Highland Wind Limited

# Pentland Floating Offshore Wind Farm

## EPS Risk Assessment for Marine Surveys and Drilled Micro-Pile Anchor Trials

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# ACRONYMS

| ACRONYM | DEFINITION |
|---|---|
| 3D | Three-Dimensional |
| AA | Appropriate Assessment |
| AZ | Acoustic Zoom |
| BCC | Basking Shark Code of Conduct |
| CIP | Copenhagen Infrastructure Partners |
| dBht | Decibel Hearing Threshold |
| DD | Decimal Degrees |
| DDM | Degrees and Decimal Minutes |
| DMS | Degrees, Minutes and Seconds |
| EPS | European Protected Species |
| EU | European Union |
| FCS | Favourable Conservation Status |
| HF | High Frequency |
| HRA | Habitats Regulations Appraisal |
| HWL | Highland Wind Limited |
| IAMMWG | Inter-Agency Marine Mammal Working Group |
| IROPI | Imperative Reason of Overriding Public Interest |
| JNCC | Joint Nature Conservation Committee |
| LF | Low Frequency |
| LSE | Likely Significant Effects |
| MBES | Multi Beam Echosounder |
| MD-LOT | Marine Directorate – Licensing Operations Team |
| MHWS | Mean High Water Springs |
| MMO | Marine Mammal Observer |
| MU | Management Unit |
| NCMPA | Nature Conservation Marine Protected Area |
| NM | Nautical Mile |
| NMFS | National Marine Fisheries Service |
| NMPI | National Marine Plan Interactive |
| PAM | Passive Acoustic Monitoring |
| PFOWF | Pentland Floating Offshore Wind Farm |

| ACRONYM | DEFINITION |
|---|---|
| PTS | Permanent Threshold Shift |
| PW | Phocid carnivores in Water |
| ROTV | Remotely Operated Vehicle |
| ROV | Remotely Operated Towed Vehicle |
| SAC | Special Areas of Conservation |
| SBP | Sub-bottom Profiler |
| SCANS | Small Cetaceans in European Atlantic Waters and the North Sea |
| SEL | Sound Exposure Level |
| SMWWC | Scottish Marine Wildlife Watching Code |
| SNH | Scottish Natural Heritage |
| SPA | Special Protection Area |
| SPI | Source Point Interval |
| SPL | Sound Pressure Level |
| SSS | Side Scan Sonar |
| UHRS | Ultra High Resolution Seismic |
| UK | United Kingdom |
| USBL | Ultra-Short Baseline |
| VHF | Very High Frequency |
| WDC | Whale and Dolphin Conservation |
| WGS84 | World Geodetic System 1984 |
| WTG | Wind Turbine Generator |

# 1 INTRODUCTION

## 1.1 Project Overview

Highland Wind Limited (HWL) is planning to undertake a number of survey campaigns and a micro-pile drilled anchor trial in 2026, to inform the detailed engineering and design of the consented Pentland Floating Offshore Wind Farm (PFOWF).

The campaigns comprise:

- Geophysical Surveys:
  - Campaign 1a: Geophysical surveys of the PFOWF Array Area (Figure 1-1), to gather additional seabed condition information to enable detailed design for construction of the PFOWF; and
  - Campaign 1b: Acoustic Zoom (AZ) survey of the PFOWF Array Area, consisting of a metal frame deployed on the seabed with up to eight hydrophones connected. The system aims to produce a repeatable, focused impulse for better bottom imaging and seabed stratification information.
- Site Trials:
  - Campaign 2: Micro-pile drilled anchor trials within the PFOWF Array Area (subject to a separate Marine Licence, currently aiming for application submission in Q1 2026). This campaign seeks to demonstrate whether this anchor solution can be utilised for PFOWF Wind Turbine Generator (WTG) installation.

These campaigns are required to further investigate and expand the understanding of the seabed conditions within the PFOWF Array Area, ahead of construction of the PFOWF.

Overall, the proposed survey campaigns and micro-pile anchor trials seek to:

- Better understand the condition and profile of the seabed to inform decision on Project design (e.g., anchor selection and installation techniques); and
- Inform requirements for future survey works if required, including the nature and extent of future surveys.

### 1.1.1 Survey Area

HWL are proposing to undertake the three campaigns across the PFOWF Array Area. The PFOWF Array Area is situated within the Pentland Firth, on the north coast of Scotland, located ~8 km off the Dounreay coast in Caithness. The Survey Area includes a 2 km buffer surrounding the PFOWF Array Area, which is required for vessel manoeuvrability and line turns. The water depths in the Survey Area are between 64 to 117 m.

The Survey Area is wholly located within Scottish Territorial waters (within 12 Nautical Miles (NM) of Mean High Water Springs (MHWS)), as shown in Figure 1-1. The total Survey Area is 48.22 km$^2$.

The coordinates for the Survey Area are provided in Appendix A.

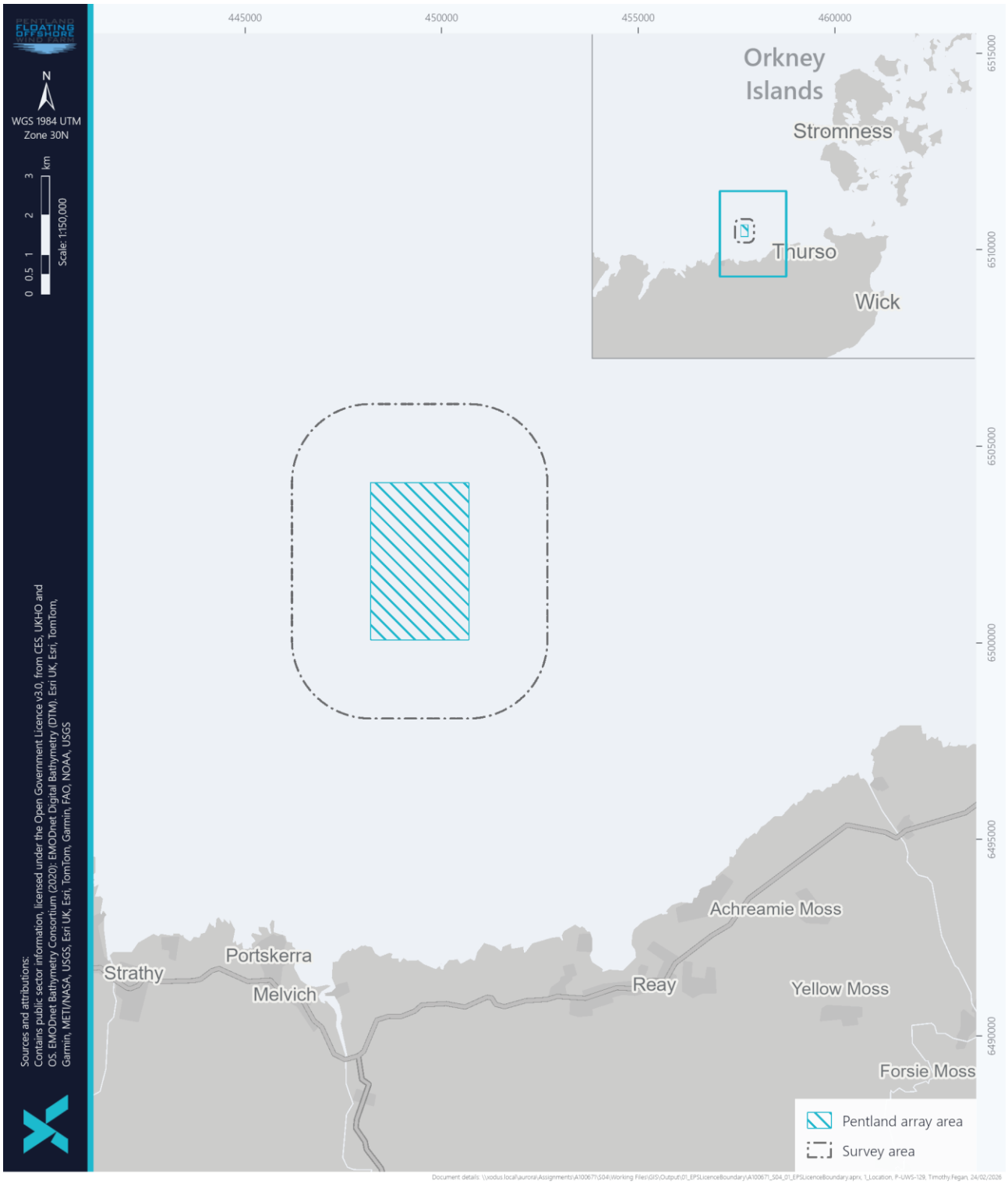


*Figure 1-1 Survey Area*

## 1.2 Report Purpose

Ahead of the commencement of any survey and anchor trial activities, all relevant consents and licences need to be in place. This document has been prepared to provide the necessary information to support the following:

- An assessment of potential impacts on cetaceans and otters, and determination of the need for a European Protected Species (EPS) Licence under the Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland) (the Habitats Regulations). Where an EPS licence is required, this document also provides the EPS risk assessment to support the application;
- An assessment of potential impacts on basking sharks, and determination of whether a derogation licence will be required under the Wildlife and Countryside Act 1981 (as amended);
- An assessment of the potential for Likely Significant Effects (LSE) on designated sites as required by the Habitats Regulations;
- An assessment of whether the proposed activities are capable of affecting (other than insignificantly) Nature Conservation Marine Protected Areas (NCMPAs), as required under the Marine (Scotland) Act 2010; and
- An assessment of the potential to harass (intentionally or recklessly) any seals at designated seal haul-outs, as defined by section 117 of the Marine (Scotland) Act 2010 and the Protection of Seals (Designation of Haul Out Sites) (Scotland) Amendment Order 2017.

## 1.3 Protected Species Overview

### 1.3.1 European Protected Species

All cetacean species (i.e., whales, dolphins and porpoises) that occur within United Kingdom (UK) waters and the Eurasian otter (*Lutra lutra*) are listed in Annex IV of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) as EPS. This provision identifies all cetaceans and otters as species of community interest in need of strict protection, as per Article 12 of the Directive. Harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) are also listed as individual EPS and fall under Annex II of the Habitats Directive, which enables the designation of Special Area of Conservation (SACs) for those species.

Although the UK is no longer part of the European Union (EU), in Scotland, the Habitats Directive is transposed into law by the Habitats Regulations within Scottish Territorial Waters (12 NM Limit). These regulations are still in force following the UK's withdrawal from the EU, meaning the strict protections for EPS remain, as per the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019. An EPS Licence is required where any activity may result in an offence under the Habitats Regulations, which in the context of the marine surveys and micro pilling trials, pertains to cetaceans and otters.

