Carnivores in Water
PPL	Prysmian Powerlink
PTS	Permanent Threshold Shift
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SBP	Sub-Bottom Profiler
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SSENT	Scottish and Southern Electricity Network Transmission
SSS	Side Scan Sonar
TTS	Temporary Threshold Shift
TVG	Transverse Gradiometer
UK	United Kingdom
USBL	Ultra-Short Baseline
VC	Vibrocore
VHF	Very High Frequency

1. Introduction

This document has been prepared in support of the Eastern Green Link 2 (EGL2) submarine High Voltage Direct Current (HVDC) link, henceforth referred to as the 'Marine Scheme'. EGL2 is a Joint Venture (JV) between National Grid Electricity Transmission and Scottish and Southern Electricity Networks (SSEN) Transmission, hereafter referred to collectively as 'the Licensee'. Prysmian Powerlink (PPL) is the appointed Principal Contractor for the Marine Scheme, and it is PPL who are to progress the activities which are the focus of the assessment within this document.

The Marine Scheme extends from Mean High Water Springs (MHWS) at the Scottish landfall in Sandford Bay, to MHWS at the English landfall at Fraisthorpe Sands. It is located within both Scottish and English territorial waters (within 12 nautical miles (NM) of the coast) and offshore waters (beyond 12 NM). The Marine Scheme comprises a Marine Installation Corridor of approximately 436 km length and 500 m maximum width. The Marine Installation Corridor extends from kilometre point (KP) 0 at its landfall in Scotland, to KP 436 at its landfall in England.

The Marine Scheme was awarded a Marine Licence (L/2023/00211/2) in English waters by the Marine Management Organisation, and in Scottish waters by the Marine Directorate – Licencing Operations Team (MD-LOT; MS-00011033).

1.1. Purpose of this Report

Prior to the commencement of cable installation, further geophysical and geotechnical surveys are required to confirm that no new obstructions have appeared on the seabed since the original marine surveys[1] were undertaken, and to inform detailed route engineering in relation to seabed conditions, bathymetry and other seabed features. In addition, separate to the survey activities, Ultra-Short Baseline (USBL) equipment is intended to be used for a number of activities where accurate seabed positioning is required.

This document assesses the potential risk to marine European Protected Species (EPS), basking sharks and seals from the proposed surveys and later use of USBL positioning equipment. Conclusions are drawn regarding whether EPS and basking shark licences are required and can be awarded in Scottish Territorial and offshore waters and whether a Marine Wildlife Licence is required and can be awarded in English Territorial and offshore waters.

[1] Various surveys have been undertaken already to inform the Marine Scheme, as reported within the original Marine Licence Applications, which included technical and environmental surveys in 2021. Since this point, further surveys have also been undertaken.

