European Protected Species and Basking Shark Risk Assessment

Document Reference: MCW-DWF-CNS-REP-RHS-000001

[Redacted]

Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
01	26/04/22	[Redacted]		
02	14/04/23			
03	13/11/2024			
04	16/12/2024			

Description of Revisions			
Rev	**Page**	**Section**	**Description**
01	-	-	-
02	4 6 9 28 31 35	1.3 1.3.2 1.4 3.4 3.6.3 5.1	Minor amendments following feedback from Marine Scotland as part of a variation request to the existing European Protected Species and Basking Shark Licences
03	Multiple	Multiple	Amended throughout for variation to extend licences to end of 2025 and reflect updated survey activities.
04	1 & 2	Exec. Summary, 1	Changed to reflect request for a new rather than varied licence application

REPORT

European Protected Species (EPS) and Basking Shark Risk Assessment

MachairWind Offshore Wind Farm Geophysical Survey

Client: ScottishPower Renewables

Reference: PC3479-ZZ-XX-RP-Z-0001

Status: Rev 4

Date: 16/12/2024

HASKONINGDHV UK LTD.

Honeycomb
Edmund Street
Liverpool
L3 9NG
Industry & Buildings
VAT registration number: 792428892

+44 151 2362944 **T**
+44 151 2272561 **F**
info.liv@gb.rhdhv.com **E**
royalhaskoningdhv.com **W**

Document title:	European Protected Species (EPS) and Basking Shark Risk Assessment
Document short title:	MachairWind OWF Geophysical Survey EPS and Basking Shark RA
Reference:	PC3479-ZZ-XX-RP-Z-0001
Status:	Rev 3
Date:	16/12/2024
Project name:	MachairWind Offshore Windfarm
Project number:	PC3479
Author(s):	Royal HaskoningDHV

Drafted by:	**[Redacted]**
Checked by:	**[Redacted]**
Date:	16/12/2024
Approved by:	**[Redacted]**
Date:	16/12/2024

Classification

MachairWind

Royal HaskoningDHV

Table of Contents

Executive Summary

In order to support site characterisation to aid the ongoing Environmental Impact Assessment (EIA) process and preliminary design considerations, a geophysical survey of the windfarm development area (plus a 1.5 km buffer) is required. MachairWind plans to carry out this geophysical survey in spring / summer 2025.

This European Protected Species (EPS) and Basking Shark Risk Assessment is being submitted in support of MachairWind's request for an EPS and basking shark licence.

The key findings set out in this Risk Assessment are as follows:

- Taking into account the proposed mitigation and assessments based on Sub Bottom Profiler (SBP) as a worst-case, there is no risk of auditory injury to cetaceans.
- Taking into account the potential for temporary disturbance due to the intermittent use of the survey equipment and assessments based on SBP as a worst-case, including cumulative impacts on cetaceans, there is no risk of significant disturbance that could affect the cetacean populations or their Favourable Conservation Status.
- There are no predicted significant effects on other designated sites where harbour porpoise or bottlenose dolphin are qualifying features.
- Taking into account the currently known hearing abilities of elasmobranch species, it is not expected that the geophysical survey will have any impact due to underwater noise, therefore the potential for underwater noise to cause injury or disturbance was screened out of assessment.
- Due to the slow speeds from both vessels associated with the geophysical survey, there is no potential for significant risk of injury to cetaceans or basking shark. Mitigation will be in place to reduce the potential for collision risk.

In light of the above, it is considered that EPS and basking shark licences to disturb can be issued.

1 Introduction

This European Protected Species (EPS) and Basking Shark Stage 1 Risk Assessment (RA) has been undertaken to support the EPS and Basking Shark Licence application submitted to Marine Directorate - Licensing Operations Team (MD-LOT) for the proposed geophysical survey to be undertaken within the MachairWind ('herein referred to as 'the Project') Windfarm Development Area (WDA) in 2025.

The purpose of this RA is to determine whether there is potential for the proposed geophysical survey to cause deliberate harm, or inadvertently cause disturbance to cetaceans or other protected species, and if mitigation would be required. The need for an EPS and Basking Shark Licence will be determined by MD-LOT, with advice from NatureScot, based on the findings from this RA. MD-LOT's consideration of whether an EPS Licence will be required will comprise of three tests:

1. To ascertain whether the licence is to be granted for one of the purposes specified in the Regulation 44;
2. To ascertain whether there are no satisfactory alternatives to the activity proposed (that would avoid the risk of offence); and
3. To determine that the licencing of the activity will not be detrimental to the maintenance of the population of the species concerned at a *Favourable Conservation Status* (FCS).[1]

1.1 EPS Protection

All species of cetacean (whale, dolphin, and porpoise) and otters occurring in United Kingdom (UK) waters are listed in Annex IV of the Habitats Directive as EPS, meaning that they are species of community interest in need of strict protection, as directed by Article 12 of the Directive.

This protection is afforded in Scottish territorial waters (i.e. those out to 12 nautical miles (nm) and within which the WDA is located) under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Regulation 39(1) of these Regulations make it an offence to:

a. Deliberately or recklessly capture, injure or kill a wild animal of an EPS;
b. 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;
    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; or
    vii. Disturb such an animal while it is migrating or hibernating.

Further protection is afforded through an additional disturbance offence given under Regulation 39(2) which states that "it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean)".

[1] *The Habitats Directive defined the conservation status of a species to be taken as 'favourable' when population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, when the natural range of the species is not being reduced for the foreseeable future and there is, a sufficiently large habitat to maintain its populations on a long-term basis.*

1.1.1 What constitutes disturbance?

Within 12 nautical miles

Whether or not a specific activity could cause 'disturbance' depends on the nature of the activity and the impact on the particular species. Whilst 'disturbance' is not defined in the Habitats Regulations, Marine Scotland (2014) advise that the following matters should be taken into account when considering what constitutes disturbance:

- 'Disturbance' in Article 12(1) (b) should be interpreted in light of the purpose of the Habitats Directive to which this Article contributes. In particular, Article 2(2) of the Directive provides that measures taken pursuant to the Habitats Directive must be designed to maintain or restore protected species at *Favourable Conservation Status*[1];
- Article 12(1)(b) affords protection specifically to species and not to habitats;
- The prohibition relates to the protection of 'species' not 'specimens of species';
- Although the word 'significant' is omitted from Article 12(1)(b) in relation to the nature of the disturbance, that cannot preclude an assessment of the nature and extent of the negative impact and ultimately a judgement as to whether there is sufficient evidence to constitute prohibited 'disturbance' of the species;
- It is implicit that activity during this period of breeding, rearing, hibernation and migration is more likely to have a sufficient negative impact on the species and constitute prohibited 'disturbance' than activity at other times of the year;
- Article 12(1)(b) is transposed into domestic legislation by Regulation 39(1) and (2) of the Habitats Regulations 1994. Therefore, when considering what constitutes 'disturbance', thought should be given to Regulation 39(1)(b) which provides a number of specific circumstances where an EPS could be disturbed, and which can potentially have an impact on the status of the species; and
- Disturbance that could be considered an offence may occur in other circumstances and therefore be covered under Regulation 39(2) of the Habitats Regulations which state that it is an offence to 'deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean)'.

Marine Scotland (2020) advise that, while the likelihood of acute injury can be relatively easy to determine, auditory injury accumulated over a period of time and disturbance are not so straightforward so assessments will need to be based on a number of factors including:

- The spatial and temporal distribution of the animal in relation to the activity;
- The duration of 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 for the animal to remain within the areas (e.g., food availability).

As noise can cause disturbance to cetaceans, any application for an EPS licence will require detailed information on the source level of the sound and its frequency. Where there is the possibility for disturbance to any individual EPS, an EPS RA must be carried out and the need for an EPS Licence determined.

1.2 Basking Shark Protection

Basking sharks (*Cetorhinus maximus*) are listed on Schedule 5 of the Wildlife and Countryside Act (WCA) 1981, CITES Appendix II, and are listed on the Bonn Convention on Migratory Species, and the Common Fisheries Policy. Basking sharks are protected from disturbance up to 12nm offshore by the Countryside and Rights of Way Act (2000) in England and Wales, and from the Nature Conservation (Scotland) Act (2004). Basking sharks are protected under Schedule 5 of the WCA which prohibits the killing, injuring or

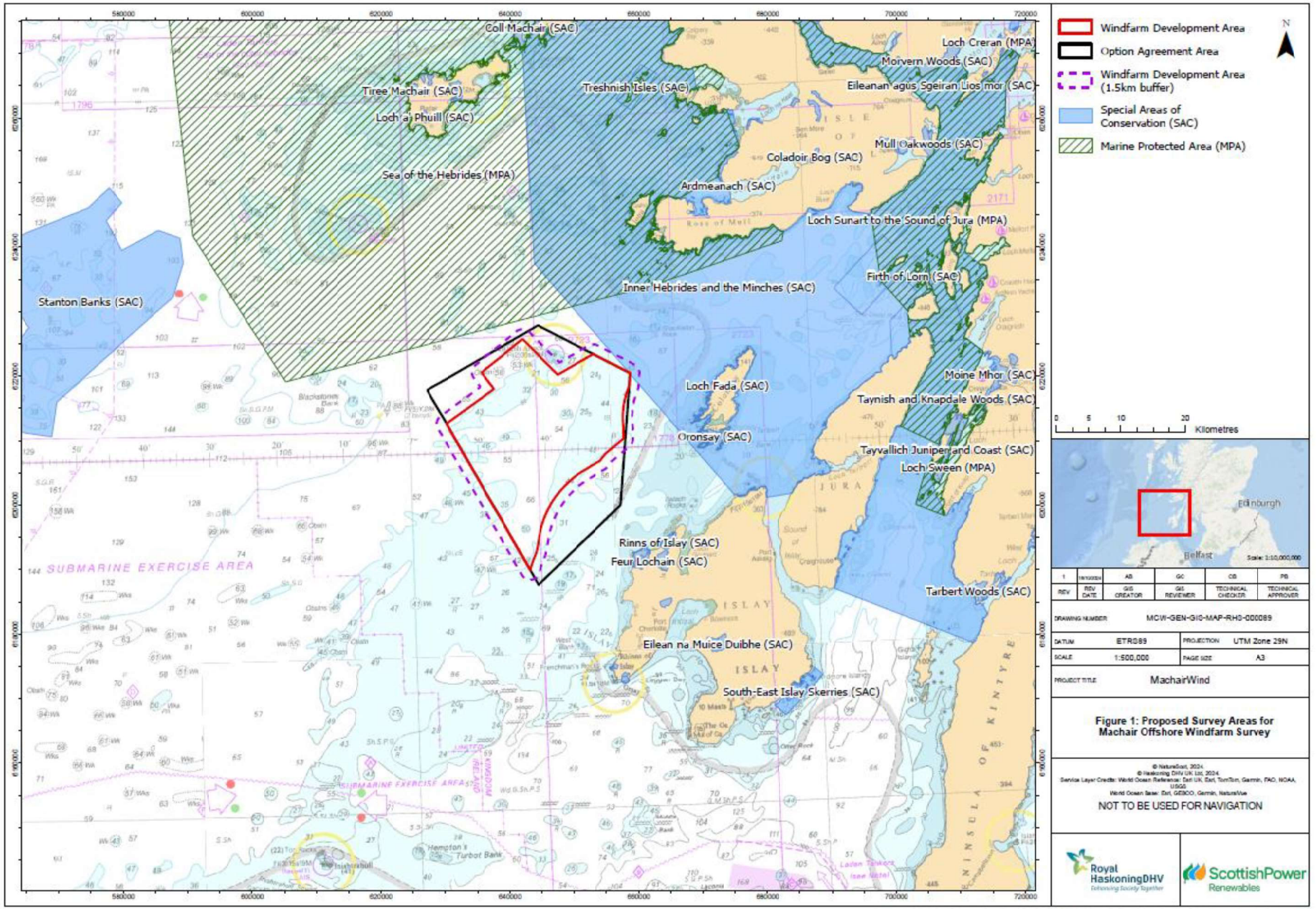
taking by any method of those wild animals listed on Schedule 5 of the Act. The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 make amendments to the WCA, strengthening the legal protection for threatened species to include 'reckless' acts, and specifically makes it an offence to intentionally or recklessly disturb or harass basking sharks. A derogation licence under the WCA will, therefore, be required for any activity which may result in disturbance or injury to basking sharks.