Part III of the Habitats Regulations defines what is considered an offence, in terms of human interactions with EPS. Regulation 39 (1) and (2) describe what constitutes as an offence, as follows:

*(1). It is an offence:*

- *a. To deliberately or recklessly capture, injure or kill a wild animal of an EPS;*
- *b. To deliberately or recklessly:*
  - *i. harass a wild animal or group of wild animals of an EPS;*
  - *ii. disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;*
  - *iii. disturb such an animal while it is rearing or otherwise caring for its young;*

*iv. obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place;*

*v. Disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; or*

*vi. Disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.*

*c. To deliberately or recklessly take or destroy eggs of such an animal; or*

*d. To damage or destroy a breeding site or resting place of such an animal.*

*(2). Subject to the provisions of this Part, it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean).*

An EPS Licence for the survey and anchor trial activities will therefore be required for: (1) any activity that might result in injury to any cetacean or otter EPS; (2) any activity which results in disturbance to any individual cetacean within Scottish territorial waters and/or; (3) any population of otters, as stated in the Regulation 39 (1)(v) above.

**Determining the Need for an EPS Licence**

The assessments presented in this report are to determine whether, when considering the implementation of appropriate mitigation, there is the potential for the proposed survey and anchor trial activities to injure or disturb cetaceans or otters. An EPS Licence may be required where the potential for disturbance remains, and this will be determined based on outcomes of the EPS Risk Assessment.

If an EPS licence is required, the Marine Directorate - Licensing Operations Team (MD-LOT) consideration of whether an EPS Licence can be granted will comprise of three tests:

1. To ascertain whether the licence is to be granted for one of the purposes specified in the Habitat Regulations;
2. To ascertain whether there are no satisfactory alternatives to the activity proposed (that would avoid the risk of offence); and
3. That the licensing of the activity will not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS).

**Eurasian Otter**

The Eurasian otter (*Lutra lutra*) is the only species of otter which is native to the UK and is fully protected as an EPS under Section 9 and Section 11 of the Wildlife and Countryside Act 1981 (as amended). When considering a certain activity, the presence of an otter as an EPS is a material consideration where proposed works have the potential to result in disturbance or harm to the species.

Considering that all activities will be located ~6 km offshore (including the buffer around the array area) and given there are no protected sites within the vicinity of the Project with otters as a qualifying feature (as defined by the criteria outlined within Section 1.4 and the protected sites risk assessment provided within Section 4), it is considered there will be no interactions with otters during the works. Therefore, this species has not been considered further within this EPS risk assessment.

### 1.3.2 Basking Sharks

Basking sharks (*Cetorhinus maximus*) are listed in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), meaning they are protected under Section 9 of the Act, which prohibits the killing, injuring, or taking by any method

of those wild animals. The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 make amendments to the Wildlife and Countryside Act 1981 (as amended), strengthening the legal protection for threatened species to include 'reckless' acts, and specifically makes it an offence to intentionally or recklessly disturb or harass basking sharks.

An assessment of potential impacts on basking sharks, to determine whether a derogation licence is required under the Wildlife and Countryside Act 1981 (as amended) is provided in Section 3.5.

## 1.4 Protected Sites Overview

### 1.4.1 European Sites

The European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) are transposed into Scottish Law by the Habitats Regulations. The European Habitats Directive (92/43/EEC) aims to promote the maintenance of biodiversity, by requiring EU Member States to maintain or restore representative natural habitats and wild species at a FCS, through the introduction of robust protection for those habitats and species of European importance.

European sites, including Special Protection Areas (SPAs) and SACs, retain the same protections as prior to the UK leaving the EU. However, the UK European Sites now form part of the UK Site Network, rather than the former 'Natura 2000' sites.

As part of the protection measures for European sites under the Habitat Regulations, Competent Authorities are required to undertake assessments to determine whether a plan or project is likely to have an adverse effect on the integrity of a European Site. This is implemented through the Habitats Regulations Appraisal (HRA) process. The HRA process requires that any proposal with the potential to negatively affect European sites or their designated features, must be subject to an HRA by the Competent Authority, and if necessary, an Appropriate Assessment (AA). The HRA process ensures that an activity cannot be consented if it may cause adverse effects on the integrity of a European Site, unless there are no satisfactory alternatives, or there is an Imperative Reason of Overriding Public Interest (IROPI) for the activity to proceed.

If the survey and anchor trial activities are found to have a potential Likely Significant Effect (LSE) on a European site, this report will provide sufficient detail to inform the HRA process.

### 1.4.2 Marine Protected Areas

Under section 82 of the Marine (Scotland) Act 2010, MD-LOT is required to consider whether a licensable activity is capable of affecting (other than insignificantly) a protected feature in a NCMPA, or any ecological or geomorphological process on which the conservation of any protected feature in an NCMPA is dependent. If MD-LOT determine there is, or may be, a significant risk of a project impeding the achievement of the Conservation Objectives, then they must notify the relevant conservation bodies (e.g., NatureScot).

It is an offence to intentionally or recklessly kill, remove, damage, or destroy any protected feature of an NCMPA. MD-LOT must be sure that consenting decisions do not cause a significant risk to the Conservation Objectives of any NCMPA. If the survey and anchor trial activities are found to have a potential to affect (other than insignificantly) the achievement of the Conservation Objectives of an NCMPA, this report will provide sufficient detail to allow MD-LOT to ascertain the potential effects on the relevant NCMPAs.

### 1.4.3 Designated Seal Haul-Outs

Seal haul-outs are coastal locations that seals use to breed, moult and rest. There are 194 seal haul-out sites have been designated through The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014, which was amended with additional sites in 2017. These haul-out sites are protected under Section 117 of the Marine (Scotland) Act 2010 and have been designated to strengthen the protection of seals when they are at their most vulnerable on land and to provide additional protection from intentional or reckless harassment whilst seals occupy these important coastal sites.

Given the proposed activities will be situated at least 6 km from the coast, there is no potential to affect designated seal haul outs, and these sites are not considered further.

### 1.4.4 Selection Criteria for Protected Sites

The potential for the proposed survey and anchor trial activities to impact protected sites needs to be considered, as well as on protected species. The following criteria has been used to select those protected sites where potential impacts need to be assessed:

- SACs and NCMPAs (including proposed and candidate sites) with cetaceans as qualifying features within 50 km of the Survey Area;
- SACs (including proposed and candidate sites) with harbour seal features within 50 km of the Survey Area and breeding grey seal within 20 km of the Survey Area;
- SPAs and NCMPAs (including proposed and candidate sites) with birds as qualifying features that overlap with or are located within 2 km of the Survey Area;
- SACs and NCMPAs (including proposed and candidate sites) with benthic interests which are within the Survey Area; and
- SACs and NCMPAs (including proposed and candidate sites) with otter features that overlap with or located within 500 m of the Survey Area.

# 2 DESCRIPTION OF PROJECT ACTIVITIES

## 2.1 Overview

As detailed in Section 1.1, HWL are planning to carry out a campaign of activities within the PFOWF Array Area including:

- Campaign 1a: Geophysical surveys of the PFOWF Array Area;
- Campaign 1b: AZ survey of the PFOWF Array Area; and
- Campaign 2: Micro-pile drilled anchor trials within the PFOWF Array Area (subject to a separate Marine Licence currently aiming for submission in Q1 2026).

### 2.1.1 Testing and Calibration of Survey Equipment

Prior to the commencement of any survey and anchor trial activities, survey equipment will need to be tested and calibrated. Testing and calibration may be required for all survey equipment that will be utilised during the survey and anchor trial campaign (as detailed within Table 2-1). It is anticipated that testing and calibration of survey equipment will take approximately 24 hours to complete.

The exact location of the testing and calibration sites are unknown at this stage, but where possible, this activity will be carried out within the Survey Area. However, it is noted that specific bathymetric conditions and features are required to facilitate testing and calibration. Where these conditions are not available within the Survey Area, an alternative location will be used, such as in port.

Since the vessel(s), equipment and activities required for testing and calibration will be the same as those used during the survey activities, the potential impacts on protected species and protected sites resulting from the testing and calibration will be analogous to those resulting from the main survey phase. As such, the EPS risk assessment does not consider testing and calibration specifically. All mitigation measures which are to be applied to the survey and anchor trial campaigns (as detailed within Section 5) will also be implemented during the testing and calibration of survey equipment.

### 2.1.2 Survey and Anchor Trial Activities

The campaigns will typically be carried out using a dedicated survey vessel, or micro piling support vessel. It is envisaged that a single vessel will be operating in each of the three campaigns, as such only one vessel will be operating in the survey area at any one time.

Vessel selection will be made prior to survey and anchor trial operations and will be informed by a number of factors including environmental considerations, weather and sea state, survey requirements, availability and water depth. Table 2-1 presents the types of activity that are associated with the geophysical surveys and anchor trial works.

*Table 2-1 Summary of the activities associated with the different survey types*

| SURVEY AND TRIAL ACTIVITIES | |
|---|---|
| **Vessels and Vehicles** | Survey vessels |
| | Remotely Operated Vehicle (ROV) / Remotely Operated Towed Vehicle (ROTV) |
| **Geophysical Surveys** | Ultra-short Baseline (USBL) positioning system |
| | Side Scan Sonar (SSS) |
| | Multi Beam Echosounder (MBES) |
| | Sub-bottom Profiler (SBP) |
| | Ultra High Resolution Seismic (UHRS) system |
| | AZ (acoustic source and hydrophones system) |
| **Micro-pile Drilled Anchor Trials** | Rotary drilled anchor micro-piles |

### 2.1.3 Survey and Anchor Trial Equipment

A range of different survey equipment may be employed during survey and anchor trial activities, as summarised in Table 2-2 below. Each type of equipment has been assessed for its potential to introduce a sound source into the marine environment and/or interact with protected species. The most significant sound related aspects potentially generated by this Project are detailed within Table 3-1, along with a determination as to whether the survey and anchor trial equipment requires further assessment.