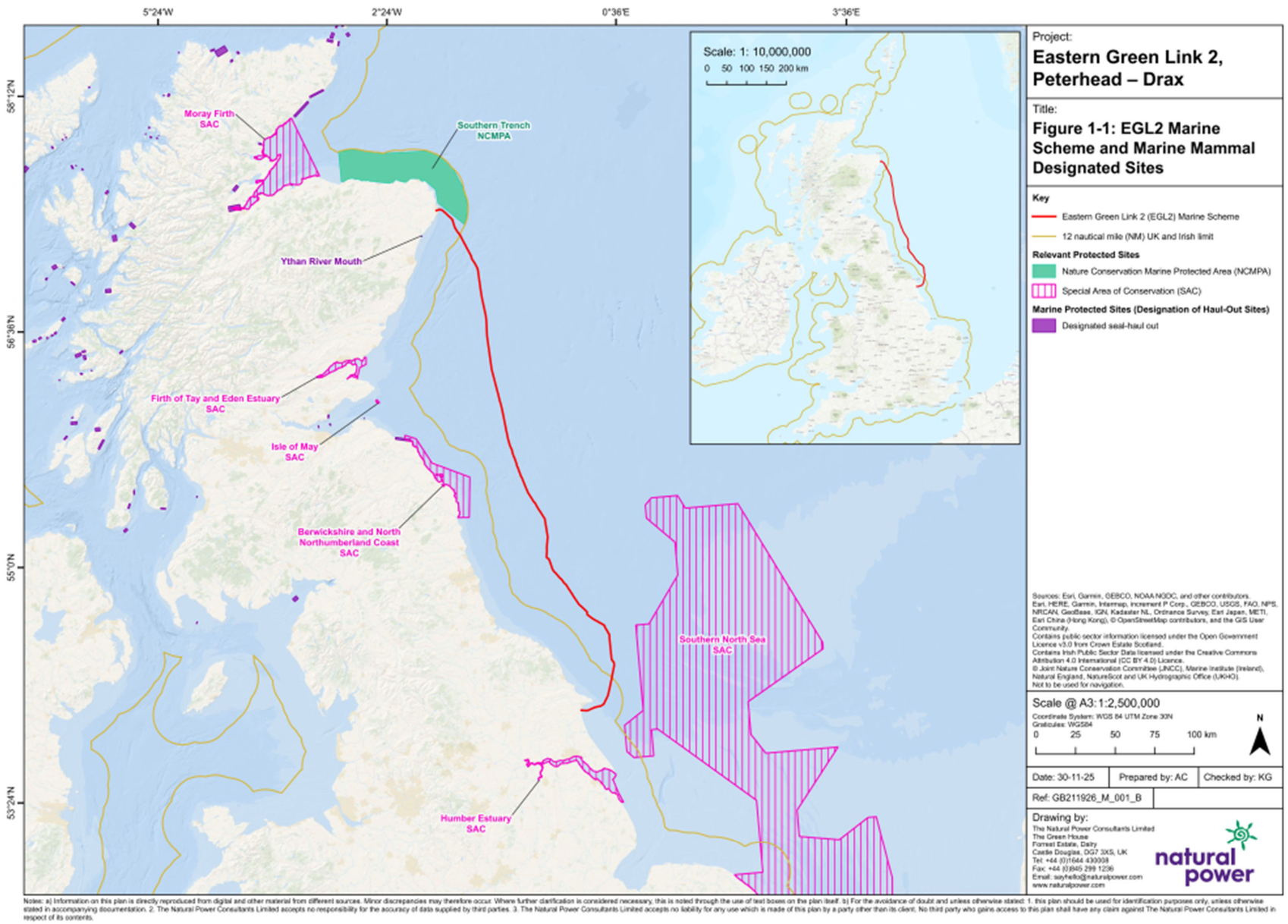

Figure 1.1 EGL2 Marine Scheme and Marine Mammal Designated Sites

2. Planned Survey Activities

2.1. Scope of Work

The planned survey activities covered in this risk assessment are:

- Geophysical surveys along the length of the Marine Scheme including close to each landfall location;
- Geotechnical surveys along the length of the Marine Scheme; and
- The likely use of USBL equipment for reasons of vessel and equipment positioning during later stages of the Marine Scheme, including the cable laying (i.e., during the construction phase).

2.2. Geophysical Surveys

Geophysical surveys will be completed along the length of the Marine Scheme including close to each landfall location. Crossing surveys will be carried out using a Remotely Operated Vehicle (ROV) that will be deployed on each crossing of a third-party asset within the Marine Scheme.

The sound-producing geophysical sensors and positioning equipment (hull or gondola mounted) that may be used are Multi Beam Echo Sounder (MBES; single or dual head), Obstacle Avoidance Sonar (OAS), Side Scan Sonar (SSS), Sub-bottom Profiler (SBP), USBL, and Doppler Velocity Log (DVL). Equipment specifications are provided in Section 2.2.1. Non sound-producing geophysical survey equipment which may be used include a magnetometer (MAG) and a pipe/cable tracker or similar.

2.2.1. Equipment Specifications

The geophysical survey will be conducted using the equipment outlined in Table 2.1. All equipment listed may not be required but has been included within this risk assessment to cover the full possible (i.e. worst case) scenario. Where exact equipment specifications are currently unknown indicative ranges are provided in *italics*.

Table 2.1 Geophysical survey and positioning equipment specifications

Equipment type	Example equipment models	Frequency range (kHz)	Max Source Pressure Level (SPL_{peak}) (dB re 1 µPa @ 1 m)
MBES	Singlehead R2Sonic 2026 Dual head R2Sonic 2024	170 – 450 380 – 420	221 221
SSS	Edgetech 4205	300 - 600	*210 – 224*
SBP	Innomar Standard SES-2000	100 (HF) 4 – 15 (LF)	>240
SSS/SBP	Edgetech 2205 combined SSS/SBP	SSS 300-600 SBP 2-16	*210 – 224*
USBL	Sonardyne MiniRanger 2 Kongsberg Hi-PAP	20 – 34 21 - 31	*194* 206*
OAS	Gemini (or Blueview)	720	n/a
DVL	Teledyne RDI Workhorse	600 or 1200	n/a

Source: NextGeo, 2025

**The Kongsberg Hi-PAP USBL can be operated at a maximum source level of 206 dB. However, it is possible to reduce the sound source for this equipment, and it will not be operated at levels capable of inducing the onset of PTS (i.e. >202 dB re 1 µPa @ 1 m).*

2.2.2. Proposed Vessels

The vessels proposed for the geophysical surveys are the Shore Ease (or similar; for shallow tidal areas), Shore Presence (or similar, for nearshore surveys) and the MG Surveyor or Ievoli Amber (or similar, for surveys along the length of the Marine Scheme). The tidal area and nearshore survey vessels will be operated 12 hours/day and return to port overnight. The other vessel(s) will work 24/7 and come into port for provisions and crew changes every 2 to 3 weeks (and to shelter from adverse weather conditions if necessary).

2.2.3. Timing and Duration

The geophysical surveys are anticipated to start at the beginning of Q2 2026. The exact survey programme is still to be confirmed and is dependent on vessel availability and suitable weather conditions. However, assuming that survey work at different locations can occur simultaneously it is anticipated that all geophysical surveys can be completed in 2-3 months including mobilisation time.

2.3. Geotechnical Survey

The geotechnical survey will consist of vibrocores (VCs) and cone penetration tests (CPTs) at set locations along the planned location route. The geotechnical locations will be selected based on the geophysical survey results and as verification and integration to any existing geotechnical information gathered from previous surveys. Only one acoustic sensor will be used, which will be a USBL for subsea positioning purposes.