1.3 Geophysical Survey Works

A geophysical survey is required to assist with the Project's ongoing design work and to inform the technical design and baseline information requirements for the WDA Environmental Impact Assessment (EIA). The geophysical survey will be undertaken within the Project's WDA (see **Figure 1.1** and **Table 1.1**).

Table 1.1 Proposed geophysical survey area

Proposed Geophysical Survey Area	Area (km^2)
Windfarm Development Area	510 km^2
Windfarm Development Area plus 1.5 km buffer	**672 km^2**


Coll Machair (SAC)
Tiree Machair (SAC)
Loch a' Phuill (SAC)
Sea of the Hebrides (MPA)
Stanton Banks (SAC)
Treshnish Isles (SAC)
Loch Creran (MPA)
Moivern Woods (SAC)
Eileanan agus Sgeiran Lios mor (SAC)
Mull Oakwoods (SAC)
Coladoir Bog (SAC)
Ardmeanach (SAC)
Loch Sunart to the Sound of Jura (MPA)
Firth of Lorn (SAC)
Inner Hebrides and the Minches (SAC)
Moine Mhor (SAC)
Loch Fada (SAC)
Taynish and Knapdale Woods (SAC)
Oronsay (SAC)
Tayvallich Juniper and Coast (SAC)
Loch Sween (MPA)
Rinns of Islay (SAC)
Feur Lochain (SAC)
Tarbert Woods (SAC)
Eilean na Muice Duibhe (SAC)
South-East Islay Skerries (SAC)
SUBMARINE EXERCISE AREA
Windfarm Development Area
Option Agreement Area
Windfarm Development Area (1.5km buffer)
Special Areas of Conservation (SAC)
Marine Protected Area (MPA)
Kilometres
Edinburgh
Belfast
DRAWING NUMBER MCW-GEN-GIS-MAP-RHS-000089
DATUM ETRS89
PROJECTION UTM Zone 29N
SCALE 1:500,000
PAGE SIZE A3
PROJECT TITLE MachairWind
Figure 1: Proposed Survey Areas for Machair Offshore Windfarm Survey
NOT TO BE USED FOR NAVIGATION
Royal HaskoningDHV
ScottishPower Renewables

1.3.1 Survey vessels

The Project will deploy two vessels, one to meet the geophysical survey requirements and one for guard vessel and fishery scouting purposes.

1.3.2 Geophysical Survey Schedule and Duration

The geophysical survey is scheduled to be conducted in one campaign in 2025. The 2025 campaign is expected to commence on the 01 April and run for approximately 153 days, therefore concluding on or around the 31 August. However, MachairWind is requesting an extension of the existing licences out to 31 December 2025, in order to allow for the unlikely event of being faced with significant weather downtime delays that exceed those estimated in **Table** 1.2. The 2025 survey includes 70 noisy days of geophysical survey (i.e. any day in which any duration of geophysical survey occurs). A summary table is provided in **Table 1.2.**

Table 1.2 Summary of the geophysical survey days, weather standby and survey season days

Survey Year	Summary of activity	Weather Downtime Days	Total Noisy Days	Days Survey Vessels Potentially Present in the WDA	Survey Season (Days)
2025	Detailed Geophysical Survey (100 m x 500 m)	50	70	120	153 (01 April to 31 August)

1.4 Types of Geophysical Survey Equipment

The geophysical survey will involve different types of survey equipment as summarised in **Table 1.3**. The equipment type and frequency ranges will remain unchanged throughout the geophysical survey. At present, the exact configuration of geophysical survey equipment to be used is unconfirmed. The proposed geophysical survey equipment information (including frequency ranges) that has been used for this assessment is set out in **Table 1.4**.

Table 1.3 Types of survey equipment

Type of Survey Equipment	Description
Sub-Bottom Profilers (SBP)	SBP systems are used to identify and characterise layers of sediment or rock 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.
Ultra-high resolution (UHR) Sparker	Applied Acoustics' Dura-Spark UHD is an ultra-high resolution dual sparker system classified as a medium penetration impulsive source used to map deeper subsurface stratigraphy. Sparkers are powerful devices and can be used to penetrate seabed layers (JNCC, 2017).
Multibeam Echo Sounder (MBES)	MBES are used to obtain detailed 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.

Type of Survey Equipment	Description
Ultra-Short Baseline (USBL) system	USBL systems are used to determine the position of subsea survey items, including Remotely Operated Vehicles (ROVs), towed sensors, etc. This involves the emission of sound from a hull-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. A complete USBL system consists of a small transducer array, which is mounted under a ship, and a transponder attached to the subsea unit. An acoustic pulse is transmitted by the transducer, travels through the water and is detected by the shipboard transducer on an onboard computer which calculates the time from the transmission of the initial acoustic pulse until the reply is detected and is measured by the USBL system. This is converted into a range and bearing, and thus the position of the subsea unit / sampling equipment is determined. These systems can either be used continuously or intermittently through the operation they are supporting.
Side Scan Sonar (SSS)	SSS is used to generate an accurate image of the seabed. An acoustic beam is used to obtain an accurate 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 on to a ROV. The higher frequency systems provide higher resolution, but shorter-range measurements.
Magnetometer	Magnetometer surveys are used to detect any ferrous metal objects on the seabed, such as wrecks, unexploded ordnance (UXO), or any other obstructions. Marine magnetometers come in two types: surface towed and near-bottom. Both are towed a sufficient distance (about two ship lengths) away from the ship to allow them to collect data without it being polluted by the ship's magnetic properties. Surface towed magnetometers allow for a wider range of detection at the price of precision accuracy that is afforded by the near-bottom magnetometers.
Drop Down Video (DDV)	DDV is used to provide additional coverage of the seabed if items of interest are identified such as reef habitats or archaeological features. The DDV will be used as an additional piece of equipment to verify items of interest identified during the geophysical survey for further investigation.

SBPs have been used as a worst-case for this EPS and basking shark RA, based on the frequency range and sound levels in **Table 1.4**. Therefore, SBPs are the type of equipment with the highest risk of injury or disturbance to cetaceans. SBPs can operate at frequency ranges between 2 kHz to over 100 kHz and can have sound sources of up to 250 dB re 1µPa at 1m (peak) (**Table 1.4**), depending on the type and make of SBP to be used. The frequency range for the SBP, UHR and USBL is within cetacean hearing range (of less than 100 kHz, as noted in the Joint Nature Conservation Committee (JNCC, 2017).

There is also the requirement for MBES to be used, which emit a sound source of up to 400 kHz, and a SSS may be utilised for some elements of the work, with a likely frequency range of 230 and 540 kHz. However, these pieces of equipment are expected to operate at frequencies outwith the hearing range of cetaceans, and the following risk assessment considers the potential for impact from audible equipment with the SBP operating as the worst-case. **Table 1.4** outlines the geophysical survey equipment requirements and worst-case source levels.

Table 1.4 Intensity and frequency of sound sources

Equipment	Frequency range	Sound Level
SBP (Innomar (SES 2000)	Primary = 85 – 115 kHz Secondary = 2 – 22 kHz	SPL: 250 dB re: 1 µPa @ 1m / SEL: 218 dB re: 1µPa^2-s
MBES (EM2040 Dual Rx)	200 – 400 kHz	SPL: 215 dB re: 1 µPa @ 1m / SEL: 175 dB re: 1µPa^2-s
SSS (Edgetech 4205) (300kHz; 600kHz;)	300kHz = 210-250 kHz; 600kHz = 510-570 kHz;	300kHz = SPL: 220dB re: 1 µPa @ 1m / SEL: 200 dB re: 1µPa^2-s 600kHz = SPL:220 dB re: 1 µPa @ 1m / SEL: 196 dB re: 1µPa^2-s
USBL (Kongsberg HiPAP 501/502)	21 – 31 kHz	206 dB re 1µPa (rms)
UHR sparker (DuraSpark 400 UHD)	0.5 – 4 kHz	SPL: 220 dB re: 1 µPa @ 1m / SEL: 193 dB re: 1µPa2-s
Sound Velocity Profiler (SVP)	N/A	N/A - do not emit noise
Magnetometer	N/A	N/A - do not emit noise
DDV	N/A	N/A - do not emit noise

2 Protected Species

2.1 Cetacean Species

All cetaceans are protected under Annex IV of the EC Habitats Directive, which lists species of community interest in need of strict protection. Furthermore, both bottlenose dolphin and harbour porpoise are listed on Annex II of the Habitats Directive which lists species whose conservation requires the designation of Special Areas of Conservation (SAC).

2.1.1 Presence within the WDA

This is within Block CS-F of the Small Cetaceans in the European Atlantic and North Sea (SCANS)-IV survey (Giles et al., 2023) which provide cetacean species density estimates. A review of the SCANS-IV surveys (Giles et al., 2023), and of the data review by Waggitt et al. (2019) shows that there are 10 cetacean species known to be present in the area, including:

- Harbour porpoise (Phocoena phocoena);
- Bottlenose dolphin (Tursiops truncatus);
- Short beaked common dolphin (Delphinus delphis);
- Risso's dolphin (Grampus griseus);
- Atlantic white-sided dolphin (Lagenorhynchus acutus);
- White-beaked dolphin (Lagenorhynchus albirostris);
- Long-finned pilot whale (Globicephala melaena);
- Killer whale (Orcinus orca);
- Minke whale (Balaenoptera acutorostrata); and
- Humpback whale (Megaptera novaeangliae).

A rarer species recorded in the area includes fin whale (*Balaenoptera physalus*). Whereas other species are infrequent visitors to the region, such as sei whale (*Balaenoptera borealis*), sperm whale (Physeter macrocephalus) and striped dolphin (*Stenella coeruleoalba*) (Baines and Evans, 2012; CMACS, 2011).

A large-scale survey of the presence and abundance of cetacean species around the north-east Atlantic, undertaken in the summer of 2022 (SCANS-IV survey; Giles et al., 2023), indicates harbour porpoise to be

the most common cetacean species present in the relevant survey block CS-F (note that the WDA is within the SCANS-IV Survey Block CS- but is in close proximity to the border with Survey Block CS-G (**Plate 2-1**). Other cetacean species recorded in survey block CS-G include bottlenose dolphin and minke whale.

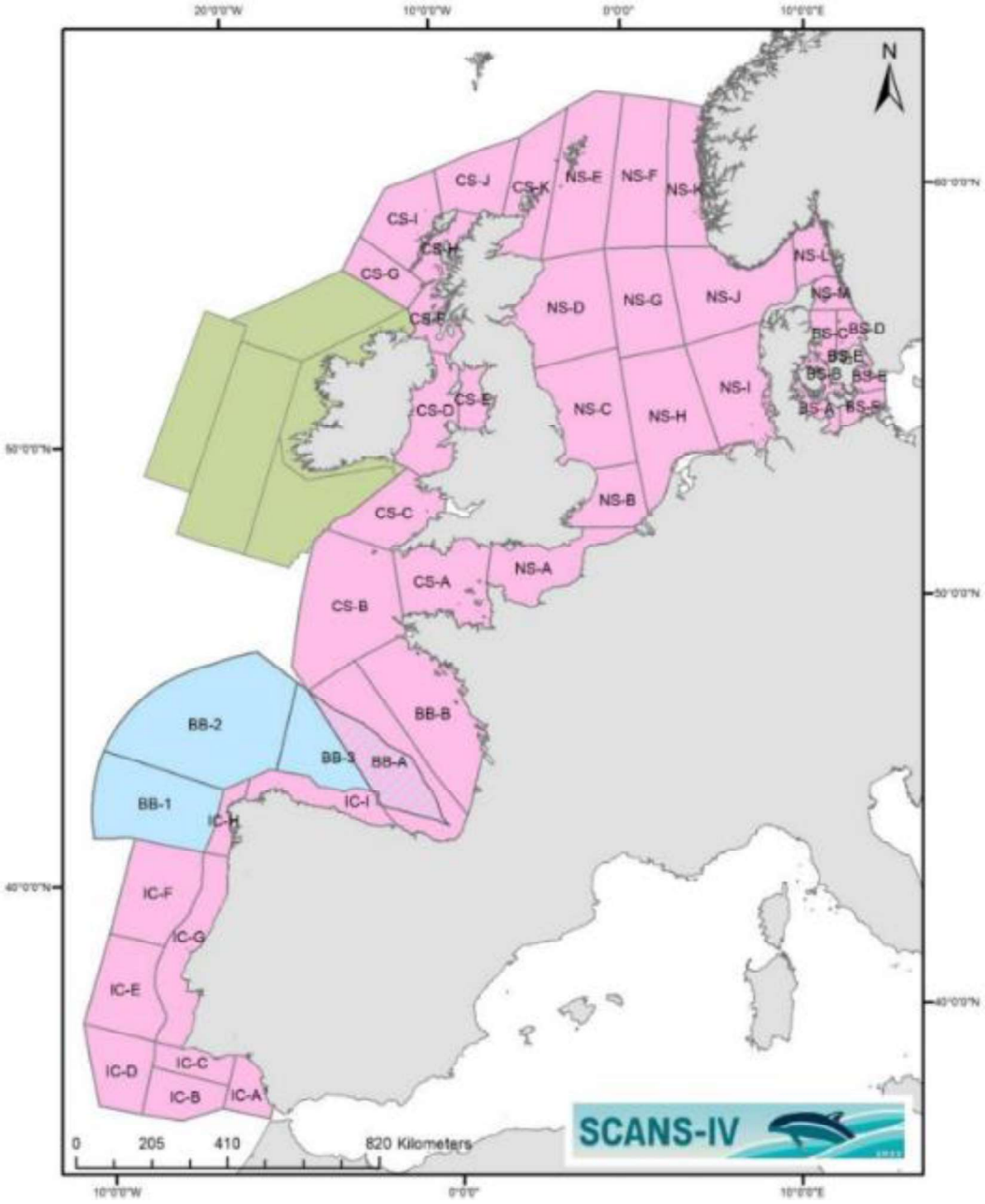


Plate 2-1 SCANS-IV Survey blocks (Giles et al., 2023)