*Table 2-2 Details of the equipment to be employed for the survey and anchor trial activities*

| SYSTEM/SURVEY EQUIPMENT | DESCRIPTION |
|---|---|
| **USBL** | USBL systems are used to determine the position of subsea survey items, including ROVs, towed devices, etc. This involves the emission of sound from a vessel-mounted transducer to a subsea transponder, thereby introducing a sound to the environment. The transducer transmits and acoustic signal through the water and the transponder sends a response which is detected by the transducer. The USBL calculates the bearing and time taken for the transmissions to be completed and thus the position of the subsea equipment is determined. |
| **SSS** | SSS is used to generate an accurate image of the seabed and is used to identify surface seabed features such as boulders, scarps and debris. An acoustic beam is used to obtain an assurance image of a narrow area of seabed to either side of the instrument by measuring the amplitude of back-scattered return signals. The instrument can either be towed behind a ship at a specified depth or mounted to an ROV/ROTV. The frequencies used by side-scan sonar are generally very high and outside of the main hearing range of all marine species (National Marine Fisheries Service (NMFS), 2024a). The higher frequency systems provide higher resolution but shorter-range measurements. |
| **MBES** | MBES are used to obtain detailed three-dimensional (3D) maps of the seafloor which show water depths. They measure water depth by recording the two-way travel time of a high frequency pulse emitted by a transducer. The beams produce a fanned arc composed of individual beams (also known as a swathe). MBES can, typically, carry out 200 or more simultaneous measurements. With regards to this Project, the MBES specifications are to be high resolution. |

| SYSTEM/SURVEY EQUIPMENT | DESCRIPTION |
|---|---|
| SBP | SBP systems are used to identify and characterise layers of sediment under the seafloor. A transducer emits a sound pulse vertically downwards towards the seafloor, and a receiver records the return of the pulse once it has been reflected off the seafloor.<br><br>There are numerous SBP technologies which may be deployed during survey operations, including; pingers and chirpers. These devices can operate across a range of frequencies depending on the purpose of the survey. Higher frequencies of operation provide the highest resolution but are limited in amount of penetration below the sea floor. The high frequency profilers are particularly useful for delineating shallow features such as faults, gas accumulations and relict channels. Lower frequencies yield more penetration but provide less resolution; lower frequency systems are more general-purpose tools that provide a good compromise between penetration capacity and resolution. |
| UHRS | A UHRS system optimised to achieve a sub-bed penetration depth focusing on the depth range of 10–1000 m below seafloor. This technology requires a controlled seismic source of energy connected by high voltage cable to a sound source (boomer or sparker) that transfers the energy through the water to penetrate the seabed. The energy reflected back from the different sediment layers below the seabed is received by hydrophones on the sea surface, recorded and processed by a data acquisition system aboard a vessel, so that visual profile of the seabed can be created.<br><br>There are numerous UHRS technologies which may be deployed during survey operations, including both boomers, and sparkers. A seismic sparker works by discharging an electrical pulse between electrodes and a grounding point in seawater. This discharge creates an acoustic pulse, and the reflected signal is received by a hydrophone deployed at a set distance from the source. |
| AZ | AZ is a novel technology that will be utilised as a separate survey campaign. The technology is similar to bubble seismic exciters that generate a low-frequency, narrowband impulse by rapidly compressing a fixed volume of air within a flexible plate or pair of plates (Falmouth Scientific Inc. 2018; 2020). However, this system will not be towed in the water column as per standard bubble seismic exciters, instead it will be a stationary system on the seabed consisting of a metal frame with up to eight hydrophones connected. The system aims to produce a repeatable, focused impulse for better bottom imaging and penetration.<br><br>It is anticipated that the $SPL_{PEAK}$ will not exceed 195 dB re 1 µPa at 1 m, with anticipated signals within the 5-500 Hz range. |
| Rotary Drilled Micro-piles | The drilled micro-pile anchor trials will consist of:<br>• A 12-pile anchor solution consisting of a circular metal template and up to 12 micro-piles (40 cm diameter including casing) installed through the template, drilled into the seabed to a depth of 24 m and grouted into position. This template will be installed in an area of deep overburden, testing the systems performance without bedrock embedment; and<br>• A 3-pile anchor solution consisting of a triangular metal template and up to 3 micro-piles (40 cm diameter including casing) installed through the template, drilled into the seabed to a depth of 24 m and grouted into position. This template will be installed in an area of shallow bedrock, testing the system performance with bedrock embedment.<br><br>A study on the drilling sound from a mobile offshore drilling unit (Jimenez-Arranz *et al.*, 2019) demonstrated that drilling produces non-impulsive sounds with low frequencies recorded at an average broadband sound level of $SPL_{RMS}$ 118 dB re 1µPa, within 1 km of the drilling unit, with 90% of the values varying between 113 and 128 dB re 1µPa.<br><br>A 2019 report on the monitoring of underwater sound pressure levels during rotary drilling at 12 Quays on the River Mersey reported a maximum of $SPL_{RMS}$ 131.4 dB re 1 µPa, at 115 m (Subacoustech Environmental Ltd., 2019). It should be noted that the piles in this instance were 1.2 m diameter, significantly larger than the proposed pile diameter. |

## 2.2 Activity Schedule

The survey campaigns and anchor trial activities are scheduled to be undertaken between 1st May 2026 and 1st November 2026, nonetheless there is the potential for the activities to move into 2027 depending on determination of associated consents (i.e., for the anchor trials) and vessel/survey contractor availability. However, it is planned that the activities will be undertaken in distinct campaigns as set out in Table 2-3, totalling 135 survey days for all three campaigns. No allowance for time has been included for the following categories of delay, as estimation of these is considered to be beyond the reasonable limits of the assessment:

- Third party activities within the region (e.g., fishing and other sea users);
- Technical equipment issues;
- Waiting on weather;
- Environmental mitigation standby; and
- Force majeure.

Nevertheless, each has the potential to impact on delivery of the survey and anchor trial scope and increase the overall duration of the survey and trial campaign, noting that the sound generating equipment will not be operating during such delays and as such, standby time does not form part of the duration of the licenced activity.

*Table 2-3 Campaign schedule*

| CAMPAIGN | DURATION | ANTICIPATED START DATE |
|---|---|---|
| 1a – Geophysical Survey | 21 days (24 hour working) | May or June 2026 |
| 1b – AZ Survey | 21 days (24 hour working) | August or September 2026 |
| 2 – Micro-pile Drilled Anchor Trial | 93 days[1] (24 hour working) | July 2026 |

[1] *The anchor trial campaign is due to take three months to complete to enable curing of grout and load testing, however, drilling of the micro-piles will be undertaken across a discrete period during the start of the campaign lasting approximately 1 week.*

# 3 EPS AND BASKING SHARK IMPACT ASSESSMENT

The purpose of this EPS Risk Assessment is to determine whether an EPS licence and/or a basking shark derogation licence are required for the proposed survey and trial activities, by identifying the potential for injury and disturbance to EPS and basking sharks. This section of the document focuses on the potential impacts to EPS and basking sharks, regardless of their inclusion as qualifying features of protected sites. An assessment of potential impacts to protected sites and their qualifying features is provided in Section 4. While pinnipeds are not classified as EPS, this section also includes an assessment of underwater sound impacts on them, supported by sound modelling, to inform the Protected Sites Impact Assessment in Section 4.

Underwater sound emissions from geophysical survey equipment (i.e., SBP, UHRS and AZ) and the micro piling trials are the primary sources of potential injury and disturbance to EPS. It is acknowledged that underwater sound emitted by the survey vessel and the physical presence of the vessels during the survey and anchor trial operations have the potential to cause disturbance to EPS and pinnipeds.

An overview of survey and trial activities and their potential impacts to EPS, basking shark and pinnipeds is provided in Table 3-1 below. While some activities and equipment may introduce underwater sound to the marine environment, it may not be in relevant frequency ranges or generate sufficient underwater sound levels to be considered as potential sources of sound-related injury or disturbance to EPS, basking shark and pinnipeds. Where this is the case, these have been screened out and will not be considered further within this assessment, as indicated in Table 3-1.

*Table 3-1 Overview of potential impacts of marine survey and anchor trial equipment on EPS and other protected species*

| ACTIVITY/EQUIPMENT | EXAMPLE EQUIPMENT | POTENTIAL IMPACTS | FREQUENCY RANGES (kHz) | INDICATIVE $SPL_{PEAK}$ (dB re 1µPa) | FURTHER CONSIDERATION AS PART OF THE EPS RISK ASSESSMENT? |
|---|---|---|---|---|---|
| **Vessels and Vehicles** | | | | | |
| **Survey vessels** | Various | Propellers, engines, and propulsion activities form the primary sound sources of survey vessels. Vessel sound is generally continuous and comes in both narrowband and broadband emissions.<br>Potential impacts on EPS and other protected species depend on the duration of the survey activities, location of the survey routes and species of cetacean potentially present in the area.<br>Increased vessel activity additionally has the potential to cause injury from collisions. The risk of collision with an animal is influenced by the dimensions of the vessel and its speed. | Acoustic energy from survey vessels is strongest at frequencies <1 kHz | < 50 m length vessel = 160 – 175 Root Mean Square (RMS)<br>> 50 m length vessel = 165 – 185 $_{RMS}$ | **No** – The source levels associated with vessels are likely to be too low to result in injury, and the presence of a single survey vessel in the region does not constitute a material change from baseline conditions.<br>It is acknowledged that vessels pose a collision risk to EPS and other protected species. While this does not constitute a change from baseline, all vessels will adhere to the Scottish Marine Wildlife Watching Code (SMWWC) (Scottish Natural Heritage (SNH), 2017) and Basking Shark Code of Conduct (BCC) (Shark Trust, 2026) as detailed in Section 5. |
| **ROV and ROTV** | Various | Potential impacts to EPS and other marine mammals include disturbance from sound emissions associated with movements underwater. However, these are anticipated to be limited in scale, given the small size of the submerged vehicles.<br>Collision risk is considered an unlikely impact, given the high level of manoeuvrability and slow movement associated with ROVs. | N/A | N/A | **No** – The predominant sound source during such activities is the USBL, and other geophysical survey sensors deployed on the vehicle, which is expected to mask any sound generated by the vehicle itself. Sound generated by geophysical survey devices has been considered separately (see below). |
| **Geophysical Surveys** | | | | | |
| **USBL** | HIPAP 501; Easytrak Nexus | USBL systems involve the emission of impulsive sound from a hull-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. The potential impacts of this sound on cetaceans depends upon the abundance, distribution and sensitivity of the species, and the duration of the operations. | 18 – 34 | 170 – 208 | **Yes** – The pressure levels and frequencies at which the USBL operate are not of a level where injury is expected but have the potential to cause disturbance to EPS. |
| **SSS** | Edge Tech 4200/4205 | SSS equipment produces impulsive sound emissions through high frequency pulses used to image the seabed habitat. Potential impacts to EPS and other marine mammals depend upon the frequency, location, and duration of the pulses. | > 200 | 190 - 230 | **No** – The SSS used for the proposed survey operations will operate at frequencies above 200 kHz. This is above the hearing threshold of all marine mammals and protected species which may be present in the area (as detailed in Table 3-3). Hence, no potential for injury or disturbance exists (NMFS, 2024a). |
| **MBES** | R2Sonic 2024; EM 2040 | High frequency noise pulses created by multi-beam echo sounder equipment generate sound waves which produce impulsive underwater sound. Depending on the frequency of the pulses, location and duration of the operations, and the species present, there could be potential impacts on cetaceans. | > 200 | 180 – 240 | **No** – The MBES used for the proposed survey operations will operate at frequencies above 200 kHz. This is above the hearing threshold of all marine mammals and protected species which may be present in the area, as detailed in Table 3-3. Hence, no potential for injury or disturbance exists (NMFS, 2024a). |
| **SBP** | Innomar medium-100 Parametric SBP (Pinger) | SBP involves the vertical emission of sound pulses (impulsive noise) to characterise the layers of sediment comprising the seabed. Such activities introduce noise emissions into the marine environment. The potential impacts of this sound depend upon the type of profiler technology used, as well as the abundance, distribution and sensitivity of the species, and the duration of the operations.<br>There are numerous SBP technologies may be deployed during the survey operations including pingers and chirpers. | 15 - 100 (pinger) | 247 (pinger) | **Yes** – The frequency of the sound emissions is within marine mammal hearing ranges, and the source pressure level may pose a risk of injury and disturbance to EPS. |
| **UHRS System** | The Dura-Spark; The Dura-Spark UHD 240/400 | A UHRS system is optimised to achieve a sub-bed penetration depth focusing on the depth range of 10–1,000 m below seafloor. This technology requires a controlled seismic source of energy connected by high voltage cable to a sound source (boomer or sparker) that transfers the energy through the water to penetrate the seabed. The energy reflected back from the solid seabed layers is received by hydrophones on the sea surface, recorded and processed by a data acquisition system aboard a vessel, so that visual profile of the seabed can be created. | 0.06-6 | 216-250 | **Yes –** The frequency of the sound emissions is within marine mammal hearing ranges, and the source pressure level may pose a risk of injury and disturbance to EPS. |