2.3.1. Equipment

The main geotechnical equipment required will be a VC and a CPT. These pieces of equipment produce continuous non-impulsive broadband noise. A USBL (HiPAP 501, Sonardyne MiniRanger 2 or similar) system will be used for subsea positioning of the geotechnical systems (see Table 2.1 for equipment specifications).

2.3.2. Proposed Vessels

One vessel will be required for the geotechnical survey (i.e. ‘the NG Driller’ (or similar)). This will work in waters greater than 10 m deep and will be active 24/7.

2.3.3. Timing and Duration

The exact survey programme for the geotechnical survey is still to be confirmed and is dependent on vessel availability and suitable weather conditions. Field testing will take approximately 2 days (including USBL calibration) and survey operations approximately 48 operational days.

2.4. Use of USBL During Construction

USBL will be utilised to provide accurate positioning for a number of cable laying/post laying activities, including:

- Route preparation activities, including pre-lay submarine intervention;
- Cable laying and jointing; and
- The placement of rock and other protection on the seabed.

These activities will take place along the length of the Marine Scheme, as indicated within Figure 1.1. These activities have been assessed and are consented within the two project Marine Licences. However, the use of USBL to provide positioning support to these activities, whilst acknowledged generally within the Marine Licences and the Environmental Appraisal Report that accompanied the marine licence application, has not previously been included within a project EPS licence.

2.4.1. Equipment

Typical USBL equipment specifications will be similar to those provided in Table 2.1 and will be operated at < 202 dB re 1 µPa @ 1 m.

2.4.2. Timing and Duration

The various post-survey project activities (i.e., construction) utilising USBL will be undertaken over a duration of around three years.

3. Legal Requirement

3.1. EPS

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

The need to consider EPS within English and Scottish Territorial Waters comes from two articles of legislation, these are:

- The Conservation of Habitats and Species Regulations 2017 (as amended in England) which transpose the Habitats Directive into English law. This legislation covers English Territorial Waters; and
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) which transposes the Habitats Directive into Scottish law. This legislation covers Scottish Territorial Waters.

The need to consider EPS within offshore waters (>12 nautical miles (NM) from the coast) comes from:

- 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 (including both Scottish and English Waters) beyond the 12 NM limit.

All of these regulations (collectively known as the 'Habitats and Offshore Habitats Regulations') provide for the designation of protected European sites (e.g., Special Areas of Conservation (SACs)) and the protection of EPS as designated under the Habitats Directive.

The Offshore Habitats 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 interpretation of the Habitats Directive (Council Directive 92/43/EEC) is more conservative in Scottish Territorial Waters than in English waters (Territorial and offshore). 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 an EPS;
- 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; and
- **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 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 under both Scottish and English regulations.

In English Waters, further protection is provided to cetaceans from the section 9 of the Wildlife and Countryside Act 1981 which states that it is considered an offence to disturb or injure a cetacean. In Scotland, cetaceans are protected under Schedule 5 of this act (as amended).

Licences may be granted by the Marine Directorate (on behalf of the Scottish Ministers) or the Marine Management Organisation via their specific Marine Conservation Team (MCT) (on behalf of the Secretary of State) which would allow otherwise illegal activities to go ahead. In England, if it is considered that a Marine Wildlife Licence will not be required, a Marine Licencing Exemption Notification can be submitted to the Marine Management Organisation (i.e., with the exemption process serving as a mechanism for confirming the lack of requirement).

Three tests must be passed before a licence 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 proposed works are both within and outside the 12 NM limit of England and Scotland's Territorial Waters. Therefore, the Habitats Regulations (as amended in England and Scotland) and Offshore Regulations apply.

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 Territorial Waters. The Act introduced a licensing system for killing or taking seals, making it an offence to do so without a licence. One hundred and ninety-four seal haul-out sites in Scotland have been designated under the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 which protects seals from harassment by humans at locations where they come ashore to rest, moult, or breed.

3.3. Basking Sharks

In Scotland and England, it is considered an offence to disturb or injure a basking shark. In Scotland, basking sharks are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). In England, basking shark offences are covered under section 9 of the Wildlife and Countryside Act (1981). Basking sharks are also protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), under Council Regulation (EU) No 605/2013.

3.4. Guidance

Guidance entitled 'The protection of marine European Protected Species from injury and disturbance: Guidance for the marine area in England and Wales and the UK offshore marine area' was published in 2010 by the Joint Nature

Conservation Committee (JNCC), Natural England and the Countryside Council for Wales (now Natural Resources Wales) (JNCC *et al*., 2010). This document has been used as a resource when a view is needed as to whether there is potential for an offence of deliberately disturbing or injuring/killing a marine EPS to occur within English Territorial and UK offshore waters, as a result of any activity associated with the proposed works.

The guidance considers certain activities that produce loud noises in areas where an EPS could be present to have the potential to result in an injury or disturbance offence, unless appropriate mitigation measures are implemented. The risk of an offence being committed is dependent on a number of factors, including the following:

- Presence/absence of EPS;
- Noise associated with the activity and resulting impacts on EPS species;
- Frequency of occurrence of EPS;
- Density of EPS; and
- Length of exposure of EPS to noise associated with proposed activities.