Distribution maps of cetacean species within the north-east Atlantic also indicate that harbour porpoise is present off western Scotland in the highest densities / is the most common, followed by bottlenose dolphin (only representing the offshore population, therefore not considering the inshore population), short-beaked common dolphin and white-beaked dolphin. Risso's dolphin, Atlantic white-sided dolphin, minke whale and killer whale are present but in lower densities (**Plate 2-2**; Waggitt et al*.,* 2019).

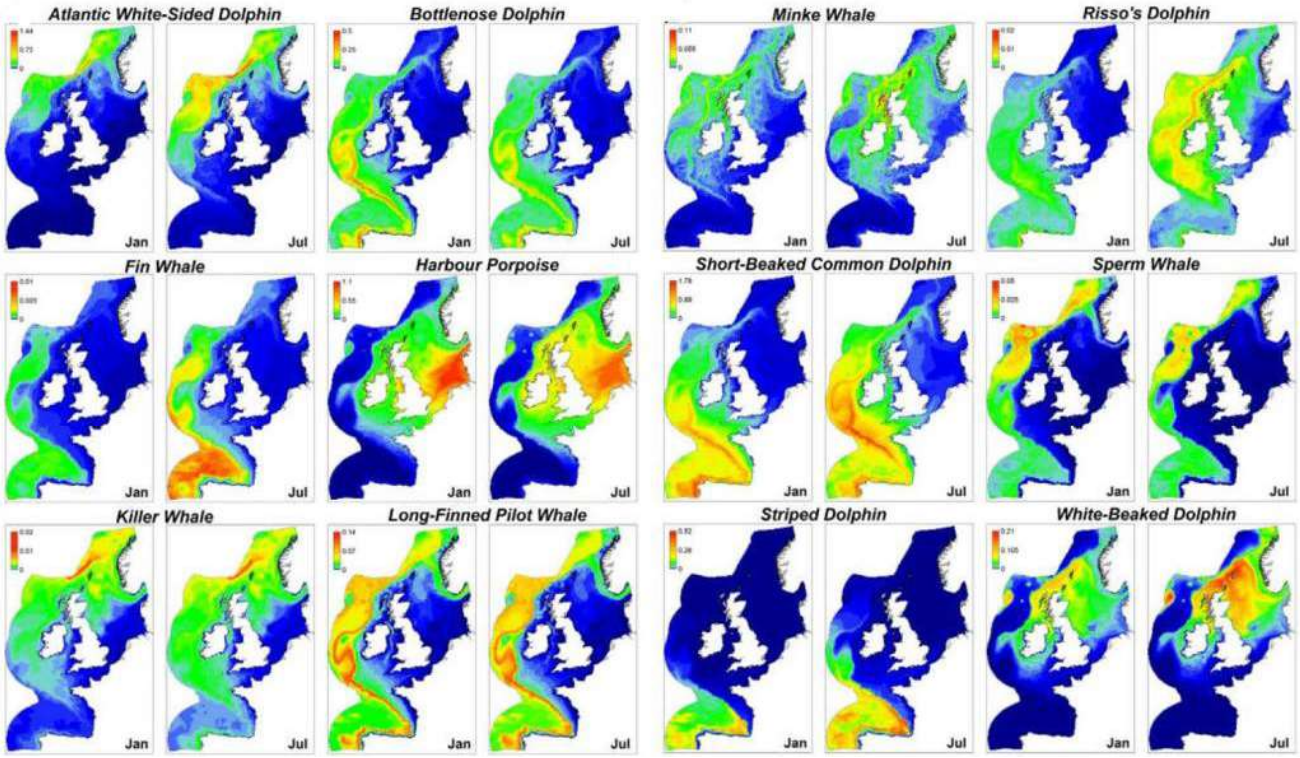


Plate 2-2 Modelled densities for marine mammal species (per km^2) in the north-east Atlantic for January and July Note that the densities for bottlenose dolphin represent the offshore ecotype, and do not include for resident populations (Waggitt et al., 2019)

The Project's monthly digital aerial surveys (DAS) recorded short-beaked common dolphin as the most abundant inside the WDA. Risso's dolphin were also recorded. Long-finned pilot whales were recorded by Marine Mammal Observers (MMO) during previous site investigation surveys. No bottlenose dolphin were recorded.

Based on the above, the cetacean species that could be present in and around the WDA include:

- Harbour porpoise;
- Bottlenose dolphin;
- Short beaked common dolphin;
- White-beaked dolphin;
- Atlantic white-sided dolphin;
- Risso's dolphin;
- Killer whale; Long finned pilot whale;
- Minke whale; and
- Humpback whale.

2.1.2 Cetacean Population Estimates

Management Units (MUs) provide an indication of the spatial scales at which any impact should be assessed for the key cetacean species (Inter-Agency Marine Mammal Working Group (IAMMWG), 2023). MUs, and the latest population estimate for each marine mammal species, have been determined based on the most relevant information, and scale at which potential impacts could occur.

For harbour porpoise, the relevant MU is the West Scotland (WS) MU, and for Atlantic white-sided dolphin, Risso's dolphin, short beaked common dolphin, white-beaked dolphin, and minke whale, there is just one

MU that covers the north-east Atlantic i.e. the Celtic and Greater North Seas (CGNS) MU (**Plate 2-3)**; (IAMMWG, 2023).

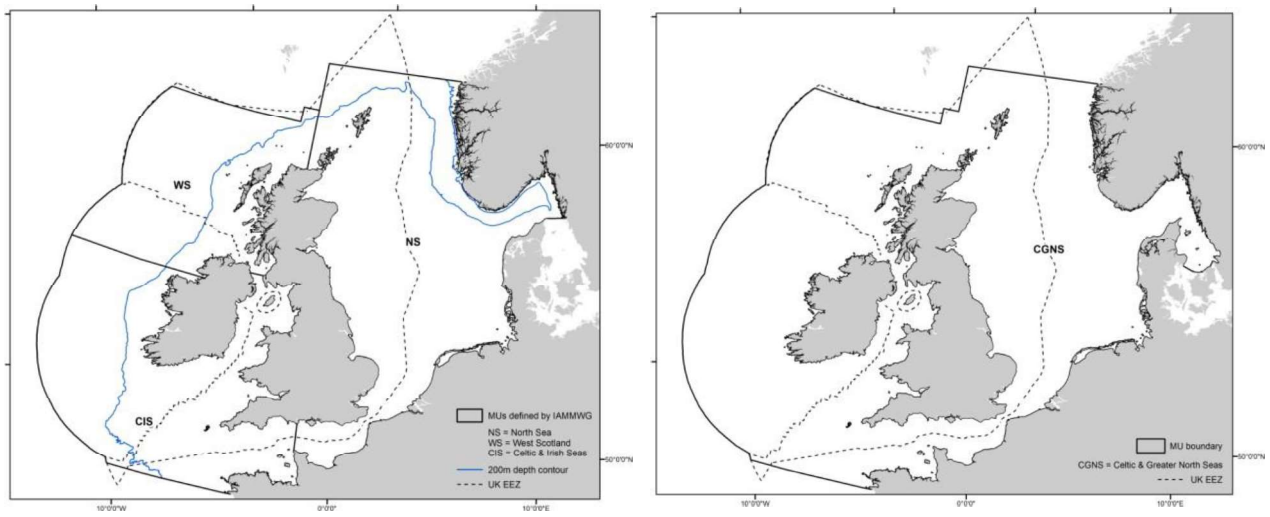


Plate 2-3 The MUs for harbour porpoise (left), and Atlantic white-sided dolphin, Risso's dolphin, short beaked common dolphin, white-beaked dolphin, and minke whale (right); IAMMWG, 2023

For bottlenose dolphin, there are seven MUs within the north-east Atlantic (**Plate 2-4)**; (IAMMWG, 2021). The WDA is within both the Offshore Waters (OW) and the Coastal West Scotland and Hebrides (CWSH) MU. There are two eco-types of bottlenose dolphin present in Europe; the coastal type and the pelagic type. These types are genetically and ecologically different from each other (Louis et al., 2014). The coastal eco-type can be further divided into specific coastal populations within Europe; the Coastal North population, containing populations from the UK and Ireland, and the Coastal South population, with individuals from Normandy and Galicia. To further investigate the demographic connectivity of the coastal populations, 425 samples from biopsies and strandings, from across the UK and north-west coasts of France and Spain, were tested and compared to establish where the coastal populations could be further split into smaller, and genetically separate populations (Nykänen et al., 2019).

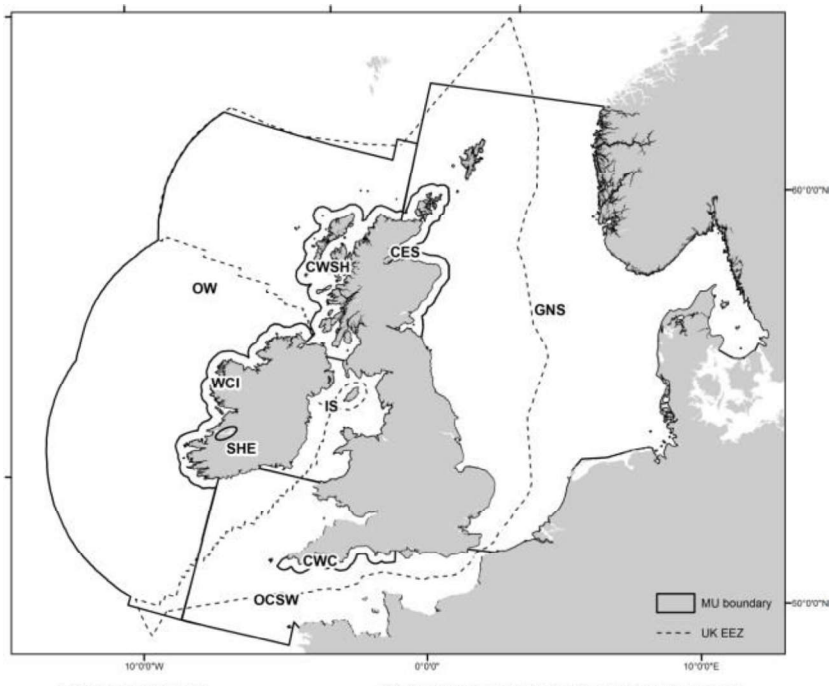


Plate 2-4 The MUs for bottlenose dolphin; IAMMWG, 2023

For the five coastal populations, there is the potential for individuals within the WDA to be from either the East and West Scotland, Wales and West Ireland, or from the wider Atlantic to be present in the WDA. Of these five populations, the migration rates from one population to another were found to be less than 1% in all possible movements, except for between Wales / West Scotland and East Scotland (with a migration rate of 25.7%), and between Galicia and East Scotland (with a migration rate of 25.7%).