| ACTIVITY/EQUIPMENT | EXAMPLE EQUIPMENT | POTENTIAL IMPACTS | FREQUENCY RANGES (kHz) | INDICATIVE $SPL_{PEAK}$ (dB re 1µPa) | FURTHER CONSIDERATION AS PART OF THE EPS RISK ASSESSMENT? |
|---|---|---|---|---|---|
| **Acoustic Zoom Survey** | | | | | |
| AZ | N/A | AZ is a novel technology which will be utilised as part of this geophysical survey campaign, consisting of a bubble seismic exciter, deployed on a metal frame placed on the seabed with up to eight hydrophones connected. | 0.005-5 | 195 | **Yes** – The sound levels and frequencies at which the AZ will operate are not of a level where injury is expected but have the potential to cause disturbance to EPS. |
| **Micro-Pile Anchor Trials** | | | | | |
| Rotary Drilled Micro-Piles | N/A | Micro-pile installation requires the advancement of a small-diameter borehole beneath the seabed using rotary drilling techniques from a subsea drilling rig.<br>In this method, the drill bit cuts and fragments the sediment as it progresses, and the drill string rotates to advance both the tooling and the micro-pile casing to the required depth. Drilling fluids or seawater circulation may be used to remove cuttings and stabilise the borehole. The casing is rotated into position to maintain borehole integrity and to provide the structural conduit for the micro-pile. Drilling continues until the design depth is achieved, after which the micro-pile is grouted or otherwise completed in accordance with engineering specifications.<br>A study on the drilling sound from a mobile offshore drilling unit (Jimenez-Arranz *et al.*, 2019) demonstrated that drilling produces non-impulsive sounds with low frequencies. | <0.25 (Subacoustech Environmental Ltd., 2019)<br><0.25 (90% of the spectral energy (Jimenez-Arranz *et al.*, 2019))<br>0.25 - 4 (<10% of spectral energy (Jimenez-Arranz *et al.*, 2019)) | $118_{RMS}$ | **No -** The sound levels resulting from the rotary drilling of the micro-piles (i.e., average $SPL_{RMS}$ 118 dB re 1µPa within 1 km based on Jimenez-Arranz *et al.*, 2019) are not of a level where injury or disturbance is expected. This is below the maximum predicted behavioural disturbance range based on the NMFS Level B harassment threshold of 120 dB for continuous sound (NMFS, 2024b).<br>Underwater sound monitoring during rotary drilled pile installation for the 12 Quays project measured a maximum $SPL_{RMS}$ of 131.4 dB B re 1 µPa, at 115 m (Subacoustech Environmental Ltd., 2019). It should be noted that the pile diameter at 12 Quays (1.2 m) were significantly larger than that proposed for the Project (40 cm). Nevertheless, the report concluded that during the rotary drilling the sound levels sampled were not clearly above the background noise measured. In contrast, additional measurements were taken in a drift past the Stena Mersey ferry which revealed noise levels clearly above the background (160.9 dB re 1 µPa $SPL_{RMS}$ was sampled at 90 m from the side of the vessel and continued to be clearly audible in excess of 600 m downriver.) (Subacoustech Environmental Ltd., 2019).<br>Overall, drilling produces non-impulsive sounds with low frequencies, which are anticipated to fall below the NMFS Level B harassment threshold of 120 dB for continuous sound within the immediate vicinity of the drilling activity. Therefore, no potential for injury or disturbance is anticipated. |

## 3.1 Cetaceans Baseline

Around 20 species of cetacean have been recorded in Scottish waters, but five species are noted most frequently in proximity to the Survey Area (National Marine Plan Interactive (NMPi), 2026; NatureScot, 2025): harbour porpoise, white-beaked dolphin (*Lagenorhynchus albirostris*), minke whale (*Balaenoptera acutorostrata*) Risso's dolphin (*Grampus griseus*) and bottlenose dolphin. The cetacean species which are most likely to be present within the vicinity of the proposed survey and anchor trial works are summarised below:

- Harbour porpoise are distributed throughout coastal and shelf waters across the sub-Arctic, favouring the cool waters of the North Atlantic and the North Pacific (Whale and Dolphin Conservation (WDC), 2026a). Harbour porpoises frequent shallow bays, estuaries and tidal channel (<200 m in depth) with the majority of animal sightings occurring within 10 km of the coast (WDC, 2026a). Harbour porpoises are the most abundant cetacean species in the Pentland Firth and is likely to be present in the vicinity of the Survey Area throughout the year. The density of harbour porpoise in the Survey Area is considered low with 0.3 animals/km$^2$ (Gilles *et al.*, 2023);
- White-beaked dolphin have a relatively limited distribution in the temperate and cold waters of the North Atlantic. White-beaked dolphins are typically found in water of <200 m in depth (WDC, 2026b). White-beaked dolphins are recorded in Scottish waters in all months of the year and have an estimated density of 0.1 animals/km$^2$ in the Survey Area. This is moderate in comparison to other regions around Scotland (Gilles *et al.*, 2023);
- Risso's dolphin occur at varying densities throughout UK waters, with small resident populations occurring throughout the UK up to depths of 100 m (NatureScot, 2014). Within Scotland, Risso's dolphin are primarily observed within the Hebridean Sea. The density of Risso's dolphin within the Survey Area is 0.04 animals/km$^2$ (Gilles *et al.*, 2023);
- Minke whale are the most common of the baleen whales within Scottish waters (NatureScot, 2023). Minke whales occur in waters <200 m in depth and can commonly be seen in coastal waters between July and September (NatureScot, 2023). They feed mainly in shallower water over the continental shelf (<200 m) and regularly appear around shelf banks and mounds, or near fronts where zooplankton and fish are concentrated at the surface. Minke whale density in the vicinity of the Survey Area is considered to be relatively high, with 0.01 animals/km$^2$ (Gilles *et al.*, 2023), and this species is most often spotted around Scotland between June and August but may be present at any time between January and October (Hague *et al.*, 2020);
- Bottlenose dolphin are one of the most cosmopolitan delphinid species in the world, with coastal bottlenose dolphins within Scottish waters appearing to have a wide but patchy distribution. There is one resident population of coastal bottlenose dolphin on the east coast of Scotland which are observed primarily within the Moray Firth and migrate southwards towards North Berwick, however they are occasionally sighted in the waters of the Pentland Firth and the Northern Isles. The density of bottlenose dolphin within Small Cetaceans in European Atlantic Waters and the North Sea (SCANS) III were approximately 0.004 animals/ km$^2$ (Hammond *et al.*, 2021) and no density estimate is available within block CS-K in SCANS-IV (Gilles *et al.*, 2023); and
- Other cetacean species, such as killer whale (*Orcinus orca*), short-beaked common dolphin (*Delphinus delphis*), Atlantic white-sided dolphin (*Lagenorphynchus acutus*), long-finned pilot whale (*Globicephala melas*), humpback whales (*Megaptera novaeangliae*) and beaked whale species (*Ziphiidae spp.*), are encountered intermittently throughout the waters off the north coast of Scotland. While these species have been sighted within Scottish waters, reports show there are no clear spatial or temporal patterns in abundance or distribution for a number of these species Gilles *et al.*, 2023). These species do not occur frequently enough to require further assessment as there are no reliable population estimates to assess against.

The distribution, density, and abundance of the most commonly occurring cetacean species expected to occur around the Survey Area based on Gilles *et al.*, (2023) and Inter-Agency Marine Mammal Working Group (IAMMWG (2022) are presented in Table 3-2 below.

*Table 3-2 Population parameters of cetacean species potentially present in the Survey Area*

| SPECIES NAME | ESTIMATED DENSITY ACROSS THE SURVEY AREA* (INDIVIDUALS/km$^2$) (GILLES *et al.*, 2023) | ESTIMATED ABUNDANCE WITHIN THE SURVEY AREA (48.22 km$^2$) | MANAGEMENT UNIT (MU) / BIOGEOGRAPHICAL POPULATION (UK PORTION) ESTIMATE (IAMMWG, 2022) | PROPORTION OF THE UK MU POTENTIALLY AFFECTED BY SURVEY ACTIVITIES |
|---|---|---|---|---|
| Harbour porpoise | 0.2813 | 13.6 | 159,632 | <0.01 |
| White-beaked dolphin | 0.1352 | 6.5 | 34,025 | <0.02 |
| Risso's dolphin | 0.0376 | 1.8 | 8,687 | <0.02 |
| Minke whale | 0.0116 | 0.6 | 10,288 | <0.01 |
| Bottlenose dolphin | 0.004* | 0.2 | 224 | <0.1 |

**** Density estimates are taken from SCANS-III Survey Block S.***

## 3.2 Potential Impact from Survey Activities

Sound generated from the proposed surveys constitute the greatest potential risk of injury or disturbance to cetaceans and pinnipeds. Injury and disturbance from underwater sound can impact cetaceans and pinnipeds in the following ways:

- Injury – Physiological damage to auditory or other internal organs; and/or
- Disturbance (temporary or continuous) – Disruptions to behavioural patterns, such as migration, breathing, nursing, breeding, foraging, socialising and / or sheltering.