The JNCC *et al*. (2010) guidance also considers that the potential for disturbance from some activities can be considered "trivial". Activities which might be considered trivial include those that lead to "sporadic disturbances without any likely negative impact on the species".

For an activity to be considered "non-trivial", the JNCC guidance (JNCC *et al*., 2010) states that "the disturbance to marine EPS would need to be likely to at least increase the risk of a certain negative impact on the species' FCS".

In Scotland the Marine Directorate and Scottish Natural Heritage (SNH) (now NatureScot) produced guidance for Scottish inshore waters '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). The Marine Directorate recognise that the guidance '…reflects a precautionary approach…' to the interpretation of the Habitats Directive with regards to EPS 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. Marine EPS and other Megafauna in the Region of the Marine Scheme

4.1. Cetaceans

Four cetacean species are considered to occur on a relatively common basis in the vicinity the Marine Scheme: Harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), white-beaked dolphin (*Lagenorhynchus albirostris*) and minke whale (*Balaenoptera acutorostrata*) (Arso Civil *et al.,* 2021, Gilles *et al.,* 2023, IAMMWG, 2023).

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[2].

The Marine Scheme falls within Block NS-C and NS-D of the SCANS-IV survey (Gilles *et al*., 2023). Abundances and densities of the species commonly seen in the area are shown in Table 4.1. Densities from both Blocks have been illustrated to provide a comprehensive view of cetacean presence in the area. The assessment (see section 5) uses the greatest of the estimates. The whole and UK portion of Inter-Agency Marine Mammal Working Group (IAMMWG) marine mammal management unit (MU) abundances for each species are also presented in Table 4.1 (IAMMWG, 2023).

This quantitative risk assessment considers the cetacean species commonly found in the vicinity of the Marine Scheme. Whilst not considered specifically in this assessment due to their low likelihood of occurrence, any assessment of, or mitigation measures put in place for, the species assessed are considered to be appropriate to / relevant for other less commonly occurring species of cetacean.

Table 4.1: Density and abundance estimates for species which occur on a relatively common basis in the vicinity of the Marine Scheme

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-C NS-D	0.6027 0.5985	North Sea (NS)	346, 601	159,632
Bottlenose dolphin	NS-C R*	0.0419 0.0298	Greater North Sea (GNS) and Coastal East Scotland (CES)	2,248	2,111
White-beaked dolphin	NS-C NS-D	0.0149 0.0799	Celtic and Greater North Seas (CGNS)	43,951	34,025
Minke whale	NS-C NS-D	0.0068 0.0419	CGNS	20,118	10,288

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

**SCANS III Block R density used for bottlenose dolphin as no density available for SCANS-IV Block NS-D (Hammond et al., 2017).*

[2] https://www.seawatchfoundation.org.uk/recentsightings/

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, the latest in a series of large-scale surveys for cetaceans in European Atlantic waters, 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 in the vicinity of the Marine Scheme, from SCANS-IV, is provided in Table 4.1**.** The IAMMWG abundance for harbour porpoise from the North Sea (NS) MU is also provided.

The closest Special Area of Conservation (SAC) designated for harbour porpoise is the Southern North Sea SAC, located approximately 18.8 km from the Marine Scheme at its closest point (Figure 1.1). The Effective Deterrence Range (EDR) for surveys of this type (i.e. SBP and USBL use) is 3 km (JNCC, 2025). There is no overlap with the Southern North Sea SAC, therefore there is no potential for significant disturbance or Likely Significant Effects (LSE).

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 the Marine Scheme. Due to the social structure and behaviour of bottlenose dolphins, which tend to occur in clusters or groups rather than singly, density estimates for large areas are not always representative because an even distribution is assumed. Nonetheless, the density of bottlenose dolphins in the vicinity of the Marine Scheme is provided in Table 4.1 (Gilles *et al*., 2023). There is no bottlenose dolphin density presented in SCANS-IV for block NS-D so alternatively the density estimate provided has been obtained from SCANS-III block R (Hammond *et al.,* 2017).

Bottlenose dolphin abundance estimates are provided for the summation of both the Greater North Sea (GNS; IAMMWG, 2023) and Coastal East Scotland (CES; Cheney *et al.,* 2024) MUs for bottlenose dolphin in Table 4.1.

The closest designated site for bottlenose dolphins (Moray Firth SAC) is approximately 105 km from the Marine Scheme via the shortest at sea route (Figure 1.1), however, individuals which utilise this SAC are known to regularly travel along the coasts of east Scotland and northern England meaning there is potential connectivity with the Marine Scheme (Cheney *et al.,* 2024). Due to the social structure and behaviour of bottlenose dolphins, the likelihood of individuals being present at the same time as the survey vessels is small, therefore there is no potential for significant disturbance or LSE.

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 of white-beaked dolphins in the vicinity of the Marine Scheme, from SCANS-IV, is provided in Table 4.1. The IAMMWG abundance for white-beaked dolphin from the CGNS MU is also provided.