This indicates, that for the WDA, any bottlenose dolphin present are most likely to be from the either the Coastal West Scotland and the Hebrides (CWSH) Management Unit (MU), or the wider Offshore Waters (OW), so both reference populations have been applied to the assessment.

As there is no MU for killer whale or long-finned pilot whale, assessment of potential impacts uses the following population estimates:

- Killer whale: Northeast Atlantic (NEA) population estimated from the North Atlantic Marine Mammal Commission (NAMMCO), (2023) and the west community (WC) population estimates (Hebridean Whale and dolphin Trust (HWDT), (2023).
- Long finned pilot whale: NEA derived from (Rogan et al., 2017).

Numbers of humpback whale are increasing in Scottish waters and are becoming more frequent in the Hebrides with individuals travelling between feeding and breeding grounds (HWDT, 2023). However, there is no regional population estimate and therefore humpback whale has been assessed qualitatively.

2.1.3 Summary of Cetacean Species

Assessments have not been undertaken for cetacean species that are considered to be rare or infrequent in the area (i.e. fin whale, sei whale, sperm whale and striped dolphin), as the potential for these cetacean species to be impacted is considered unlikely. However, any mitigation measures implemented for other species would also mitigate the effects on rare or infrequent species in the unlikely event they are present in the area during geophysical surveys and the assessments have been carried out on all the representative functional hearing groups for porpoise, dolphin and whale species.

Table 2.1 summarises the cetacean species, density estimates, and reference populations used in the assessments.

Table 2.1 Cetacean species, density estimates and reference populations

Species	Density Estimate	Reference Population
Harbour porpoise	0.2010/km^2 (SCANS-IV Survey Block CS-F; Giles et al., 2023)	WS MU = 24,305 (IAMMWG, 2023)
Bottlenose dolphin	0.0532/km^2 (SCANS-IV Survey Block CS-F; Giles et al., 2023)	CWSH MU = 45 & OW MU = 1,299 (IAMMWG, 2023)
Short beaked common dolphin	0.627/km^2 (Project Digital Aerial Surveys (DAS, 2023)	CGNS MU = 51,417 (IAMMWG, 2023)
White-beaked dolphin	0.2543/km^2 (SCANS-IV Survey Block CS-F; Giles et al., 2023)	CGNS MU = 34,025 (IAMMWG, 2021)
Atlantic white-sided dolphin	0.0224/km^2 (SCANS-IV Survey Block CS-F; Giles et al., 2023)	)CGNS MU 12,293 (IAMMWG, 2023)
Risso's dolphin	0.01/km^2 (Project DAS)	CGNS MU = 8,687 (IAMMWG, 2023)
Killer whale	0.0008/km^2 (Annual average density across WDA Waggitt et al., 2019)	15,014 (NEA) NAMMCO (2023)
		8 (WC community_ (HWDT), 2023

Species	Density Estimate	Reference Population
Long-finned pilot whale	0.0326/km^2 (SCANS-IV Survey Block CS-G; Giles et al., 2023)	152.071 (NEA) (Rogan et al., 20170
Minke whale	0.075/km^2 (Project DAS)	CGNS MU =10,288 (IAMMWG, 2023)
Humpback whale	-	-

2.2 Other Protected Species

2.2.1 Basking Sharks

Within UK waters, the basking shark is a seasonal visitor, arriving in significant numbers in May and remaining until October, with certain areas attracting higher abundances, such as the Hebrides (particularly off the islands of Skye and Mull), the Isle of Man, Malin Head, and south-west England. In the early spring and summer months, warmer waters move from the Atlantic into the coastal waters of west Scotland, England, and Wales, which encourages greater marine productivity. It is thought that this increase is the reason for the higher abundances of basking sharks during these months (The Shark Trust, 2018).

The basking shark is an elasmobranch (sharks and rays) which is a group with generally low sensitivity to noise vibrations due to the fact they do not have a swim bladder (Popper et al., 2014; NatureScot, 2019). The hearing range of basking sharks is not known; however, five other elasmobranchs have been found to have a hearing range between 20 Hz to 1 kHz with greatest sensitivities at lower frequencies (Mickle et al., 2020). This may or may not be transferable to basking sharks (Macleod et al., 2011). As 20 Hz - 1 kHz only encompass a small proportion of the noise emitted during the proposed site investigation surveys, and the activities will be intermittent, noise disturbance is not expected to impact basking sharks. On this basis, the potential for noise emissions to impact upon basking sharks is screened out of further assessment.

Vessel collision also poses a threat to this slow-moving species and basking sharks have a medium sensitivity to collision (NatureScot, 2019). Collision risk increases with increasing vessel speed; as the survey vessels will be moving slowly, collision risk is generally low. Risk will be reduced further by mitigation measures implemented for the geophysical survey (**Section 4**).

The Hebridean Whale and Dolphin Trust (HWDT) has been collecting data on marine megafauna in the Hebrides since 2002, and in 2023 recorded 0.069 sightings per 100 km^2, which equates to 0.0007 per km^2 which is the lowest record in the past 20 years. Most sightings of basking shark were recorded within the Sea of Hebrides Nature Conservation Marine Protected Area (NCMPA) or just north of the NCMPA. (Hartny-Mills et al., 2024). NMPi (2022) reports basking sharks to be present in the WDA at a predicted density of 0.00-0.009 animals/km^2. The Shark Trust has recorded 99 sightings off the west coast of Scotland between 2003 – 2022 and there is an estimated abundance of 112 individuals (Shark Trust, 2020).

2.2.2 Marine Turtles

Five species of marine turtle have been recorded in the UK, with the majority of sightings being of leatherback turtles (*Dermochelys coriacea*), which is considered to be resident in UK waters (DECC, 2016). Other species of marine turtle are considered to be rare or vagrant within UK waters. The leatherback turtle has been recorded in the WDA in very small numbers via the Project's DAS, where they migrate through UK waters, in response to food distributions. Nesting locations are in the tropics and sub-tropics, and then individuals migrate north, some towards the European shelf, reaching UK waters. Waters around the UK are at a temperature that reaches their lower limit, and the species are therefore only present in warmer summer months (specifically between June to October) (DECC, 2016).

Information on the hearing abilities and sensitivities of marine turtles is limited; however, initial auditory hearing studies have found that turtle species hear in the range of 100 Hz to 2,000 Hz (e.g., Ridgway et al., 1969). (Martin et al., 2012) measured underwater hearing abilities in loggerhead turtles *Caretta caretta and* found a behavioural sensitivity threshold of between 100 Hz and 400 Hz, at about 100dB re 1 µPa.

While there is a small likelihood of the geophysical survey sound sources being within marine turtle hearing ranges, it is also unlikely that there would be any marine turtle in close proximity of the geophysical survey itself. In addition, the mitigation measures outlined in **Section 4** will ensure that there are no marine turtles present within the monitoring zone, prior to the geophysical survey commencing. It is not expected that there would be any significant risk to leatherback turtles from the geophysical survey. Therefore, the potential effects on marine turtles have not been assessed further.

2.2.3 Pinnipeds

Harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) are common throughout UK waters. Although both species are Annex II species, they are not listed on Annex IV of the Habitats Directive, and as such are not classified as EPS. Seals are protected in the UK under the Conservation of Seals Act 1970. Both species are listed under Annex II of the EU Habitats Directive and are considered Scottish Priority Marine Features (PMFs). The Protection of Seals (Designated of Haul-Out Sites) (Scotland) Order 2014 introduces additional protection for seals at 194 designated haul-out sites, where harbour seal and grey seal come ashore to rest, moult or breed.

2.3 Designated Sites

Potential effects of the geophysical survey on designated sites are assessed in **Section 3.6**.

2.3.1 Special Areas of Conservation (SACs)

SACs are designated under Regulation 33(2) of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland). Part II of the Habitats Regulations sets out the provisions for the selection of Special Areas of Conservation (SACs) for Annex I habitats and Annex II species. Key to the designation of SACs is Paragraph 7 (2), the relevant part of which states: "...*For aquatic species which range over wide areas, such sites will be proposed only where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction*".

The Inner Hebrides and the Minches SAC

The closest harbour porpoise SAC is the Inner Hebrides and the Minches SAC, which is adjacent to the WDA. The Inner Hebrides and the Minches has been designated because of its importance to harbour porpoise year-round as it contains the highest density of harbour porpoise in Scotland (NatureScot, 2020a). It is the second largest Marine Protected Area (MPA) for harbour porpoise in Europe and the only one for harbour porpoise in Scotland and as such it provides protection to approximately 32% of the harbour porpoise population found on the west coast of Scotland.

To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining FCS for Harbour Porpoise in UK waters. In the context of natural change, this will be achieved by ensuring the following:

1. To ensure that the Inner Hebrides and the Minches SAC continues to make an appropriate contribution to harbour porpoise remaining at favourable conservation status.
2. To ensure for harbour porpoise within the context of environmental changes, that the integrity of the Inner Hebrides and the Minches SAC is maintained through:
    a. Harbour porpoise within the Inner Hebrides and the Minches are not at significant risk from injury or killing.
    b. The distribution of harbour porpoise throughout the site is maintained by avoiding significant

disturbance.

c. The condition of supporting habitats and the availability of prey for harbour porpoise are maintained.

Treshnish Isles SAC

The Treshnish Isles SAC, which is located 42 km from the WDA, is a remote chain of uninhabited islands and skerries situated in south-west Scotland. The islands, numerous skerries, islets and reefs support a breeding colony of grey seals *Halichoerus grypus*, contributing just under 3% of annual UK pup production and has a population abundance of approximately 3,400 individuals (JNCC, 2015a, Argyllmarinesac.org, 2024). The conservation objectives for Treshnish Isles SAC are:

1. To avoid deterioration of the habitats of the qualifying species (grey seal) or significant disturbance to grey seal, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for grey seal; and

2. To ensure for the qualifying species that the following are maintained in the long term:
    a. Population of the species as a viable component of the site.
    b. Distribution of the species within site.
    c. Distribution and extent of habitats supporting the species.
    d. Structure, function and supporting processes of habitats supporting the species.
    e. No significant disturbance of the species.

South-East Islay Skerries SAC

The skerries, islands and rugged coastline of the Inner Hebridean island of Islay hold a nationally-important population of the Harbour seal *Phoca vitulina*. The South-East Islay Skerries SAC is located 58.5 km from the WDA and has a population abundance of between 501 – 1,000 individuals (JNCC, 2015b). The south-east coastline areas are extensively used as pupping, moulting and haul-out sites by the seals, which represent between 1.5% and 2% of the UK population.

1. To avoid deterioration of the habitats of the qualifying species (harbour seal) or significant disturbance to grey seal, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for grey seal; and

2. To ensure for the qualifying species that the following are maintained in the long term:
    a. Population of the species as a viable component of the site.
    b. Distribution of the species within site.
    c. Distribution and extent of habitats supporting the species.
    d. Structure, function and supporting processes of habitats supporting the species.
    e. No significant disturbance of the species.

2.3.2 Nature Conservation Marine Protected Area (NCMPA)

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 Nature Conservation Marine Protected Area (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 hindering the achievement of the conservation objectives, then they must notify the relevant conservation bodies. It is an offence to intentionally or recklessly kill, remove, damage, or destroy any protected feature of an NCMPA. Marine Directorate must be sure that consenting/licensing decisions do not cause a significant risk to the conservation objectives of any NCMPA.

2.3.3 The Sea of the Hebrides NCMPA

The Sea of the Hebrides NCMPA is 3 km from the WDA at its closest point, where basking shark, minke

whale, fronts and geodiversity features, are protected features. Basking sharks are considered to be most sensitive to collision with vessels, and somewhat sensitive to entanglement in fishing gear and disturbance from underwater noise. Minke whales are sensitive to underwater noise (leading to disturbance and possibly injury), entanglement in fishing gear and collision with vessels. NatureScot also note the importance of sandeels as prey species of minke whales within the site (NatureScot, 2020b).

NatureScot, (2020b) advises that, in order to conserve basking sharks and minke whales, risk of injury and death should be minimised, access to resources within the site should be maintained, and supporting features should also be conserved.