To assess the potential for sound impacts on cetaceans and pinnipeds, predicted emission levels are compared to available estimated thresholds for injury and disturbance. Several threshold criteria and methods for determining how marine mammals perceive sound are available (e.g., the Decibel Hearing Threshold (dBht) method and other hearing weighted and linear measures) and each has its own advantages and disadvantages. Scottish Government (2020) guidance recommends using the injury and disturbance criteria proposed by Southall *et al.*, (2007), which combine linear (un-weighted) peak Sound Pressure Levels (SPLs) and weighted Sound Exposure Levels (SELs). Since the publication of this seminal paper, there has been mounting evidence of marine mammal auditory abilities in novel and well-studied species (e.g. harbour porpoise) which has led to updates in auditory thresholds for injury (NMFS, 2024a; Southall *et al.*, 2019). Following regulator feedback, these updated hearing groups and thresholds for acoustic injury have been adopted herein and are detailed in Table 3-3 and Table 3-4 below.

If a sound emission consists of frequencies outside the estimated auditory bandwidth of a given species, disturbance or injury is highly unlikely. To evaluate potential sound-related impacts, the likely hearing sensitivities of different cetacean and pinniped hearing groups has been summarised below in Table 3-3. These auditory bandwidths form the basis for screening out SSS, MBES and drilled micro-piles from further assessment, as detailed in Table 3-1.

*Table 3-3 Auditory Bandwidths Estimated for Cetaceans (Southall et al., 2019; NMFS, 2024a)*

| HEARING GROUP | ESTIMATED AUDITORY BANDWIDTH |
|---|---|
| **Low-frequency cetaceans (LF): (e.g., baleen whales, such as humpback whales, minke whales, fin whales, etc.)** | 7 Hz to 35 kHz |
| **High-frequency cetaceans (HF): (e.g., dolphins, toothed whales, beaked whales and bottlenose whales)** | 150 Hz to 160 kHz |
| **Very high-frequency cetaceans (VHF): (e.g., harbour porpoises and other 'true' porpoises)** | 275 Hz to 160 kHz |
| **Phocid carnivores in water (PW): (e.g., earless, or 'true' seals, such as grey and harbour seals)** | 75 Hz to 100 kHz |

## 3.3 Sound Assessment Criteria

This section outlines the sound assessment criteria used to evaluate sound-related impacts on EPS and pinnipeds. Underwater sound modelling has been conducted using the Xodus' Xposure modelling tool, which was developed in-house to assess sound propagation from common underwater sound sources (piling, surveys, etc.). The Xposure model has been successfully used for numerous underwater sound propagation assessments and is based on an extended version of the semi-empirical model developed by Marsh & Schulkin (1962).

### 3.3.1 Injury (Physiological Damage)

The proposed injury criteria recommended by NMFS (2024) and Southall *et al.*, (2019) are created for two different types of sound:

- Impulsive: These sounds are short in duration (i.e. less than one second), temporary, and occupy a broadband bandwidth, and have rapid rise and decay times with a high peak pressure level; and
- Non-impulsive: These sounds can occupy a broadband, narrowband or tonal bandwidth, and may be brief, prolonged, continuous, or intermittent in nature. They are not characterised by rapid rise and decay times or a high peak pressure level.

The surveys will comprise acoustic equipment which emits multiple pulsed sound, as detailed within Table 3-1. The sound generated from this equipment will disperse through the water column, with sound pressure decreasing as distance from the sound source increases. Therefore, marine mammals will be exposed to a lower sound pressure further from the sound source. To assess the potential for injury or disturbance to marine mammals, the dispersion of sound through the water column has been modelled to determine the appropriate mitigation zone, ensuring that the received sound pressure levels are reduced below potentially injurious levels for marine mammals.

A dual-metric approach has been adopted to identify the range of potential injury to marine mammals based on the source level including the peak pressure and cumulative SELs for each equipment type which requires consideration for sound-related injury (see Table 3-1). The thresholds which each marine mammal and pinniped hearing group may experience sound-related injury are presented Table 3-4. These thresholds are derived from measurements of marine mammal hearing, using weighting functions which account for peak hearing abilities for each group (NMFS, 2024a).

*Table 3-4 Criteria considered in this assessment for the onset of injury in marine mammals from underwater sound (NMFS, 2024a)*

| MARINE MAMMAL GROUP | TYPE OF SOUND | PTS THRESHOLD CRITERIA | |
|---|---|---|---|
| | | $SPL_{peak}$, dB re 1 µpa (unweighted) | Cumulative $SEL^2$, dB re 1 $\mu pa^2s$ (weighted) |
| LF Cetaceans | Single or multiple pulses e.g. impulsive | 222 | 183 |
| | Non-impulsive e.g. continuous sound | - | 197 |
| HF Cetaceans | Single or multiple pulses e.g. impulsive | 230 | 193 |
| | Non-impulsive e.g. continuous sound | - | 201 |
| VHF Cetaceans | Single or multiple pulses e.g. impulsive | 202 | 159 |
| | Non-impulsive e.g. continuous sound | - | 181 |
| Phocid Pinnipeds (underwater) | Single or multiple pulses e.g. impulsive | 223 | 183 |
| | Non-impulsive e.g. continuous sound | - | 195 |

### 3.3.2 Disturbance

To evaluate the possibility of a disturbance offence (as defined in Section 1.3.1) resulting from the proposed surveys, it is essential to assess whether the survey activities could cause a non-trivial disturbance based on the sensitivities of the species present and whether the number of individuals affected could lead to population-level consequences. If there is potential for disturbing an individual animal, an EPS Licence must be obtained to avoid committing an offence. However, when issuing an EPS Licence, MD-LOT must consider whether the FCS of any species will be impacted.

The impacts of the proposed activities on the FCS of all protected species must be considered to satisfy Regulation 39(1) and 39(2) of The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

The potential range of disturbance for UHRS, SBP and AZ has conservatively been estimated using the 5 km Effective Deterrence Range (EDR) as advised by NatureScot through consultation on the survey activities. The 5 km EDR is recommended to be used in the assessment of underwater sound disturbance impacts to harbour porpoise associated with SBP surveys (JNCC, 2020). It is noted that updated guidance, published by JNCC based on an extensive review of evidence (JNCC, 2025) recommends a 3 km EDR, which is based on generalised assumptions of the equipment specifications and on equipment which emits frequencies that have the potential to disturb harbour porpoise, which have been observed to respond to acoustic disturbance over distances of several kilometres. As such, using the 5 km EDR for all marine mammal species is highly precautionary, given that other marine mammals are not considered as sensitive to acoustic disturbance.

It is not considered appropriate to use the 5 km EDR for USBL, given the low source level associated with this piece of equipment (<208 dB re 1 µPa), compared to source levels for SBP and UHRS. For assessing potential marine mammal disturbance from the operation of USBL, auditory thresholds for disturbance as defined by the National Marine Fisheries Service (NMFS) (2014), along with behavioural response criteria from Southall *et al.*, (2007), have

[2] *The recommended accumulation period is 24-hours.*

been adopted. These thresholds (provided in $SPL_{rms}$) and the behavioural response severity rating are detailed in Table 3-5.

*Table 3-5 Disturbance threshold criteria for impulsive sounds (Southall et al., 2007; NMFS, 2014)*

| BEHAVIOURAL EFFECT | THRESHOLD CRITERIA $SPL_{RMS}$ (DB RE 1 µPA) |
|---|---|
| **Potential strong behavioural reaction (6 or more on the severity scale)** | 160 |

## 3.4 Sound-Related Impacts to EPS and Pinnipeds

### 3.4.1 Sound Modelling Approach

**Geophysical Survey Equipment**

The underwater sound assessment was conducted using Xodus' Xposure model, a set of tools developed for common sound sources (e.g., piling, surveys). This modelling tool is based on an extended version of the semi-empirical model developed by Marsh & Schulkin (1962). The sound propagation model uses several concepts including:

- Refractive cycle, or skip distance;
- Geometric divergence;
- Deflection of energy into the bottom at high angles by scattering from the sea surface;
- A simplified Rayleigh two-fluid model of the bottom for sand or mud sediments; and
- Absorption of sound energy by molecules in the water.

The following inputs are required for the model:

- Third-octave band source sound level data;
- Discreet range (distance from source to receiver);
- Water column depth and sediment layer depth;
- Sediment type (sand/mud);
- Sea state; and
- Source directivity characteristics.

The Marsh & Schulkin (1962) model is based on a combination of acoustic theory and empirical data from around 100,000 measurements and has been found to provide good predictions.

As well as calculating the unweighted RMS and peak sound pressure levels at various distances from the source, it is also necessary to calculate the SEL for a mammal using the relevant auditory weightings described earlier taking into account the number of pulses to which it is exposed. For operation of the survey source, the SEL sound data for a single pulse was utilised, along with the maximum number of pulses expected to be received by marine mammals in order to calculate cumulative exposure. Two conditions were modelled:

- A sound source passing a static mammal[3]; and
- A mammal moving away from a moving sound source[4] .

*[3] This is referred to as the baseline case, as it is considered that marine mammals will not move away from the source without being impacted upon by the received sound level.*
*[4] Further discussion of marine mammal swim speeds is provided in Section 3.4.2 below.*

Both cases were modelled for a range of start distances (initial or closest passing distance between the animal and source) to calculate cumulative exposure for the scenarios (moving source, static mammal and moving animal, moving source). In each case, the pulses to which the mammal is exposed in closest proximity to the source dominate the sound exposure. This is due to the logarithmic nature of sound energy summation.

It should be noted that the sound exposure calculations are based on the simplistic assumption that the seismic sources are active continuously over a 24-hour period, being activated at the same interval. In the real-world the situation is more complex with the device not activated during turns for example. However, the SEL calculations do not take any breaks in activity into account and therefore the activation period is assumed to be consecutive and hence worst-case. However, the potential for recovery is not accounted for in the multiple pulse sound criteria described in NMFS (2024) and so as far as the SEL calculation is concerned, breaks in activity are not considered in the assessment.

Survey activities are assumed to be continuous. With the Source Point Interval (SPI) set very low, this will mean that cumulative SELs will be comparatively high, albeit the pulses to which the mammal is exposed in closest proximity will dominate the sound exposure.

**Acoustic Zoom Survey**

Although the AZ represents a novel technology and has therefore not been explicitly incorporated into the underwater sound modelling, its expected acoustic output is demonstrably lower in source level than that of the SBP. As outlined above, the AZ is anticipated to produce a maximum source level of 195 dB re 1 µPa @ 1 m, with acoustic energy concentrated in the 5–500 Hz range. When considered alongside its operational mode, consisting of static placement directly on the seabed, it is reasonable to expect substantial attenuation of sound energy through seabed coupling and sediment absorption, further reducing the intensity of propagating sound relative to an acoustic source located in the water-column.

In contrast, the SBP is a well-characterised, geophysical survey source, typically generating higher broadband source levels and more pronounced propagation ranges in the water column. Given that the maximum AZ source level (195 dB) is lower than or comparable to source levels routinely modelled for SBP operations, and that its low-frequency energy will be more effectively absorbed by the seabed, the potential injury or disturbance impacts from AZ use will be inherently less than those modelled for SBP.