There are no designated sites (SACs) for white-beaked dolphins (the species is not listed on Annex II of the Habitats Directive).

4.1.4. Minke Whale

Minke whales are the smallest of the baleen whales and are widespread around the UK. There was 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 in the vicinity of the Marine Scheme, from SCANS-IV, is provided in Table 4.1. The IAMMWG abundance for minke whales from the CGNS MU is also provided.

There are no designated sites (SACs) for minke whales (the species is not listed on Annex II of the Habitats Directive).

The closest protected area for minke whale (Southern Trench Nature Conservation Marine Protected Area (NCMPA)) is approximately 2.2 km from the Marine Scheme at its closest point (Figure 1.1). Applying the 3 km EDR for geophysical survey equipment (JNCC, 2025), minke whales may be disturbed from a maximum of 0.3% of the NCMPA (6.8 km^2) in a day. Any such disturbance will be short-term and reversible. This estimate is likely to be conservative because the EDRs are designed for harbour porpoise (which are more sensitive to underwater noise than minke whale). A project is considered to result in significant disturbance if it excludes individuals from more than 20% of a site in any given day (JNCC, 2025); disturbance of this magnitude (1.8%) is therefore considered to be not significant (i.e. no potential to adversely effect, other than insignificantly, the conservation objectives of the site).

4.2. 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.,* 2022).

The closest designated seal haul out site is the Ythan River Mouth which is approximately 25.7 km from the Marine Scheme at its closest point (no potential for disturbance; Figure 1.1).

This EPS Risk Assessment does not assess potential effects on seals because they are not EPS (and therefore information on seals is not required as part of the licence application forms). However, any mitigation proposed (see section 6) will also be applied to seals.

4.2.1. Grey Seals

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.

The greatest densities of grey seals in relation to the Marine Scheme are found in the Berwickshire and North Northumberland Coast SAC (designated for this species) which is approximately 36.8 km from the Marine Scheme at its closest point (Figure 1.1). The Humber Estuary SAC and Isle of May SAC (both also designated for grey seals) are approximately 52.4 km and 88.7 km from the proposed Marine Scheme at their closest points (Figure 1.1). The EDR for surveys of this type (i.e. SBP and USBL use) is 3 km (JNCC, 2025). There is no overlap with the any of these SACs, therefore there is no potential for significant disturbance or LSE.

4.2.2. Harbour Seals

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.

Harbour seals are not common in the vicinity of the Marine Scheme. The closest SAC for harbour seal (Firth of Tay and Eden Estuary SAC) is approximately 93.9 km from the Marine Scheme at its closest point (Figure 1.1). The EDR for surveys of this type (i.e. SBP and USBL use) is 3 km (JNCC, 2025). There is no overlap with the Firth of Tay and Eden Estuary SAC, therefore there is no potential for significant disturbance or LSE.

4.3. Other Marine Megafauna

4.3.1. Basking Shark

There are normally few sightings of this species in the North Sea (Drewery, 2012; Wilson *et al.,* 2020) which indicates a low abundance in the vicinity of the Marine Scheme. 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), and this impact has been assessed for basking sharks. 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). Therefore, the potential effects of increased anthropogenic noise from the proposed works has been screened out for basking sharks and have not been assessed in the relevant EPS risk assessments (although any mitigation measures proposed (see Section 6) will also be applied to basking sharks).

4.3.2. 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.

5. Risk Assessment

During the proposed geophysical and geotechnical surveys there is potential for marine EPS, seals and basking sharks to be impacted. The following impacts associated with the work may affect marine EPS and seals:

- Increased anthropogenic noise from geophysical survey and positioning equipment; and

The following impact associated with the work may impact marine EPS, seals and basking sharks:

- Collision risk (with the survey vessel(s)).

Increased anthropogenic noise from geotechnical survey equipment (VCs and CPTs) has been considered as a potential impact but not assessed individually. This is because the continuous non-impulsive broadband sounds produced by the geotechnical survey equipment will not result in injury or disturbance to EPS. Nedwell and Brooker (2008) assessed the likelihood of injury to, and avoidance by, marine mammals to pin pile drilling noise (which produces non-impulsive broadband sounds comparable to VC and CPTs) in Strangford Lough. They found that (1) the noise levels generated were very much lower than those that may induce the onset of auditory injury and (2) the ranges for 'significant avoidance in the majority of individuals' and 'low likelihood of disturbance' were 1.5 m and 85 m respectively. Therefore, marine mammals are considered to be unlikely to be disturbed by noise from drilling or, as in this case, VC and CPT geotechnical survey work, unless they are in the very close vicinity of the work, i.e. a small number of metres. Presence in the very close vicinity of the work is unlikely due to the small-scale temporary displacement which will occur as a result of the use of USBL systems (assessed in section 5.2.2.2)

Increased anthropogenic noise from the survey vessels themselves has also been considered as a potential impact but has not been assessed individually. This is because noise from project vessel(s) is unlikely to significantly increase vessel noise in this area and any displacement due to noise from the survey vessels alone is likely to be small-scale and temporary due to the transient nature of the activities. 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 and geotechnical 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 Marine mammal hearing ranges