2.3.4 Designated Seal Haul-Out Sites

Seal haul-out sites are coastal locations that seals use to breed, moult and rest. Almost 200 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 (**Figure 2.1**). These haul-out sites are protected under Section 117 of the Marine (Scotland) Act 2010. The Act is designed to assist in protecting the seals when they are at their most vulnerable, and as such provide additional protection from intentional or reckless harassment.

In total there are 26 protected seal haul-out sites within the vicinity of the WDA, with the closest being Oronsay at 14.3 km, Nave Island 14.6 km and Oronsay Strand 15.2 km.

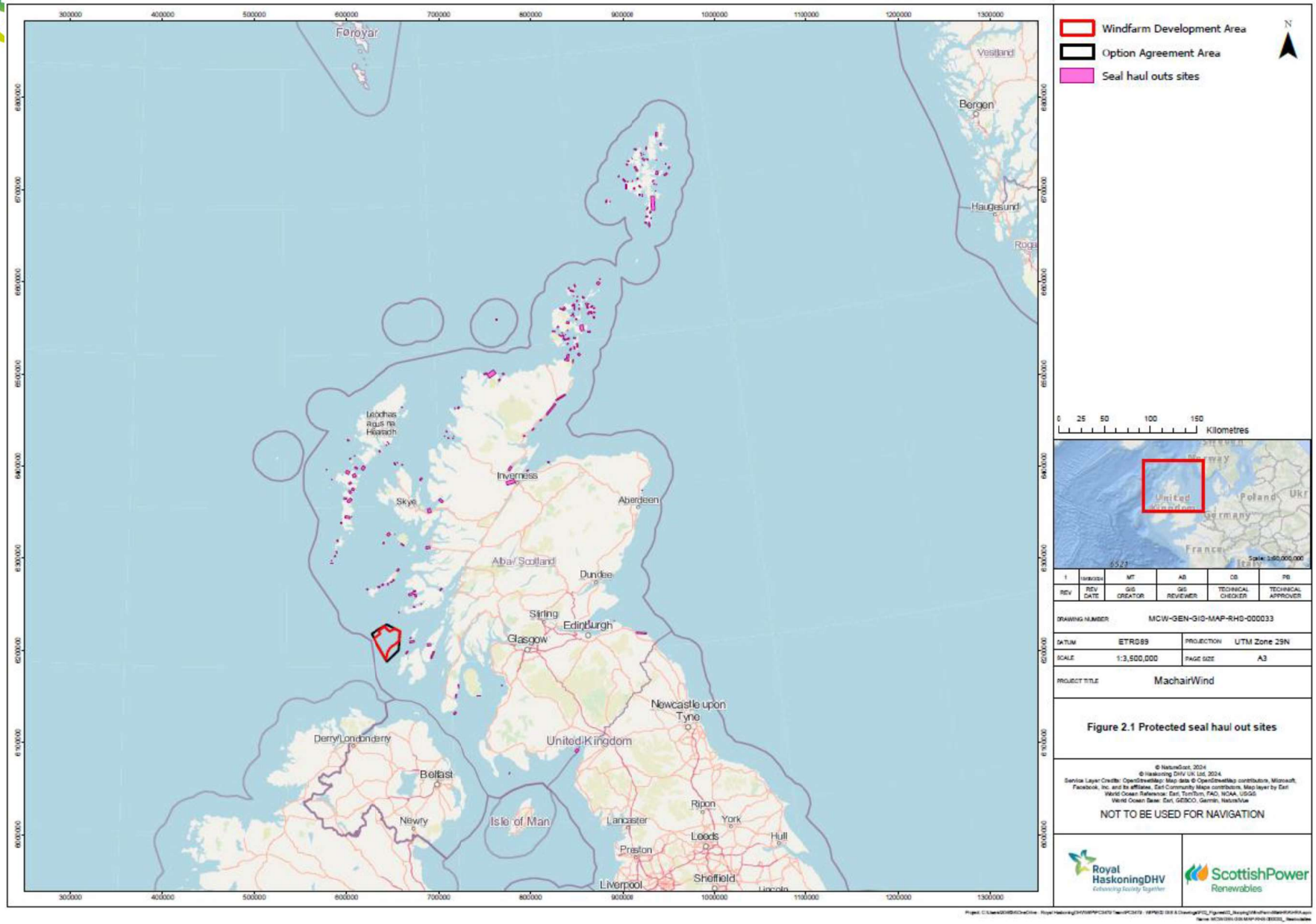


Figure 2.1 Protected seal haul-out sites

3 European Protected Species Stage 1 Risk Assessment

3.1 Potential Impacts

Potential impacts to cetaceans during site investigation surveys are:

- Permanent change in hearing sensitivity / auditory injury (Permanent Threshold Shift (PTS)) from underwater noise;
- Disturbance from underwater noise;
- Disturbance from presence of vessels; and
- Increased collision risk with vessels.

Underwater noise has the potential to impact cetaceans if the frequency is within their hearing range (**Table 3.1**) and / or the sound levels are greater than thresholds for the species (**Table 3.2**) (Southall et al., 2019).

Table 3.1 Cetacean and turtle hearing ranges (from Southall et al., 2019; Mickle et al., 2020 and Ridgway et al., 1969)

Species Hearing Group	Generalised Hearing Range
Harbour porpoise Very high-frequency cetaceans (VHF)	275 Hz to 160 kHz
Dolphin species (including killer whale and long-finned pilot whale) High-frequency cetaceans (HF)	150 Hz to 160 kHz
Minke whale and humpback whale Low-frequency cetaceans (LF)	7 Hz to 35 kHz
Basking shark	20 Hz to 1 kHz
Leatherback turtle	100 Hz to 2 kHz

Table 3.2 Cetacean threshold and criteria for underwater noise (from Southall et al., 2019)

Species Hearing Group	Unweighted SPL_{peak} (dB re 1 µPa)		Weighted SEL_{cum} (dB re 1 µPa²s)			
	Impulsive		Impulsive		Non-impulsive	
	PTS	TTS	PTS	TTS	PTS	TTS
Harbour porpoise Very high-frequency cetaceans (VHF)	202	196	155	140	173	153
Dolphin species High-frequency cetaceans (HF)	230	224	185	170	198	178
Minke whale and humpback whale Low-frequency cetaceans (LF)	219	213	183	168	199	179

The potential for auditory injury is not just related to the level of the underwater sound and its frequency relative to the hearing bandwidth of the animal but is also influenced by the duration of exposure. Southall et al. (2019) gives individual criteria based on whether the noise source is considered impulsive or non-impulsive. Southall et al. (2019) categorises impulsive noises as having high peak sound pressure, short duration, fast rise-time and broad frequency content at source, and non-impulsive sources as steady-state noise. Seismic airguns are considered impulsive noise sources. Sonars, vessels and other low-level

continuous noises are considered non-impulsive. A non-impulsive noise does not necessarily have to have a long duration.

Southall et al. (2019) presents single strike, unweighted peak criteria for Sound Pressure Level (SPL) (SPL_{peak}) and cumulative (i.e. more than a single sound impulse) weighted Sound Exposure Level (SEL) criteria (SEL_{cum}) for both permanent threshold shift (PTS), where unrecoverable hearing damage may occur, and temporary threshold shift (TTS), where a temporary reduction in hearing sensitivity may occur in individual receptors (**Table 3.2**).

There are currently no agreed thresholds and criteria for disturbance from underwater noise. However, unweighted impulsive single-strike criteria from Lucke et al. (2009) for behavioural response in harbour porpoise, based on impulsive seismic airgun stimuli, is:

- 145dB re 1 μPa^2s (SEL_{ss})

Table 3.3 summarises the potential impact to marine mammals from the different types of survey equipment, taking into account frequency range and sound levels.

JNCC et al. (2010) assessed MBES system to have the potential to emit sound sources of up to 248 dB re 1µPa @1m, with frequencies of between 10 kHz and 200 kHz; the proposed equipment for the survey has a dual operating range of 200 kHz to 400 kHz. Due to the high amplitude of MBES, there is the potential for auditory injury to marine mammal species, however this is highly unlikely as an animal would need to be within very close proximity of the source.

It is also unlikely that the MBES could cause disturbance when active for a short period due to the operating frequencies being outside the audible range of all marine mammals (JNCC et al., 2010). MBES surveys that are carried out in waters of less than 200 m in depth are not considered to be a risk to marine mammals, as it is thought that the higher frequencies typically used fall outside of their hearing ranges, and the sounds are likely to attenuate quickly due to the high frequencies used. JNCC therefore advise that mitigation is unlikely to be required for MBES surveys in shallow (less than 200 m water depth) surveys (JNCC, 2017).

Similarly, the high frequency of the SSS falls outside of the hearing ranges for marine mammals the proposed survey SSS operates between 210-890 kHz, and the sounds are likely to attenuate quickly due to the high frequencies used. Therefore, as for the MBES, mitigation in shallow waters (less than 200 m) is not required.

Depending on the type of equipment, the SBP that can operate on frequencies between 3.5 kHz and 7 kHz (for pingers) and 0.5 kHz and 5 kHz (for boomers), with recorded amplitudes of up to 209 dB re 1 Pa RMS @ 1m (JNCC et al., 2010). Frequency ranges of the SBP used in the survey (0.5 – 15 kHz) can be within cetacean hearing range and will therefore be audible to cetacean species that could be present in the area. There is therefore the potential for disturbance impacts to occur. Most of the sound energy generated by the SBP equipment will be directed towards the seabed and the pulse duration is extremely short, with the continuous movement of the survey. Auditory injury effects are not predicted, as an animal would need to remain in the very small zone of ensonification for a prolonged period, which is highly unlikely (JNCC et al., 2010). SBP has been assessed as worst-case for cetacean impacts from site investigation survey equipment. None of the equipment used will involve seismic airguns.

Table 3.3 Summary of potential impacts to cetacean species from site investigation survey equipment and vessels

Equipment	Potential Impacts to Cetacean Species	Assessed Further
MBES	The MBES system will be hull mounted and emit a sound source of 200 kHz and 400 kHz, with a SEL of 175 dB re 1 µPa^{2}s and a SPL peak of 215 dB re 1 µPa. The frequencies used by MBES are generally very high and outside of the main hearing range of cetacean species.	**No** As the equipment is outside main hearing range of cetacean, no further assessment required.
SSS	A SSS may be utilised for all elements of the work, with a likely frequency range of 210 kHz and 540 kHz. The frequencies used by SSS are generally very high and outside of the main hearing range of cetacean species.	**No** As the equipment is outside main hearing range of cetacean no further assessment required.
UHR	For the proposed surveys, the UHR has an operating frequency of 0.5 - 4 kHz. The UHR has operating frequencies within marine mammal hearing range.	There is the potential for injury and disturbance impact, however SBP assessed as worst-case for marine mammal impacts.
SBP	For the proposed surveys, the SBP could have a frequency of 2 - 22 kHz, depending on the band selected. The SBP frequency ranges are within cetacean hearing range and will therefore be audible to the marine mammal species that could be present in the area.	**Yes** Potential risk of PTS assessed further. Potential disturbance assessed further.
USBL	For the proposed surveys the USBL operating frequency would be typically 21-31 kHz. The USBL also has operating frequencies within marine mammal hearing range.	There is the potential for injury and disturbance impact, however SBP assessed as worst-case for marine mammal impacts.
Magnetometer	Magnetometers do not emit noise as a part of their normal functioning, so there is no possibility of injury or disturbance.	**No**
DDV	DDV do not emit noise as a part of their normal functioning so there is no possibility of injury or disturbance.	**No**
Vessels	Source levels are likely to be too low to result in PTS or TTS, however, they will be audible to most species, and thus have the potential to result in disturbance. Vessels within the WDA and transits to and from the WDA could increase collision risk.	**Yes** Potential for disturbance from underwater noise vessels. Potential for increased collision risk.

3.2 Assessment of potential effects of survey equipment on EPS

The Review of Consents (RoC) Habitats Regulations Assessment (HRA) for the Southern North Sea (SNS) Special Area of Conservation (SAC) (BEIS, 2020) undertook underwater noise modelling to determine the

potential impact ranges of site investigation surveys for harbour porpoise.