On this basis, applying the SBP injury and disturbance ranges as a conservative worst-case proxy for AZ represents a precautionary and suitably robust approach. This ensures that potential effects associated with the AZ are not underestimated, despite the absence of technology-specific modelling, and that the assessment remains aligned with the upper bound of predicted impact potential.

### 3.4.2 Injury Impacts

Potential injury to cetaceans (i.e., injury which results from a Permanent Threshold Shift (PTS) in hearing abilities) is limited to impulsive sound sources which exceed the injury thresholds defined in Table 3-4.

Modelling of ranges at which injury impacts are likely to result from deployment of geophysical survey equipment has been undertaken, as described in Section 3.3.1, and shown in Table 3-6 below. Example equipment has been selected to exemplify the realistic worst-case scenario for UHRS, SBP/AZ and USBL, including the maximum SPLs across source frequencies meant to encapsulate the hearing abilities of all representative hearing groups. Impacts from sound sources which are strictly behavioural in nature (i.e., disturbance impacts) are covered in Section 3.3.2.

All of the survey technologies modelled have the potential to cause injury to EPS and other marine mammals (Table 3-6). As such, the survey activities may be potentially injurious to EPS species without appropriate mitigations.

The assessment predicts that the greatest potential impact ranges would occur during operation at higher frequencies and associated sound pressure levels. Across modelling scenarios and metrics, the injury ranges were generally highest for the VHF hearing group (Table 3-6), which is represented by harbour porpoise in UK waters. The maximum potential impact ranges for the unweighted peak SPL was associated with VHF cetaceans at 381 m based on operation of a 3D UHRS system (6 kHz) and 189 m based on operation of the low frequency SBP/AZ (15 kHz) (Table 3-6). Conversely, HF cetaceans seemed to constitute the hearing group with the lowest potential impact ranges for the peak SPL for SBP/AZ, USBL and UHRS.

The maximum predicted injury range for the weighted cumulative SEL is associated VHF cetaceans, extending to approximately 104 m, based on operation of a 3D UHRS system (6 kHz) (Table 3-6). Table 3-6 presents similar impact ranges, following rounding, for all marine mammal hearing groups for the 6 kHz UHRS. When considering the low frequency UHRS system (0.06 kHz), VHF and HF cetaceans demonstrated the lowest impact ranges (i.e., <1 m) for both SEL metrics.

For both the SBP/AZ (low and high frequency) and USBL equipment (high frequency), LF cetaceans largely displayed the lowest impact ranges for the cumulative SEL metrics. For low frequency USBL (18 kHz), all hearing groups demonstrated impact ranges of <1 m for the cumulative SEL metrics.

The deployment of high frequency USBL (34 kHz) in 117 m depths has a potential range of impact to a maximum of 94 m for VHFs, when considering cumulative SEL metric. However, in order for the cumulative SEL threshold to be exceeded, an animal would have to remain within 94 m of the source for a sustained period. The likelihood of a cetacean remaining this close to operational equipment is extremely low, when considering that the source is deployed from a moving vessel travelling at more than 2 $ms^{-1}$ (i.e., 4 knots) and, in some cases, is being towed at depth (e.g., a USBL may be mounted on an ROV within a few metres of the seabed). Whilst USBL may be deployed from a stationary vessel during particular activities (e.g., micro-pile drilling), these are anticipated to be limited in duration. As such, a realistic risk of injury is not expected from the use of USBL, and no marine mammal mitigation is proposed for USBL operations.

The majority of injury ranges were at least slightly reduced when considering animal movement during cumulative SEL estimation. Swim speeds of the species most likely to be observed in the area have been shown to be several $ms^{-1}$ (e.g., cruising minke whale swim speed is 3.25 $ms^{-1}$ and harbour porpoise may swim up to 4.3 $ms^{-1}$) (Blix and Folkow, 1995; Otani *et al.*, 2000). Further, SNH (2016) has provided standard values for mean swimming speeds of various marine mammal species likely to occur in the project area, including harbour porpoise (1.4 $ms^{-1}$; Westgate *et al.*, 1995); harbour / grey seal (1.8 $ms^{-1}$; Thompson, 2015); and minke whale (2.1 $ms^{-1}$; Williams, 2009). To offer a representative model of the predicted sound exposure ranges of marine mammals moving away from the sound source, a mean swim speed of 1.5 $ms^{-1}$ has been used in the calculations. Considering that the surveys themselves will take place while the vessel is moving, the cumulative SELs of all equipment types are expected to be lower, based on the premise that animals are likely to move away from the mobile sound source at some angle opposing the direction of vessel travel.

It should also be noted that the modelling scenarios are meant to define the worst-case injury ranges associated with the deployment of the Project's survey equipment. The in-situ deployment of the sound-generating survey equipment will most frequently occur in waters of intermediate depths (i.e., somewhere between 64 - 117 m). Moreover, the frequency ranges depicted constitute the lowest and highest reasonably practicable settings for the survey activities modelled, meaning that the spread of sound in the marine environment is also likely to fall

somewhere between the modelled extremes. The injury ranges anticipated to result from equipment use are thus likely to fall within the spectrum of those defined by the model outputs, thereby reducing the impact ranges associated with the low frequency survey equipment.

Due to the potential for injury to EPS resulting from SBP/AZ and UHRS operations, marine mammal mitigation will be implemented if SBP, AZ and UHRS are used. Available mitigation measures specifically designed for geophysical surveys (JNCC, 2017) have been incorporated into mitigation measures described in Section 5 below. These measures include deployment of a Marine Mammal Observer (MMO) to monitor for the presence of cetaceans within a 500 m mitigation zone prior to the commencement of, and during, any SBP, AZ or UHRS surveys (JNCC, 2017).

In consideration of the relevant mitigation measures for SBP, AZ and UHRS, none of the modelled scenarios indicate any injury events are likely to exceed the 500 m mitigation zone. As EPS and other marine mammal species would need to come within the mitigation zone, and likely follow, the moving vessel or vehicles from which the survey equipment will be deployed, injury to EPS from survey activities will not occur when the mitigations are applied. For these reasons, the survey activities are not anticipated to impair the ability of an animal to survive or reproduce or result in any significant impacts on the FCS of any EPS.

*Table 3-6 Sound modelling results for injury impact ranges from impulsive sound sources (N/E = "none expected" or distances less than 1 m)*

| Activity | Frequency (kHz) | Peak SPL (dB re 1µPa) | SEL (dB re 1µPa²s) | Potential Injury Range (m) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Weighted Cumulative SEL (Static Mammals) | | | | Weighted Cumulative SEL (Moving Mammals) | | | | Unweighted Peak SPL | | | |
| | | | | VHF | HF | LF | PW | VHF | HF | LF | PW | VHF | HF | LF | PW |
| SBP/AZ | 15 | 247 | 228 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 189 | 9 | 32 | 33 |
| | 100 | 247 | 228 | 6 | 4 | 4 | 4 | 6 | 4 | 3 | 4 | 61 | 11 | 19 | 18 |
| USBL | 18 | 170 | 147 | N/E | N/E | N/E | N/E | N/E | N/E | N/E | N/E | N/E | N/E | N/E | N/E |
| | 34 | 208 | 185 | 94 | 3 | 1 | 2 | 56 | 2 | N/E | 1 | 4 | N/E | N/E | N/E |
| UHRS | 0.06 | 216 | 187 | N/E | N/E | 11 | N/E | N/E | N/E | 2 | N/E | 9 | N/E | 1 | 1 |
| | 6 | 250 | 231 | 104 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 381 | 14 | 48 | 55 |

### 3.4.3 Disturbance Impacts

In addition to physical injury, sound emissions have the potential to affect the behaviour of cetaceans and pinnipeds in the vicinity of the sound source. Significant or strong disturbance (see Section 3.3.2) may occur when an animal is at risk of a sustained or chronic disruption of behaviour or habitat use resulting in population-level effects. An assessment of potential disturbance impacts from USBL, SBP/AZ and UHRS operations is provided below.

As outlined in Section 3.3.2, a 5 km EDR has been used to estimate the range of disturbance associated with the operation of UHRS and SBP in line with NatureScot advice, whereas disturbance from USBL has been estimated through a modelling approach using auditory thresholds for disturbance as defined by the NMFS (2014), along with behavioural response criteria from Southall *et al.*, (2007). The outputs of the sound modelling assessment against the disturbance thresholds are provided in Table 3-7.

*Table 3-7 Sound modelling results for disturbance impacts from impulsive sound sources*

| ACTIVITY | FREQUENCY (kHz) | $SPL_{RMS}$ (DB re 1µPa) | RANGE OF BEHAVIOURAL CHANGE (m) |
|---|---|---|---|
| USBL | 18 | 167 | 1 |
| | 34 | 205 | 44 |
| SBP/AZ | 15 | 243 | 5,000 |
| | 100 | 243 | |
| UHRS | 0.06 | 213 | |
| | 6 | 247 | |

SBP/AZ, USBL and UHRS survey activities have the potential to generate a strong disturbance event (i.e. a disturbance offence) as described in Section 1.3.1. The potential for a disturbance offence to result from these types of technology varies between activity type. The sounds emitted by the SBP/AZ (operating at 15-100 kHz) and UHRS (operating between 0.06 – 6 kHz) form the higher source level, lower frequency sounds, and the disturbance ranges have been conservatively estimated as 5 km, based on the EDR presented in JNCC (2020). The operation of USBL will be at a higher frequency and lower source level and the disturbance range is estimated as 44 m for this equipment (Table 3-7).

The estimated number of individuals potentially affected by the worst-case scenario for each survey type is presented in Table 3-8, using population data from Table 3-2. The impact ranges serve as the radii with which to calculate the total area of coverage for a potential disturbance event associated with each survey activity.

*Table 3-8 Number of cetaceans which may experience a disturbance offence from impulsive survey activities based on known population parameters of the most frequently occurring species*

| SPECIES NAME | NUMBER OF INDIVIDUALS WHICH MAY INCUR A STRONG DISTURBANCE | | | PROPORTION OF THE MU (UK PORTION) POTENTIALLY AFFECTED BY PROJECT ACTIVITIES |
|---|---|---|---|---|
| | USBL | UHRS | SBP/AZ | |
| | 18 – 34 kHz ($0.006\ km^2$) | 0.06 – 6 kHz ($78.5\ km^2$) | 15 - 100 kHz ($78.5\ km^2$) | |
| Harbour porpoise | <0.01 | 22 | 22 | <0.1 |
| White-beaked dolphin | <0.01 | 10.6 | 10.6 | <0.1 |
| Risso's dolphin | <0.001 | 3.0 | 3.0 | <0.1 |
| Minke whale | <0.001 | 0.9 | 0.9 | <0.01 |
| Bottlenose dolphin | <0.001 | 0.3 | 0.3 | 0.1 |

The source levels associated with the example survey equipment have the potential to elicit a strong behavioural response in EPS which could be classed as a disturbance offence as defined under the Habitats Regulations. However, none of the biogeographical population MU for any of the EPS known to regularly occur within the project area will incur significant impacts. For all of the proposed survey activities, 0.1% or less of the relevant biogeographic populations may be impacted by sound-related disturbance.