Functional hearing group	Example species	Estimated auditory bandwidth (kHz)
Low frequency (LF) cetaceans	Minke whales	0.007 - 35
High frequency (HF) cetaceans	Bottlenose dolphin, Risso's dolphin, white-beaked dolphin, Atlantic white-sided dolphin and common dolphin	0.15 - 160
Very High frequency (VHF) cetaceans	Harbour porpoise	0.275 - 160

Functional hearing group	Example species	Estimated auditory bandwidth (kHz)
Phocid carnivores in water (PCW)	Harbour seal, grey seal	0.05 - 86

Source: Southall et al. (2019)

5.1.1. Auditory Injury (PTS)

Southall *et al.* (2019)[3] provide thresholds for received sound levels that have the potential to induce the onset of auditory injury (Permanent Threshold Shift (PTS)[4]) in marine mammals (Table 5.2Error! Reference source not found.). Sound from geophysical survey and positioning equipment is generally impulsive. It is worth noting that the criteria refer only to the 'onset' of injury risk rather than a confident assessment of an occurrence of the effect.

JNCC *et al*. (2010) proposes that a permanent shift in the hearing thresholds (PTS) of an EPS would constitute an injury offence. The Southall *et al*. criteria for injury are based on quantitative sound level and exposure thresholds over which PTS onset could occur (Table 5.2Error! Reference source not found.). If it is likely that an EPS could become exposed to sound at or above the levels proposed, then there is a risk that an injury offence could occur.

Table 5.2 Auditory injury (PTS) thresholds for impulsive noise

Functional Hearing Group	Peak Sound Pressure Level (SPLpeak) (dB re 1 µPa)	Sound Exposure Level (SEL) (dB re 1 μPa^2s)
LF cetaceans	219	183
HF cetaceans	230	185
VHF cetaceans	202	155
PCW	218	185

Source: Southall et al. (2019)

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, updated JNCC guidance for English, Welsh and Northern Irish waters recommends that a 3 km EDR is used for geophysical survey and positioning equipment (i.e. SBPs and USBL systems; JNCC, 2025). No equivalent document is available in Scotland so this EDR has also been applied for these activities in Scottish waters. Using this value the number of individuals that may potentially show a behavioural response to sound from geophysical survey and positioning equipment can be calculated. Without suitable alternative data being available the same deterrence range has been applied to the other species assessed here. This assumption is highly conservative.

[3] Although not used in the assessment, the updated marine mammal hearing and auditory injury thresholds provided in the 2024 'Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing' by National Marine Fisheries Service have been considered and deemed to not impact the results of the EPS risk assessment conclusions.

[4] 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.

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 disturb marine mammals.

5.2.1. Prediction of Potential Impacts from DVL, MBES, OAS and SSS

The high frequency sounds produced by the DVL, MBES, OAS and SSS fall outside the hearing range of the marine mammals assessed (see section 2, Table 5.1). Therefore, there is no risk of auditory injury or behavioural responses from the use of this equipment and no mitigation or EPS / Marine Wildlife licence is required.

5.2.2. Prediction of Potential Impacts of SBP and USBL

5.2.2.1. Auditory Injury

USBL

The sounds produced by the USBL equipment do fall within the hearing range of the marine mammals assessed (see section 2, Table 5.1). If operated at its highest source level (206 dB re 1 µPa @ 1 m) the Kongsberg Hi-PAP USBL has the potential to induce the onset of auditory injury (PTS) at very close-range (Southall *et al*., 2019; Table 5.2**Error! Reference source not found.**). However, it is possible to reduce the sound source for this equipment, and it will not be operated at levels capable of inducing the onset of PTS (i.e. >202 dB re 1 µPa @ 1 m) and therefore, there is no risk of auditory injury onset from the use of this equipment, and no mitigation is required.

SBP

The sounds produced by the SBPs proposed to be used in the geophysical surveys do fall within the hearing range of the marine mammals assessed (see section 2, Table 5.1). The estimated maximum source level of the Innomar Standard SES-2000 and Edgetech 2205 series SBP (maximum SPL_{peak} >240 dB re. 1 µPa) has the potential to induce the onset of auditory injury (PTS) at very close-range (Southall *et al*.). However, it is likely that the presence of the survey vessels will lead to small-scale temporary displacement of marine mammals, resulting in them being at sufficient distance from the survey equipment so as not to be susceptible to auditory injury. Nonetheless, to remove the risk of auditory injury from the use of the SBP systems mitigation will be required (see section 6).

5.2.2.2. Behavioural Responses

It is possible that the sounds produced by the USBL and SBP systems may be detected by marine mammals of all hearing groups and therefore their use may have the potential to cause disturbance. 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 3 km EDR recommended for SBP and USBL systems for harbour porpoise (JNCC, 2025), the number of individuals for each marine mammal species assessed which has the potential to be affected from the use of this equipment has been estimated (Table 5.3). The area of potential effect was estimated using the formula: area = πr^2 = 28.27 km^2 (where r = 3 km). For all cetaceans, the number of individuals and the percentage of the MU reference population estimated to be disturbed was calculated using the density estimates and reference population abundance estimates presented in Section 4 (Table 4.1). Where more than one density estimate has been provided (e.g., for the two different SCANS survey blocks that intersect with the Marine Scheme), the largest density was used.