For this, the assessment used the maximum source levels that could be expected from geophysical survey equipment: SBP; (based on a threshold of 140 dB re 1 µPa SPL unweighted), with a maximum source noise level of 267 dB re 1 µPa-m. The noise modelling indicates that the permanent loss of hearing sensitivity (PTS) in harbour porpoise could occur within a maximum of 23 m (an area of 0.0017 km2) from the source location (BEIS, 2020). This is based on the PTS cumulative threshold of 155 dB SEL weighted (**Table 3.2**); (Southall et al., 2019).

The modelling for BEIS (2020) predicted a maximum impact range of 3.77 km (44.65 km^2) for possible behavioural disturbance of harbour porpoise, based on a threshold of 140 dB re 1 µPa SPL unweighted (BEIS, 2020).

As harbour porpoise have the lowest auditory injury thresholds, PTS impact ranges for all other species are expected to be less than 23 m from the source. In addition, most of the sound energy generated by the SBP equipment will be directed towards the seabed and the pulse duration is extremely short, further limiting the potential for PTS.

The current guidance for assessing the significance of underwater noise disturbance in relation to SACs designated for harbour porpoise (JNCC et al., 2020), recommends the use of an Effective Deterrence Radius (EDR) of 5 km for geophysical surveys. As a highly conservative worst-case approach, a disturbance range of 5 km (an area of 78.53 km^2) has been used to determine the potential disturbance for other cetacean species.

The SBP proposed for the geophysical survey includes the hull mounted Innomar SES 2000 with an operating frequency of 8.5 – 11.5 kHz and a DuraSpark 400 UHD operating at 0.5 - 4 kHz. Scottish and Southern Energy, (2020) undertook noise modelling results for injury impacts from impulsive noise sources including the Innomar SES 2000. The worst case operating SPL_{Peak} was modelled as 445 m for VHF cetaceans when operating at 4 kHz.

For the SBP, it is realistic and appropriate to base the assessments on the potential impact area around the geophysical survey vessel, as the potential risk of PTS and disturbance would be around the geophysical survey vessel at any one time. Marine mammals would not be at risk throughout the entire area surveyed in a day, as animals would return once both vessels had passed, and the disturbance had ceased. However, in the BEIS, (2020) RoC HRA, it was estimated that in the unlikely event that an SBP is used continuously over a period of 24 hours with a vessel speed of 7.4 km/h (4 knots) a total area of approximately 256 km^2 per day could be affected (BEIS, 2020). As outlined in the RoC HRA (BEIS, 2020), this is a highly precautionary scenario as it is very unlikely that a SBP would be undertaken along a single transect line of 178 km in a single day. The current geophysical survey plan indicates that the geophysical survey vessel is expected to cover a transect length of up to 120 km per day. In addition, as noted above, it is highly unlikely that cetaceans would be disturbed from the full area for a period of 24 hours, therefore the daily survey area assessment is considered highly precautionary.

Table 3.4 presents a summary of the desk-based review of potential impact ranges for SBP, as worst-case for the geophysical survey. The presented case studies were chosen as they were the most comparable in environmental characteristics to the Project.

Table 3.4 Summary of the desk-based review of potential impact ranges for SBP

Equipment	Species	Potential effect	Threshold (and source)	Reported range of effect	Reference
Sub bottom profiler	Harbour porpoise	PTS onset	155 SEL_{cum} dB re 1 µPa (NMFS, 2018)	23 m	BEIS (2020)
		Behavioural	140 SPL_{RMS} dB re 1 µPa unweighted; (NMFS, 2018)	3.77 km	
Sub bottom profiler (220 dB re 1 µPa @ 1m peak)	Harbour porpoise	PTS	Not reported	32 m	Neart na Gaiothe Offshore Wind (2019)
	Dolphin species	PTS	Not reported	0 m	
	Whale species	PTS	Not reported	5 m	
	Cetaceans	Disturbance	Not reported	1.5 km	
Sub bottom profiler (215 SPL_{peak} dB)	Dolphin species	PTS	230dB_{peak} / 185dB SEL_{cum} (NMFS, 2018)	0 m	Wieting (2019)
	Whale species	PTS	219dB_{peak}, 183dB SEL_{cum} (NMFS, 2018)	<1 m	
	Harbour porpoise	PTS	202dB_{peak} / 155dB SEL_{cum} (NMFS, 2018)	<3 m	
Sub bottom profiler (4kHz) (235 SPL_{peak} dB 1µPa)	Harbour porpoise	PTS	230dB_{peak} / 185dB SEL_{cum} (Southall *et al.,* 2019)	445 m	Scottish and Southern Energy (2020)
	Dolphin species	PTS	219dB_{peak}, 183dB SEL_{cum} (Southall *et al.,* 2019)	98 m	
	Whale species	PTS	202dB_{peak} / 155dB SEL_{cum} (Southall *et al.,* 2019)	178 m	
	Cetaceans	Disturbance	Not reported	3.12 km	

3.2.1 PTS

Table 3.5 presents the PTS impact range and areas used in the assessments, based on the worst-case for SBP (**Table 3.4**).

Table 3.5 PTS impact ranges for SBP used in assessments

Potential Impact	Species	Predicted maximum impact range	Maximum predicted area of potential impact – one geophysical vessel
PTS	Harbour porpoise (VHF)	445 m	0.62 km^2
	Dolphin species (HF)	98 m	0.03 km^2

Potential Impact	Species	Predicted maximum impact range	Maximum predicted area of potential impact – one geophysical vessel
	Whale species (LF)	178 m	0.10 km^2

Table 3.6 summarises the PTS assessment for cetaceans, based on the worst-case for SBP, for a single geophysical survey vessel to be undertaking geophysical activities within the WDA.

Table 3.6 PTS assessment for cetaceans

Potential Impact	Species	Maximum number of individuals (% of ref pop) – one geophysical vessel
PTS	Harbour porpoise	0.12 (0.0005% WS MU)
	Bottlenose dolphin	0.001 (0.002% CWSH & 0.0001% OW MU)
	Short-beaked common dolphin	0.02 (0.0003% CGNS MU)
	White-beaked dolphin	0.007 (0.00002% CGNS MU)
	Atlantic white-sided dolphin	0.0006 (0.000005% CGNS MU)
	Risso's dolphin	0.0003 (0.000003% CGNS MU)
	Killer whale	0.00002 (0.0000002% NEA MU & 0.003 WC MU)
	Long-finned pilot whale	0.001 (0.0000006% NEA MU)
	Minke whale	0.008 (0.000007% CGNS MU)

The implementation of the mitigation measures outlined in **Section 4** dramatically reduces the risk of injury to animals including humpback whale as a result of SBP operations (assessed as the worst-case survey equipment). Accordingly, the noise-emission characteristics of the SBP, coupled with the mitigation strategies, preclude the potential to commit an offence with regards to injury or to affect the FCS of any cetacean species and, therefore, there is no requirement for an EPS Licence.

3.2.2 Disturbance from underwater noise from the geophysical survey

Table 3.7 presents the predicted disturbance impact range and areas, based on the worst-case for SBP (**Table 3.4**).

Table 3.7 Predicted disturbance impact ranges for SBP

Potential Impact	Species	Predicted maximum impact range	Maximum predicted area of potential impact – one geophysical vessel
Disturbance	Harbour porpoise	3.77 km	44.65 km^2
	Other cetaceans	3.12 km	30.58 km^2

Table 3.8 summarises the disturbance assessment for cetaceans, based on the worst-case for SBP, for one geophysical survey vessel operating at the WDA.

Table 3.8 Disturbance assessment for cetaceans

Potential Impact	Species	Maximum number of individuals (% of ref pop) – one geophysical vessel
Disturbance	Harbour porpoise	9..0 (0.003% WS MU)
	Bottlenose dolphin	1.6 (3.6% CWSH & 0.12% OW MU)
	Short-beaked common dolphin	19.2 (0.033% CGNS MU)
	White-beaked dolphin	7.8 (0.022% CGNS MU)
	Atlantic white-sided dolphin	0.7 (0.005% CGNS MU)
	Risso's dolphin	0. 3 (0.003% CGNS MU)
	Killer whale	0.02 (0.0001% NEA MU & 0.3% WC MU)
	Long-finned pilot whale	1.0 (0.0006% NEA MU)
	Minke whale	2.3 (0.022% CGNS MU)

Any disturbance would be temporary and marine mammals would be expected to return to the area once the geophysical vessel has passed and the noise source ceased. It is possible that a small number of individual animals may experience some level of disturbance while they encounter noise emissions. As such, an EPS Licence is required for activities within 12 nm (as per Regulation 39(2)). Potential disturbance impacts will be minimised with the implementation of mitigation measures set out in **Section 4**.

3.2.3 Disturbance based on 5 km EDR for geophysical survey

Table 3.9 presents the disturbance impact areas, based on a 5 km EDR for one geophysical survey vessel.

Table 3.9 Disturbance areas based on 5km EDR

Potential Impact	Species	Predicted maximum impact range	Maximum predicted area of potential impact – one geophysical survey vessel
Disturbance (5 km EDR)	All	5km	78.54km^2

Table 3.10 summarises the disturbance assessment for cetaceans, based on a 5 km EDR.

Table 3.10 Disturbance assessment for cetacean species based on 5 km EDR

Potential Impact	Species	Maximum number of individuals (% of ref pop) – one geophysical survey vessel
Disturbance (5km EDR)	Harbour porpoise	15.8 (0.064% WS MU)
	Bottlenose dolphin	4.2 (9.3% CWSH & 0.32% OW MU)
	Short-beaked common dolphin	49.2 (0.085% CGNS MU)
	White-beaked dolphin	20.0 (0.058% CGNS MU)
	Atlantic white-sided dolphin	1.8 (0.014% CGNS MU)
	Risso's dolphin	0.8 (0.009% CGNS MU)
	Killer whale	0.06 (0.0004% NEA MU & 0.8% WC MU)
	Long-finned pilot whale	2.6 (0.001% NEA MU)

Potential Impact	Species	Maximum number of individuals (% of ref pop) – one geophysical survey vessel
	Minke whale	5.9 (0.057% CGNS MU)

This assessment suggests there could be a high proportion of the CWSH bottlenose dolphin population potentially disturbed. However this is very precautionary for the following reasons;

- The CWSH population tend to remain close to the coast rather than further offshore;
- The density estimates used to inform this assessment are based on the OW population recorded by the SCANS-IV survey; and
- During the Project's DAS, no bottlenose dolphin were recorded in the 24 months of surveys, indicating a very low presence within the WDA.

Any disturbance would be temporary and marine mammals would be expected to return to the area once both vessels had passed and the noise source ceased. It is possible that a small number of individual animals may experience some level of disturbance while they encounter noise emissions. As such, an EPS Licence is required for activities within 12 nm (as per Regulation 39(2)). Potential disturbance impacts to all marine mammals will be minimised with the implementation of mitigation measures set out in **Section 4**.

3.2.4 Disturbance from daily survey area based on the Marine Noise Registry (MNR) (JNCC, 2023)

Table 3.11 presents the disturbance from the daily survey area based on JNCC (2023) and one vessel.

Table 3.11 Disturbance from daily survey area based (BEIS, 2020)

Potential Impact	Species	Maximum predicted area of potential impact – one geophysical survey vessel
Daily survey area (BEIS, 2020)	All	256 km^2

Table 3.12 summarises the disturbance assessment for cetaceans, based on daily survey area recommended from the MNR JNCC (2023) from one vessel.

Table 3.12 Disturbance assessment to cetaceans based on (JNCC, 2023) daily survey area

Potential Impact	Species	Maximum number of individuals (% of ref pop) – one geophysical survey vessel
Disturbance (256km^2)	Harbour porpoise	51.5 (0.211% WS MU)
	Bottlenose dolphin	13.6 (30.3% CWSH & 1.04% OW MU)
	Short-beaked common dolphin	160.5 (0.279% CGNS MU)
	White-beaked dolphin	65.1 (0.0191% CGNS MU)
	Atlantic white-sided dolphin	5.7 (0.046% CGNS MU)
	Risso's dolphin	2.6 (0.029% CGNS MU)
	Killer whale	0.2 (0.001% NEA MU & 2.6% WC MU)
	Long-finned pilot whale	8.3 (0.005% NEA MU)
	Minke whale	19.2 (0.186% CGNS MU)

This assessment suggests there could be a high proportion of the CWSH bottlenose dolphin population potentially disturbed. However, this is very precautionary for the reasons as outlined above (**Section 3.2.3**),

in addition to it being unlikely that the geophysical survey vessel would travel in one day the distance assumed within the RoC (2020) report (i.e. 178 km), or that any cetaceans (including bottlenose dolphin) would be disturbed from that whole survey area for a full day.