The greatest disturbance impacts to EPS are associated with the impulsive SBP/AZ and UHRS survey activities (Table 3-7). Assuming disturbance out to this range results in prediction of 22 harbour porpoise individuals being disturbed. Nonetheless, this only equates to <0.1% of the MU being potentially impacted by the survey activities (Table 3-8).

Furthermore, with regards to USBL, the number of animals within the disturbance range at any one time is predicted to be ≤0.01 individuals (Table 3-8). This means that on average, there will be no marine mammals within the disturbance range for 99.99% of USBL operations, making potential disturbance impacts at the population level arising from this survey equipment negligible. As such the use of USBL does not have the potential to result in an EPS disturbance offence under the Habitats Regulations. For USBL, the survey vessel/ ROV will not be stationary for prolonged periods during these activities, animals within a particular area will not be exposed to extended periods of underwater sound. Rather, individuals would have to follow the moving equipment to be subjected to lasting or prolonged periods of sound which may have detrimental effects at the individual or population level (i.e. a significant disturbance), which is highly unlikely. Therefore, an EPS licence for disturbance will not be required for the use of USBL, in line with Scottish Government guidance that activities predicted to disturb less than one individual being unlikely to require an EPS licence (Marine Scotland, 2021).

The survey activities are anticipated to be completed over approximately 135 days. This timeframe captures all three campaigns, and within these campaigns there will be periods of inactivity, for example during weather downtime. Given the transient and short-term nature of the survey and vessel activities, it is highly unlikely that any disturbance offences from use of the UHRS, SBP or AZ would negatively impact upon the FCS of any of the cetacean species which may be present in the Survey Area. This is on the basis that the predicted level of disturbance is unlikely to affect the ability of any individual animal to survive or reproduce and will not have significant population-level impacts to any EPS.

It is possible that a small number of animals may experience some level of disturbance for the short period that they encounter the proposed survey activities. As such, an EPS Licence will be required for disturbance of cetaceans potentially resulting from UHRS, SBP and AZ survey activities, in accordance with the Habitat Regulations.

## 3.5 Basking Sharks

Basking sharks belong to the elasmobranch group (which includes sharks and rays). Basking sharks are one of the only three species of shark which filter feed and are the second largest fish in the world (Sims, 2008). This species can be found throughout the offshore waters in the UK continental shelf (Sims, 2008) and are considered frequent visitors to the west coast of Scotland (Witt *et al.*, 2012). They are widely distributed in cold and temperate waters and feed predominantly on plankton and zooplankton e.g., barnacles, copepods, fish eggs and deep-water oceanic shrimps by filtering large volumes of water through their wide-open mouth. They typically move very slowly (around four miles per hour). In the winter, they dive to great depths to get plankton while in the summer they are mostly near the surface, where the water is warmer.

This group, by nature, demonstrate a generally low sensitivity to sound pressure due to the fact that they do not have a swim bladder. The general hearing range of basking sharks is not defined; however, five other elasmobranch species have been found to have a hearing range between 20 Hz to 1 kHz. This hearing range may or may not be

transferable to basking sharks (Macleod *et al.*, 2011). As the 20 Hz to 1 kHz range only encompasses a small portion of the sound profiles emitted during proposed survey works, and the activities are for a short duration, acoustic disturbance to basking sharks is not anticipated. On this basis, the potential impacts of underwater sound on basking shark have been screened out for further assessment.

The potential for vessels collision presents a potential risk for this slow-moving species. The potential for collision risk increases with vessel speed. As only a single, slow moving vessel will be present in the Survey Area during each of the survey or trial campaigns, collision risk is anticipated to be generally low. The presence of a single vessel does not constitute a change in baseline vessel activity in the area. In line with industry best practice, HWL will further reduce collision risk through the adoption of appropriate mitigation measures and by following the BCC (Shark Trust, 2026) and the SMWWC (SNH, 2017) (as outlined in Section 5).

Historical sightings of basking sharks within the Pentland Firth are fairly irregular, with no clear trends in abundance or distribution (Evans *et al.*, 2011). Dedicated basking shark surveys within the UK are limited and density estimates for UK waters are not available outside of known hotspots in the Sea of the Hebrides and South-West England (Austin *et al.*, 2019). Given their known distribution, it is considered extremely unlikely that interactions with basking sharks will occur, and hence, the potential for the proposed surveys and anchor trial activities to result in intentional or reckless disturbance or harassment of this species is equally limited. However, as disturbance to basking sharks remains a possibility from vessel disturbance alone, an application for a Basking Shark Derogation Licence under the Wildlife and Countryside Act 1981 (as amended) will be submitted.

## 3.6 Cumulative Effects

A review of the active EPS licences on the Marine Scotland Information website has been carried out to identify the potential for spatial and temporal overlap with other activities; however, there are no active EPS licences for activities in the Pentland Firth. Therefore, no significant cumulative effects on EPS are expected.

## 3.7 Conclusions

It is anticipated that there will be no injurious impacts to cetaceans as a result of the survey activities or drilled micro-pile anchor trials and no requirement to apply for an EPS Licence in that respect, once the proposed mitigation measures are applied (Section 5). However, there is potential for disturbance to cetaceans resulting from the use of SBP, UHRS and AZ. As such, HWL will apply for an EPS Licence in respect to this disturbance for these activities. However, the disturbance is expected to be limited to one or a few individuals of the local population and will therefore not result in any adverse impact to the FCS of any cetacean species.

The use of USBL will not result in any injury risk, and the extremely limited disturbance ranges result in a prediction of ≤0.01 individuals of any EPS species being exposed to disturbance at any given time. This, combined with the transient nature of the survey activities, mean that an EPS disturbance offence (as defined by the Habitats Regulations) is not anticipated to result from the use of USBL, and hence an EPS Licence will not be required for this equipment.

Although unlikely, there remains a possibility for disturbance to basking sharks in relation to potential vessel collision or disturbance. Therefore, an application for a Basking Shark Derogation Licence under the Wildlife and Countryside Act 1981 (as amended) will be submitted.

Overall, the proposed surveys and anchor trial operations constitute work of overriding public interest while presenting a minor and temporary disturbance to a few individual animals in a limited area.

# 4 PROTECTED SITES RISK ASSESSMENT

## 4.1 Relevant Protected Sites

Since an EPS Licence will be required for the proposed surveys, it is also necessary to assess potential impacts from survey activities on protected sites to inform the HRA process. The protected sites considered within the assessment are based on the selection criteria (as detailed within Section 1.4.4).

Figure 4-1 shows the protected sites (SACs, SPAs, Ramsar sites, MPAs and Sites of Special Scientific Interest (SSSI)) within a 50 km range of the survey and anchor trial areas, of which, there are no protected sites which met the criteria selection defined in Section 1.4.4. As such, it is considered that the proposed survey and drilled micro-pile anchor trials do not have the potential to result in LSE on any of the protected sites identified.

Nonetheless, a number of species protection measures will be implemented as set out in Section 5.

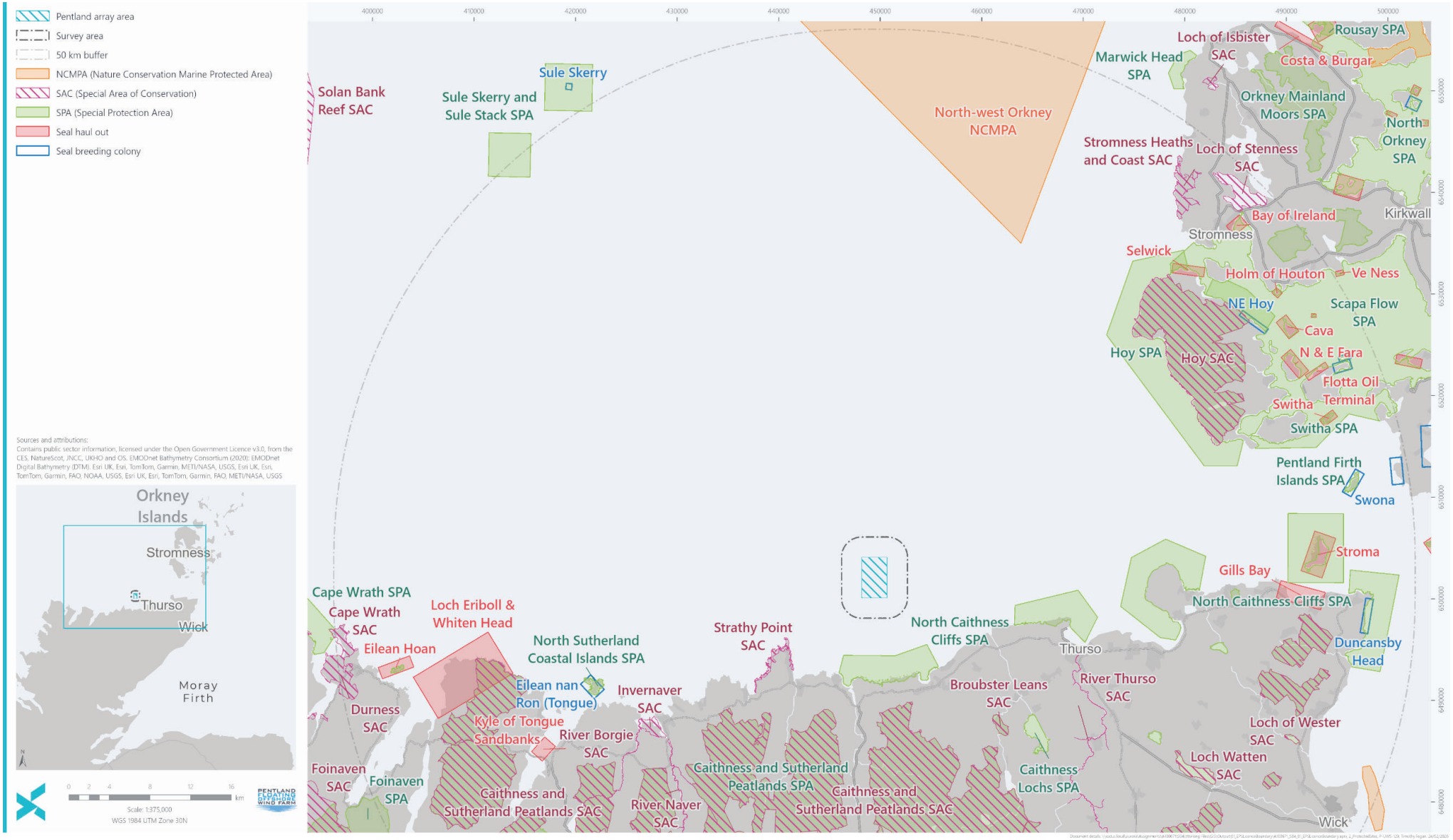


*Figure 4-1 Protected Sites in the vicinity of the Survey Area*

# 5 SPECIES PROTECTION MEASURES

## 5.1 Overview

This section summarises the proposed mitigation measures to be implemented for avoiding and reducing potential impacts on marine mammal species that may be present within the vicinity of the proposed works.