There is potential for temporary behavioural disturbance as a result of the use of USBL or SBP during the geophysical (and geotechnical) surveys, and the later sundry use on the project of USBL for the positioning of operations. However, any response is unlikely to significantly affect the local distribution or abundance of any species in English or Scottish waters (the largest percentage of a reference population which has the potential to be affected in a day is 0.056 % for the UK portion of the bottlenose dolphin MU, which is deemed negligible). For bottlenose dolphins this is likely to be a conservative estimate because of their uneven distribution (see section 4.1.2) and that the EDRs are designed for harbour porpoise (which are more sensitive to underwater noise; this is also a conservatism to consider for white-beaked dolphins and minke whales).

Table 5.3 The maximum number of individuals estimated to have the potential to be disturbed at a single point in time by geophysical survey and positioning equipment using the 3 km EDR (28.27 km^2 area)

Species	Number of individuals	% of MU	% of UK portion of MU
Harbour porpoise	17	0.005 %	0.011 %
Bottlenose dolphin	1	0.053 %	0.056 %
White-beaked dolphin	2	0.005 %	0.007 %
Minke whale	1	0.006 %	0.012 %

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). Non-lethal collisions have also been documented (Laist *et al*., 2001; Van Waerebeek *et al*., 2007). 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.

Avoidance behaviour by marine mammals (e.g., bottlenose dolphins), 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).

The proposed survey work will require a total of three vessels following predetermined lines for geophysical surveys and one vessel which will either be stationary (when sampling) or transiting (between sampling locations) for the geotechnical surveys. 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 vessels is unlikely to significantly increase the vessel traffic in the area (they are unlikely to be on survey at the same time). Therefore, the increase in potential collision risk for marine mammals, turtles and basking sharks is considered to be negligible. Nonetheless, during transits, when vessel speed may be greater, transit watches (see section 6.2) will be conducted.

6. Mitigation Measures

Mitigation measures will be required for the use of an SBP, during the geophysical surveys, to reduce the risk of auditory injury to marine EPS, and to reduce the chance of vessel collisions with marine EPS and basking sharks.

Mitigation measures will adhere to the following guidance:

- The JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017); and
- The JNCC guidance for the use of Passive Acoustic Monitoring in UK waters for minimising the risk of injury to marine mammals from offshore activities (JNCC, 2023).

The Scottish Marine Wildlife Watching Code[5] and Basking Shark Code of Conduct[6] will be adhered to during transits (see Section 6.2). Toolbox talks will be given during mobilisation.

6.1. Use of SBP

6.1.1. Pre-Work Search

In order to minimise the risk of inducing the onset of auditory injury in any individuals, a 30-minute pre-work search (for marine megafauna) within a 500 m radius mitigation zone around the survey vessel will be undertaken prior to initiation of the SBP and commencement of the survey work. The pre-work search will be undertaken by at least one dedicated Marine Mammal Observer (MMO)[7] / Passive Acoustic Monitoring (PAM) operator[8] using either visual or passive acoustic methods, depending on conditions (visibility and sea state). If any marine megafauna are detected within the mitigation zone during the pre-work search there will be a minimum 20-minute delay in starting the equipment from the time of the last detection within the mitigation zone. If individuals are detected once the equipment is on and the survey is underway there is no requirement to stop. The MMO / PAM operator must monitor the mitigation zone for the full duration of the pre-work search and the soft start procedure (if undertaken). Once data acquisition begins, monitoring can cease.

6.1.1.1. Visual

The MMO will search from a suitable position which allows for a clear view of the horizon and the mitigation zone. The MMO will be equipped with binoculars and a tool to estimate distance i.e., a range finding stick or reticule binoculars.

6.1.1.2. PAM

PAM will be utilised in the following circumstances:

- JNCC sea state ‘category c’ (choppy with many white caps) or Beaufort sea state 4 or above;

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5 Scottish Marine Wildlife Watching Code | NatureScot

6 Download.ashx (sharktrust.org)

7 MMOs will be trained (i.e., JNCC MMO certified) and experienced (i.e., experienced MMOs will have at least 20 weeks of experience within UK waters over the past 10 years (and be familiar with the identification of the marine mammal species likely to be encountered in the area) and practical experience of implementing the JNCC guidelines. Newly qualified MMOs will not work in isolation for their first few jobs).

8 PAM operators will be suitably trained and have an appropriate level of experience of conducting PAM for mitigation (i.e., experienced PAM operators will have at least 20 weeks of experience and newly qualified PAM operators should not work in isolation for their first five PAM jobs (JNCC, 2023)).

- Visibility drops to a degree that the mitigation zone cannot be clearly seen in its entirety; or
- Light levels drop to a point where the whole of the mitigation search zone is not clearly visible without the aid of artificial light (i.e. for nighttime working if 24 hr operations are undertaken).

Either a towed PAM system (with multiple hydrophones to allow distance determination to adequately monitor the 500 m mitigation zone) or a dipping hydrophone (any detections will be assumed to have occurred within the mitigation zone) will be used. The 2023 JNCC guidance for the deployment of towed PAM systems will be followed at all times.