There is very little information documented on behaviour response of mysticetes to geophysical surveys, however Southall et al. (2007) includes a summary of the observed behavioural responses from noise sources. The majority of the studies included were based on the responses to seismic surveys. Dunlop et al. (2017) found that humpback whale in response to seismic airguns displayed changes in behaviour by changes in their respiration rates, but apart from that found no abnormal behaviours, such as instances of a female separating from her calf or sustained bouts of high energy surface behaviours (which are considered abnormal behaviour indicative of a stress response in humpback whales). In another study, passive acoustic monitoring (PAM) was used to document the presence of singing humpback whales off the coast of Northern Angola, and opportunistically test for the effect of seismic survey activity on the number of singing whales. It was found that singing significantly decreased, suggesting that the breeding display of humpback whales is disrupted by seismic survey activity (Cerchio et al., 2014). However, this is not an issue for this application because humpback whales are not known to breed in the west coast of Scotland.

Any disturbance would be temporary and marine mammals would be expected to return to the area once the geophysical survey vessel had passed and the noise source ceased. It is possible that a small number of individual animals may experience some level of disturbance while they encounter noise emissions. As such, an EPS Licence is required for activities within 12 nm (as per Regulation 39(2)). Potential disturbance impacts will be minimised with the implementation of mitigation measures set out in **Section 4.**

3.3 Disturbance from underwater noise due to the presence of vessels

Any disturbance from underwater noise and presence of vessels would be less than the potential disturbance areas assessed for the geophysical survey equipment. Although noise levels from vessels are highly unlikely to cause physical or auditory injury, they could be sufficient to cause local disturbance to sensitive marine mammals in the immediate vicinity of the vessels, depending on ambient noise levels.

Thomsen et al. (2006) used species hearing detection thresholds to conclude that noise from larger vessels around 0.25 kHz will be detected by harbour porpoise at distances of approximately 1 km, and noise from smaller vessels around 2 kHz will be detected at around 3 km.

The distance at which animals may react to vessels is difficult to predict. Behavioural responses can vary a great deal depending on context and data specific to harbour porpoise are limited. According to Thomsen et al. (2006), harbour porpoise might be expected to respond to vessels of this type at approximately 400 m (Moray West, 2018). There have been many cases where cetaceans have been recorded to alter their vocalisation due to the presence of vessels, for example, killer whales increased the durations of their calls (Foote et al., 2008), bottlenose dolphin became more vocal by increasing whistles in response to boat traffic (Antichi, et al., 2022), expending high levels of energy by engaging in breeding activities, nursing, and calving (Braithwaite et al. 2015, Hurries, et al. 2021). Dolphin species are considered to have a sensitivity of low to disturbance effects. Common dolphin in the vicinity of the construction of a pipeline in north-west Ireland left the area due to vessel presence, however patterns suggested disturbance impacts were only short term (Culloch et al. 2016).

Hurrie et al. (2021) look at the presence of vessels of humpback whale behaviour was found to cause increases in swim speed, respiration rate, and path directness as well as decreases in dive. Although observed changes were likely short-term, the occurrence of disturbance on breeding grounds increases the potential risk by reducing humpback whale energy stores in food limited conditions (Williams et al. 2011). The observed avoidance of vessels by increasing swim speed, respiration rate and path directness, while decreasing dive times is energetically demanding during a time when whales are already expending high levels of energy by engaging in breeding activities, nursing, and calving (Braithwaite et al. 2015), (Hurries, et al. 2021).

While the predicted source levels associated with the survey vessels have the potential to elicit a behavioural response in cetacean species, the noise from both vessels would need to be emitted over an extended period to cause a significant disturbance offence as defined under the Regulations 39(1) or 39(2). As both vessels will not be stationary, marine mammals within a particular area will not be exposed to extended periods of noise from the vessels.

Any disturbance would be temporary and marine mammals would be expected to return to the area once both vessels have passed and the noise source ceased. As such, vessel noise is not anticipated to negatively impact upon the FCS of any EPS.

3.4 Increased collision risk with vessels

Any increased collision risk with vessels is unlikely for cetaceans, as both vessels would be relatively slow moving and maintaining a fixed route during the geophysical survey. Dolphins and harbour porpoise are smaller, faster, and more agile in the aquatic environment, and therefore able to avoid collision with vessels, and are assessed as having a low sensitivity. Larger whale species such as humpback whale and minke whale are generally less able to avoid collision with vessels due to their larger size and are more at risk of vessel collision than other cetacean species. Laist et al. (2001) predicted that the most severe injuries from collision with vessels travelling at over 14 knots, and Vanderlaan and Taggart., (2007) predicted that the probability of lethal injury of a large whale species (North Atlantic right whale) decreases from 0.79 at speeds of 15 knots to 0.21 at 8.6 knots. Given that both vessels involved in the geophysical survey will be moving along a defined survey route at a very slow speed of 4 knots, the potential for collisions to occur is negligible. It is also noted that non-lethal collision has been reported by Van Waerebeek et al. (2007), suggesting if collisions do occur between vessels and marine mammals these are not necessarily always fatal. Potential collision risk to all marine mammals and for larger cetaceans such as minke whale and humpback whale will be limited by the slow vessel speed and the use of mitigation outlined in **Section 4**.

Vessels movements to and from the port would be on established shipping routes. The two vessels required for the geophysical survey would be a very small proportion of current vessel activity in and around the survey areas and routes to and from port.

Although vessel collision is a threat for basking sharks, due to the low density of basking shark within the WDA, it is predicted that up to six individuals would be at risk of collision (based on the highest density across the WDA of 0.009 animals/km^2 (NMPi, 2022) over the total area of 672 km^2. Using the most recent density estimated from HWDT (2024), 0.0007 animals/km^2, equates to less than one individual would be at risk of collision. Any potential collision risk for basking sharks will be limited by the slow vessel speed and the use of mitigation outlined in **Section 4**.

Given that there is predicted to be no risk of injury to any EPS or to basking shark as a result of collision risk, there is no potential to commit an offence with regards injury. There will, therefore, be no impact on the FCS of any species. As such, there is no offence and therefore no requirement for an EPS Licence in this respect.

3.5 Cumulative Impact Assessment (CIA)

For wide ranging species such as cetaceans and basking sharks, it is important to consider other projects and activities over a wider area. Considering the potential impacts associated with the geophysical survey **Section 3.1**, this has been based on the Scottish west coast area.

There is very little information on activities and projects in the Scottish west coast area that could have potential cumulative impacts with the geophysical survey. However, as a precautionary approach it has been assumed that there could be the potential for up to two site investigation surveys at other sites off the Scottish west coast area (**Table 3.13**).

For temporary impacts, such as underwater noise disturbance, the impact to the overall population is considered to be negligible (no potential for a significant effect on the overall population) if less than 1% of the reference population is anticipated to be exposed to effect.

Taking into account that cetacean species are not as sensitive to disturbance impacts as they are to the potential for injury, and that they would not be permanently disturbed from any area (as the impact is temporary and individuals will return to the area once the relevant activity has ceased), and that less than 1% of the populations may be impacted, as assessed in **Table 3.13**, the overall conclusion is that there would be no potential for a population level impact to harbour porpoise, Atlantic white-sided dolphin, bottlenose dolphin (of the OW population), Risso's dolphin, short beaked common dolphin, white-beaked dolphin, killer whale, long-finned pilot whale or minke whale. There is the potential for a cumulative disturbance effect to bottlenose dolphin if it is assumed they are from the CWSH population, however, this is considered unlikely due to the reasons outlined in **Section 3.2.3**.

As noted above, the cumulative assessment indicates no significant disturbance of cetaceans at a population level. It is possible that a small number of individual animals may experience some level of disturbance while they encounter noise emissions. The characterisation of effects as presented in this RA has identified that the potential for impact will be highly localised and short term in nature, and not result in significant effects. The potential for the geophysical survey to contribute to cumulative impacts is, therefore, highly unlikely. It is, therefore, predicted that the relatively localised areas of disturbance, and the short period of time that cumulative impacts could arise, are such that they will not cause an impact that will affect the FCS of any EPS. As such, an EPS Licence is required for activities within 12 nm (as per Regulation 39(2)). Potential disturbance impacts will be minimised with the implementation of mitigation measures set out in **Section 4**.

Based on the assumption that all the planned projects and activities with the potential for injury will have mitigation in place, which is similar to or more extensive than the measures being undertaken for the geophysical surveys, no EPS will be at risk of injury from these activities.

Table 3.13 Potential for Cumulative Impacts

Cumulative impacts	Potential area of impact	Number of harbour porpoise (% of reference population)	Number of bottlenose dolphin (% of reference population)	Number of short beaked common dolphin (% of reference population)	Number of white-beaked dolphin (% of reference population)	Number of Atlantic white-sided dolphin (% of reference population)	Number of Risso's dolphin (% of reference population)	Number of killer whale (% of reference population)	Number of Long-finned pilot whale (% of reference population)	Number of minke whale (% of reference population)
Proposed surveys (5km EDR)	78.54 km^2	15.8 (0.064% WS MU)	4.2 (9.3% CWSH & 0.32% OW MU)	49.2 (0.085% CGNS MU)	20.0 (0.058% CGNS MU)	1.8 (0.014% CGNS MU)	0.8 (0.009% CGNS MU)	0.06 (0.0004% NEA MU & 0.8% WC MU)	2.6 (0.001% CGNS MU)	5.9 (0.057% CGNS MU)
Up to two geophysical surveys undertaken at the same time (5km EDR)	157.08 km^2	31.6 (0.129% WS MU)	8.4 (18.6% CWSH & 0.64% OW MU)	98.5 (0.171% CGNS MU)	40.0 (0.117% CGNS MU)	3.5 (0.028% CGNS MU)	1.6 (0.018% CGNS MU)	0.1 ((0.008% NEA & 1.6% WC)	5.1 (0.003% NEA)	11.8 (0.114% CGNS MU)
Total	**235.62 km^2**	**47.4 (0.19% WS MU)**	**12.8 (27.9% CWSH & 0.96% OW MU)**	**147.7 (0.26% CGNS MU)**	**60.0 (0.18% CGNS MU)**	**5.3 (0.04% CGNS MU)**	**2.4 (0.027% CGNS MU)**	**0.16 (0.008% NEA & 2.4% WC)**	**7.7 (0.004% NEA)**	**17.7 (0.17% CGNS MU)**

3.6 Potential Effects on Designated Sites

As outlined in **Section 1.3.2**, the proposed geophysical survey is scheduled to be conducted from 1 April to 31 August in 2025.

3.6.1 The Inner Hebrides and the Minches SAC

As outlined in **Section 2.3**, the Inner Hebrides and the Minches SAC has been designated because of its importance to harbour porpoise year-round (NatureScot, 2020a).

The geophysical survey will be conducted outside the SAC, but there is the potential for impacts to overlap with the SAC area due to the close proximity. As a precautionary approach, the potential disturbance of harbour porpoise in the Inner Hebrides and the Minches SAC has been assessed based on half the overall disturbance area being within the SAC (due to the WDA being directly adjacent to the SAC boundary, the largest potential overlap would be from activities being undertaken at the boundary of the SAC) (**Table 3.14**).

Table 3.14 Assessment of potential disturbance of harbour porpoise in the Inner Hebrides and the Minches SAC

Potential Effect	Maximum area of overlap in SAC (% of SAC area)	Potential adverse effect on site integrity
Disturbance (5 km EDR) (78.54 km^2)	0.57%	**No** Temporary effect. Potential disturbance would not impact a significant proportion of the SAC area.
Daily survey area (BEIS, 2020) (256 km^2)	1.85%	

Disturbance of harbour porpoise would not exceed 2% of the SAC. Therefore, there is **no significant disturbance and no potential adverse effect on the integrity of the SAC in relation to the conservation objectives for harbour porpoise**.

There are no anticipated potential effects on other designated sites where harbour porpoise or bottlenose dolphin are a qualifying feature, taking into account the distances to the sites and the potential impacts associated with the proposed geophysical survey **(Section 3.1)**.