Species and task specific mitigation measures are provided below; however, the following mitigation measure will be implemented throughout all survey and anchor trial works:

- All vessels will adhere to the provisions of the SMWWC (SNH, 2017) and BCC (Shark Trust, 2026); and
- Vessel crew will be made aware of all protected species within the marine environment, and their responsibility to implement the mitigation in this document.

## 5.2 Marine Mammals

To reduce risk of injury and disturbance to marine mammals resulting from SBP survey operations, JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017) will be adopted. The key mitigation components for SBP, UHRS and AZ include:

- Deployment of a MMO to monitor for the presence of cetaceans and seals, prior to the commencement of SBP, UHRS and AZ operations;
- For SBP, UHRS and AZ operations during hours of darkness and/or in periods of poor visibility and/or during periods when the sea state is greater than Beaufort 3, deployment of Passive Acoustic Monitoring (PAM) system to detect for the presence of cetaceans that cannot be detected by the MMO;
- A 500 m mitigation zone will be implemented;
- Where the SBP, UHRS or AZ survey equipment has the capability to undergo a soft start procedure, this shall be implemented when the equipment is switched on[5];
- The mitigation zone shall be centred on the SBP, UHRS or AZ device, e.g., if the SBP, UHRS or AZ is deployed on an ROV or towered equipment, this will be the centre of the mitigation zone, and not the survey vessel; and
- Reporting of survey activities and marine mammal sightings.

### 5.2.1 M1 – Marine Mammal Observer

There will be MMO coverage for the duration of the SBP, UHRS or AZ activities, with adequately trained and experienced MMO(s) (also trained in PAM operation) working standard 12-hour shifts and will be equipped with binoculars offering at least 8x magnification. The MMO(s) will be stationed at a suitable vantage point on the survey vessel which offers 360° visibility.

### 5.2.2 M2 – Marine Mammal Monitoring

During daylight hours the MMO(s) will carry out visual observations to monitor for the presence of cetaceans and seals before the SBP, UHRS or AZ is activated and will recommend delays in the commencement of the operation should any cetaceans or seals be detected within the 500 m mitigation zone.

Should any cetaceans or seals be detected within the mitigation zone prior to the commencement of SBP, UHRS or AZ operations (or after breaks in SBP, UHRS or AZ survey activity of more than 10 minutes), operations will be delayed

[5] *It is noted that the Innomar medium-100 Parametric SBP exemplar equipment is not capable of undertaking a soft start.*

until their passage, or the transit of the vessel, results in the cetaceans or seals being outwith the mitigation zone. In both cases, there will be a 20-minute delay from the time of the last sighting within the mitigation zone to the commencement/recommencement of the SBP, UHRS or AZ operations.

### 5.2.3 M3 – Passive Acoustic Monitoring (PAM)

If SBP, UHRS or AZ operations are required when visibility is poor (i.e., due to fog or during hours of darkness) and/or during periods when the sea state is greater than Beaufort 3, the PAM system will be operated by a single MMO/PAM operator. The PAM system shall comprise of at least three hydrophone elements, allowing for directional localisation of detections, together with software allowing real time automated detection of marine mammal vocalisations (e.g., PAMGuard or equivalent).

### 5.2.4 M4 - Pre-Start Search

Visual (MMO) (and acoustic (PAM) monitoring if required) will be conducted for a pre-start search of 30 minutes i.e., prior to the commencement of SBP, UHRS or AZ operations. This will involve a visual (during daylight hours) or PAM watch (during poor visibility or at night) to determine if any (vocalising) marine mammals are within the 500 m mitigation zone.

### 5.2.5 M5 – Reporting

During survey campaigns involving SBP, UHRS or AZ operations, all recordings of cetaceans and seals will be made using JNCC Standard Forms. At the end of the operations, a monitoring report detailing the cetaceans recorded, methods used to detect them, and details of any problems encountered will be submitted to MD-LOT. The report will also include feedback on how successful the mitigation measures were. This requirement will be communicated to the MMOs at project start up meetings and at crew change.

## 5.3 Basking Sharks

### 5.3.1 M6 – Basking Shark Monitoring

As outlined in Section 5.2.1, there will be MMO coverage for the duration of the UHRS and SBP activities, with adequately trained and experienced MMO(s) working standard 12-hour shifts. The MMO will also monitor for the presence of basking shark following the mitigation measures described above for marine mammal monitoring. Should any basking sharks be detected within 500 m of the vessel prior to the commencement of SBP, UHRS or AZ surveys (or after breaks in geophysical survey activity of more than 10 minutes), operations will be delayed until their passage, or the transit of the vessel, results in the animals being out-with the mitigation zone. In all cases, there will be a 20-minute delay from the time of the last sighting within the mitigation zone to the commencement/ recommencement of the operations.

# 6 CONCLUSION

This EPS risk assessment has assessed the risk posed by the survey and anchor trial activities (including equipment calibration) associated with the Project to EPS, other protected species and protected sites. This has included assessing the risk caused by sounds emitted from the proposed geophysical surveys and drilled micro-pile anchor trials to the following receptors:

- Otters;
- Cetaceans;
- Basking sharks;
- SACs with cetacean, benthic, seal and otter qualifying features;
- NCMPAs with cetacean, basking shark, benthic, bird and otter qualifying features; and
- SPAs.

The assessment has concluded that the nature of proposed survey and anchor trial works, in combination with the proposed mitigation measures, means that no adverse injurious impact to EPS is anticipated, and an EPS Licence will not be required in this regard. However, the use of SBP, UHRS and AZ equipment may cause a disturbance impact to cetaceans, and as such, an application for an EPS Licence for disturbance will be sought by HWL. Additionally, there is potential for disturbance to basking sharks from vessels and therefore an application for a Basking Shark Derogation Licence will be sought by HWL.

The EPS and Basking Shark Derogation Licences will be applied for to cover a period of 18 months, between 1st May 2026 and 1st November 2027, allowing flexibility should there be delays to the programme.

The assessment concluded that there is no potential for the use of USBL or the drilled micro-pile anchor trials to result in an EPS injury or disturbance offence, as defined by the Habitats Regulations. As such, these activities do not require an EPS licence.

Overall, the proposed survey and anchor trial works constitute work of an overriding public interest while presenting a trivial and temporary disturbance in a limited area over a limited time period.

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# APPENDIX A COORDINATES DEFINING THE SURVEY AREA

Coordinates (WGS84) are provided in Degrees, Minutes and Seconds (DMS), Degrees and Decimal Minutes (DDM) and Decimal Degrees (DD).

| LATITUDE (DMS) | LONGITUDE (DMS) | LATITUDE (DDM) | LONGITUDE (DDM) | LATITUDE (DD) | LONGITUDE (DD) |
|---|---|---|---|---|---|
| *The Survey Area has been simplified to reduce the number of coordinates.* | | | | | |
| 58° 38' 14.34" N | 3° 48' 53.87" W | 58° 38.239' N | 3° 48.898' W | 58.63732 | -3.81496 |
| 58° 37' 58.53" N | 3° 48' 59.12" W | 58° 37.976' N | 3° 48.985' W | 58.63293 | -3.81642 |
| 58° 37' 37.28" N | 3° 49' 20.47" W | 58° 37.621' N | 3° 49.341' W | 58.62702 | -3.82235 |
| 58° 37' 21.56" N | 3° 49' 55.19" W | 58° 37.359' N | 3° 49.920' W | 58.62265 | -3.832 |
| 58° 37' 13.01" N | 3° 50' 46.16" W | 58° 37.217' N | 3° 50.769' W | 58.62028 | -3.84616 |
| 58° 37' 11.69" N | 3° 53' 31.07" W | 58° 37.195' N | 3° 53.518' W | 58.61991 | -3.89196 |
| 58° 37' 14.20" N | 3° 54' 6.96" W | 58° 37.237' N | 3° 54.116' W | 58.62061 | -3.90193 |
| 58° 37' 20.51" N | 3° 54' 35.23" W | 58° 37.342' N | 3° 54.587' W | 58.62236 | -3.90979 |
| 58° 37' 30.25" N | 3° 54' 59.66" W | 58° 37.504' N | 3° 54.994' W | 58.62507 | -3.91657 |
| 58° 37' 42.84" N | 3° 55' 18.75" W | 58° 37.714' N | 3° 55.312' W | 58.62857 | -3.92187 |
| 58° 38' 9.28" N | 3° 55' 35.95" W | 58° 38.155' N | 3° 55.599' W | 58.63591 | -3.92665 |
| 58° 40' 26.62" N | 3° 55' 40.10" W | 58° 40.444' N | 3° 55.668' W | 58.67406 | -3.92781 |
| 58° 40' 42.51" N | 3° 55' 35.82" W | 58° 40.709' N | 3° 55.597' W | 58.67848 | -3.92662 |
| 58° 40' 57.36" N | 3° 55' 24.16" W | 58° 40.956' N | 3° 55.403' W | 58.6826 | -3.92338 |
| 58° 41' 18.16" N | 3° 54' 48.37" W | 58° 41.303' N | 3° 54.806' W | 58.68838 | -3.91344 |
| 58° 41' 25.82" N | 3° 54' 21.29" W | 58° 41.430' N | 3° 54.355' W | 58.69051 | -3.90591 |
| 58° 41' 29.77" N | 3° 53' 51.43" W | 58° 41.496' N | 3° 53.857' W | 58.6916 | -3.89762 |
| 58° 41' 31.20" N | 3° 50' 53.13" W | 58° 41.520' N | 3° 50.886' W | 58.692 | -3.84809 |
| 58° 41' 23.48" N | 3° 50' 1.58" W | 58° 41.391' N | 3° 50.026' W | 58.68986 | -3.83377 |
| 58° 41' 8.31" N | 3° 49' 25.89" W | 58° 41.138' N | 3° 49.431' W | 58.68564 | -3.82386 |
| 58° 40' 43.56" N | 3° 49' 1.04" W | 58° 40.726' N | 3° 49.017' W | 58.67877 | -3.81696 |
| 58° 40' 27.67" N | 3° 48' 56.76" W | 58° 40.461' N | 3° 48.946' W | 58.67435 | -3.81577 |