6.1.2. Soft Start

A soft start is the gradual ramping of power over a set period and should be utilised on all sound generating survey and positioning equipment which might have the potential to induce the onset of auditory injury to marine mammals, where equipment allows. This build-up of power should occur in uniform stages to provide a constant increase in output over a minimum period of 15 minutes in line with equipment specifications. The maximum soft start duration will be 25 minutes (JNCC, 2017). The survey equipment will start as soon as practically possible following completion of the soft start.

6.1.3. Line Turns

Geophysical survey data is usually collected on predetermined survey lines, with a line change or line turn required when the survey vessel reaches the end of a line.

Due to the nature of the proposed surveys it is expected that any required line turns will be undertaken in less than 40 minutes. If this is the case, at the end of a line the survey equipment power will be reduced, if possible. If it is not possible to reduce the power then it may remain on.

During the final 10 minutes of the line change the survey equipment power will be increased (if previously reduced), until operational power is reached (i.e. a form of mini soft start). Once full power is reached the survey line should be started as soon as possible. If line turns can be completed in < 10 minutes then a tailored ramp up in power or shot point interval can be undertaken during this period.

In cases where line turns are expected to take longer than 40 minutes, the SBP will be shut down at the end of the pre-turn survey line and a pre-work search (and soft start) will be undertaken prior to the start of the next line. To avoid any unnecessary delays the 30-minute pre-work search by the MMO or PAM operator may occur during the line turn as long as it continues until the equipment is turned back on to begin the soft start.

6.1.4. Breaks in Operation

6.1.4.3. Unplanned Breaks

For any unplanned breaks in operation the MMO / PAM operator will begin monitoring the mitigation zone as quickly as possible after the break has occurred.

Breaks of less than 10 minutes

If the survey equipment can be restarted and data acquisition resumed in less than 10 minutes, the equipment can be restarted at the same power level as prior to the break (or lower). There is no requirement for a full pre-work search or soft start provided no marine megafauna have been detected during the breakdown period.

Breaks of greater than 10 minutes

If the survey equipment cannot be restarted (and data acquisition resumed) within 10 minutes, a full pre-work search and soft start will be carried out. Any time the MMO / PAM operator has been monitoring the mitigation zone during the breakdown period can contribute to the 30-minute pre-work search.

6.1.4.4. **Planned Breaks**

Currently no additional planned breaks in data acquisition are required other than during line changes.

If planned breaks are required, the same procedure applies as for unplanned breaks. However, if the planned break will be for less than 10 minutes, the MMO / PAM operator must begin monitoring 20 minutes prior to the planned break and continue for the duration of the break.

6.1.5. **Reporting**

Post-survey reports will be provided by the MMO and PAM operator following the JNCC guidelines for reporting for geophysical surveys (JNCC, 2017; JNCC, 2023).

The Marine Noise Registry (MNR) will be completed for SBP operations.

6.2. **Transit Watches**

An observer on the bridge of 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, a member of the bridge crew, another member of the ship's crew or an MMO as appropriate. Observers and the vessel operator will be briefed on the Scottish Marine Wildlife Watching Code and Basking Shark Code of Conduct during mobilisation.

7. Conclusions

7.1. Potential to Injure or Disturb Marine EPS

7.1.1. Geophysical Survey Equipment

DVL, MBES, OAS and SSS

The conclusions of the assessment for effects as a result of increased anthropogenic noise from the use of DVL, MBES, OAS 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).

USBL and SBP

The conclusions of the assessment for effects as a result of increased anthropogenic noise from the use of USBL, and SBP geophysical survey and positioning equipment is that:

- There is no potential for auditory injury to EPS from the use of a USBL system (see section 5.2.2.1);
- With mitigation (see section 6.1), there is no potential for auditory injury to EPS from the use of the SBP (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.

Considering these conclusions:

- In Scottish Territorial Waters (i.e. within 12 NM) an EPS licence (to disturb) will be required and can be granted for the geophysical surveys, and use of USBL on the project for positioning purposes. The number of individuals which may be disturbed is presented in Table 5.3.
- In English Territorial Waters, and both Scottish and English offshore waters, an EPS Licence and Marine Wildlife Licence (to disturb) will not be required for the geophysical surveys (or subsequent USBL use). Therefore, for England, a Marine Licencing Exemption Notification can be submitted to the Marine Management Organisation.

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 6.2). 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, Marine Wildlife Licence and basking shark licence will not be required for this aspect of the proposed work in all assessed jurisdictions.

7.2. Potential for LSE on Designated Sites and Protected Areas

There is no potential for LSE on marine mammal SACs and no potential to adversely effect, other than insignificantly, the conservation objectives of the Southern Trench NCMPA (see Section 4).

Additional sites were assessed in the project Habitats Regulations Assessment (HRA; EGL2, 2022a), which concluded no adverse effect on site integrity, and in the MPA and Marine Conservation Zone (MCZ) assessment (EGL2, 2022b), which concluded no significant risk to any of the identified designated features or conservation objectives of the sites as a result of the Marine Scheme. The effects of the proposed surveys are less than those resulting from the project as a whole.

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