3.6.2 Treshnish Isles SAC and South-East Islay Skerries SAC

Although seals are not an EPS, an assessment in relation the nearby Treshnish Isles or South-East Islay Skerries SACs has been included in this report.

There will be no direct impact on either the Treshnish Isles or South-East Islay Skerries SAC from the geophysical survey due to the distance from the WDA. However, it is assumed that any individuals present within the survey area have potential connectivity with their respective SAC.

There is little available information on the potential for disturbance from geophysical surveys for either grey seal or harbour seal; however, observations of behavioural changes in other seal species have shown avoidance reactions up to 3.6 km from the source (for a seismic survey of 1,600 cu. in.) (Harris et al., 2001); a potential disturbance range of 3.6 km (disturbance area of 40.7 km^2) will, therefore, be applied to both grey seal and harbour seal due to a lack of species-specific information. As this was recorded for seismic surveys rather than due to the equipment associated with smaller geophysical surveys, this is considered to represent a worst-case.

The number of grey seals that could potentially be disturbed due to the geophysical survey, based on one

survey vessel, is up to 18.3 (based on the 0.45 individuals per km^2, as calculated from the Russell et al. (2017), or 0.53% of the Treshnish Isles SAC (based on the count of 3,400 from Argyll marine SAC org, (2024)) and 0.4% west Scotland MU (4,174 individuals; Special Committee on Seals (SCOS), 2022).

The number of harbour seals that could potentially be disturbed due to the geophysical survey is up to 2.0 (based on the 0.05 individuals per km^2, as calculated from the Russell et al. (2017), or 0.3% of the South-East Islay Skerries SAC (count of 706; (Morris et al., 2021)) and 0.01% west Scotland MU (15,600 individuals; SCOS, 2022).

Given the low number of seals at risk of disturbance, and the low level of overall population impact, and the temporary nature of the disturbance, it is considered that there **is no potential for any effects on the site integrity in relation to the conservation objective for grey seal or harbour seal**.

3.6.3 The Sea of the Hebrides NCMPA

As outlined in **Section 2.3**, the Sea of the Hebrides NCMPA has been designated because of its importance to minke whale and basking shark during the summer season (April-October) (NatureScot, 2020b).

The geophysical survey will be conducted outside the NCMPA but there is the potential for noise impacts to overlap with the protected site due to the close proximity. A small number of line turns may extend to this area of the buffer zone. As a precautionary approach, the potential disturbance of minke whale in the Sea of the Hebrides NCMPA has been assessed based on up to half of the disturbance area being within the NCMPA (**Table 3.15**).

Table 3.15 Assessment of potential disturbance of minke whale in the Sea of the Hebrides MPA

Potential Effect	Maximum area of overlap in NCMPA (% of NCMPA area)	Potential for significant impact to NCMPA
Disturbance (5 km EDR) (78.54 km^2)	0.78%	**No** Temporary effect. Potential disturbance would not impact a significant proportion of the NCMPA area.
Daily survey area (BEIS, 2020) (256 km^2)	2.55%	

Disturbance of minke whale would not exceed more than 3% of the SAC. Therefore, there is **no significant disturbance and no potential for impact on the NCMPA**.

3.7 Protected Seal Haul-Out Sites

The closest protected seal haul-out sites to the WDA are Oronsay (14.3 km), Nave Island (14.6 km) and Oronsay Strand (15.2 km). All these nearby sites are protected for grey and/or harbour seal. Given the distance between the WDA and the protected sites, there is no potential for direct impact due to the geophysical survey. However, there is the potential for the transiting vessels to disturb seals while they are hauled-out. The response of seals to disturbance at haul-out sites can range from increased alertness to moving into the water (Wilson, 2014). The potential impact on pupping groups can include temporary or permanent pup separation, disruption of suckling, energetic costs and energetic deficit to pups, physiological stress and, sometimes, enforced move to distant or suboptimal habitat. Potential impacts on moulting groups can include energy loss and stress, while impacts on other haul-out groups can cause loss of resting and digestion time and stress (Wilson, 2014). The potential impacts will be determined by the response of the seals, the duration and proximity of the disturbance to the seals.

For grey seal, mothers responded by moving into the water more due to boat speed than as a result of the distance, although movement into the water was generally observed to occur at distances of between 20 and

70 m, with no detectable disturbance at 150 m (Wilson, 2014; Strong and Morris, 2010). However, grey and harbour seals have also been reported to move into the water when vessels are at a distance of approximately 200 m to 300 m (Wilson, 2014).

Therefore, it is considered that, for grey seal, vessels travelling within 300 m of a haul-out site, a grey seal may flee into water, but significant disturbance would be expected at a distance of less than 150 m. Therefore, both vessels transiting to the WDA will remain at a distance of at least 500 m from the protected seal haul-out sites and use existing shipping lanes and transit routes wherever possible, to ensure there is no disturbance to seals while they are hauled out. With the proposed mitigations, it can be concluded that there would be no potential for significant disturbance to protected haul-out sites.

4 Mitigation Strategy

As noted in **Section 1.3.1,** the geophysical survey equipment to be used has not yet been confirmed; therefore, the use of an SBP has been used as the worst-case to inform the assessments. The geophysical survey equipment to be used should use the lowest practical noise levels were possible.

The following mitigation measures, as outlined within the JNCC, (2017) '*Guidelines for Minimising the Risk of Injury to Marine Mammals from Geophysical Surveys*' would apply for the geophysical survey using either SBP, USBL, or UHR equipment:

- As the geophysical survey is short in nature and will use low energy sources (such as SBP), a non-dedicated **Marine Mammal Observer** (MMO) can be used. A non-dedicated MMO refers to a trained MMO who may undertake other roles on the geophysical vessel when not conducting their mitigation role. This person can be a member of the geophysical vessel's crew provided that during the mitigation period, they do not undertake any other roles on the geophysical vessel.
    - Note that the pre-survey watch can only be undertaken in periods of daylight and good visibility.
- **Passive Acoustic Monitoring** (PAM) shall be deployed as an additional mitigation measure in conditions of poor visibility and surveys starting in darkness.
- Prior to any acoustic survey commencement, a 30 minute pre-survey search of a 500m mitigation zone around the moving acoustic source is required. If a marine mammal or basking shark is sighted (or detected) within the mitigation zone during the pre-survey search, the survey cannot commence until:
    1. The 30 minute pre-survey search is complete; and
    2. The mitigation zone has been clear of marine mammals and basking sharks for a period of 20 minutes prior to start of survey.

A **soft-start** must be undertaken (wherever practical) once the pre-survey search of 30 minutes has been completed and there have been no marine mammal or basking shark sightings for at least 20 minutes. The soft-start will consist of a gradual and consistent ramp-up of power over a minimum of a 15 minute period[9], and the line must be commenced within 25 minutes of the start of the soft-start procedure. Once soft-start has commenced, there is no requirement to stop or delay the acoustic survey due to marine mammal or basking shark presence within the 500 m mitigation zone.

- If a line change is expected to take more than 40 minutes, the acoustic survey should be halted at the end of the survey line, and a full pre-survey search and soft-start procedure should begin prior to the next line.
    - The pre-survey search of the 500 m mitigation zone can commence while on the line turn, so that acoustic sources can be switched on ready for the next line. Note that the same delay and soft-start procedures apply for line changes as outlined above.
- If a line change is expected to take less than 40 minutes, surveys can continue if the shot point interval is increased to a maximum of 5 minutes and is decreased gradually in the final 10 minutes of the line

change.

- The survey sources can alternatively be switched off during line changes of less than 40 minutes, and the mitigation procedures undertaken as per the line changes of more than 40 minutes as outlined above.

- If several types of survey equipment are started sequentially, or interchanged during the operation, only one pre-shooting search is required prior to commencement of the first acoustic output, and only if there are no gaps in data acquisition of more than 10 minutes.

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/relevant for other less commonly occurring species of cetacean that may be present in the survey area. These mitigation measures for cetacean EPS (JNCC, 2017) are also deemed to be appropriate for seals, turtles and basking sharks, and would reduce the potential for impact to all species.

In addition to the mitigation outlined in JNCC (2017), the Project has committed to the following:

- The inclusion of basking shark as a species that would require delay of the geophysical vessel transect commencing, in the event that any individuals are sighted by the MMO during the pre-survey search and present a risk of collision.
- Producing and presentation of a toolbox talk to inform the crew on the presence and identification of basking sharks and ways to minimise collision risk.
- Adherence to both the Scottish Marine Wildlife Watching Code[2] and the Shark Trust's Basking Shark Code of Conduct[3] during all operations and transits, where safe to do so, including, but not limited to[4]:
  - The Master of both vessels ensuring that marine mammals and basking shark are avoided to a safe distance (100 m or more) in all possible circumstances (or 500m in the case of large aggregations of basking shark);
  - Reducing speeds from both vessels to less than 6 knots when basking shark are sighted in the vicinity of the vessels (wherever possible taking into account vessel safety); and
  - The Master of both vessels minimising high powered manoeuvres where this does not impair safety.
- Both vessels transiting to the WDA will remain at a distance of at least 500m from the protected seal haul-out sites and will use existing shipping lanes and transit routes wherever available (and safe to do so).

5 Assessment of Potential Offence

Following the Marine Scotland, (2020) guidance, relevant to geophysical surveys which occur in waters within the 12 nm limit, it can be concluded that, with mitigation for the survey and positioning equipment, potential impacts from the proposed survey work are unlikely to result in the harassment, disturbance, injury or killing of an EPS as defined under regulation 39(1) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (referred to as the Habitats Regulations).

In relation to regulation 39(2) of the Habitats Regulations, the percentage of the reference population of each species, which has the potential to be disturbed by use of the geophysical survey equipment, is considered to be negligible (less than 1% for all cetacean species which occur in the area) and therefore not detrimental to the maintenance of the population of the species concerned at a FCS. Any disturbance is

[2] *Available at: https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/scottish-marine-wildlife-watching-code*

[3] *https://www.sharktrust.org/Handlers/Download.ashx?IDMF=6137b1a1-8518-4327-9922-7b280acb8336*

[4] *While every attempt will be made to follow these Codes of Conduct at all times, vessel and personnel safety will come first*

likely to be localised and short-term, and with mitigation is considered to be negligible. Disturbance will not be sufficient to cause any population level effects, and thus it is considered that an EPS Licence (to disturb) can be issued under Section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland).

With regard to basking sharks, there is more potential for injury due to vessel collision risk, as the underwater noise emissions associated with the geophysical survey falls outside of the hearing ranges of elasmobranch species, with exception of the UHR. However, the mitigation measures that will be in place for marine mammals and underwater noise will also be in place for basking shark, alongside adherence to the Basking Shark Code of Conduct. Therefore, with mitigation measures, there is no potential for population level impacts to basking shark as a result of injury and it is considered that a basking shark licence can be issued under the Wildlife and Countryside Act 1981.

5.1 EPS and Basking Shark Licensing Tests

The purpose of this EPS and Basking Shark RA is to determine whether, when considering appropriate mitigation as presented in **Section 4**, there is still potential for the geophysical survey to cause deliberate harm, or inadvertently cause disturbance to cetaceans or other protected species. The need for an EPS Licence and Basking Shark Licence will be determined by MD-LOT, with advice from NatureScot, based on findings from this EPS and Basking Shark RA.

MD-LOT's consideration of whether an EPS Licence will be required will comprise three tests:

1. To ascertain whether the licence is to be granted for one of the purposes specified in the Regulation 44;
2. To ascertain whether there are no satisfactory alternatives to the activity proposed (that would avoid the risk of offence); and
3. To determine that the licencing of the activity will not be detrimental to the maintenance of the population of the species concerned at a *Favourable Conservation Status* (FCS)

Test 1: The licence must relate to one of the purposes referred to in Regulation 44.
The Scottish Government can only issue licenses under Regulation 44(2) of the Regulations (as amended) for specific purposes. These purposes include:

- 44(2)(e) preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

The development of the Project meets the requirements of Regulation 44 (2) (e) by demonstrating a direct environmental benefit on a national and international scale and complies with international and national environmental policies. There is an overarching European, UK and Scottish policy requirement for sustainable energy supply from renewables. This need is the subject of national planning and energy policy. While the geophysical survey will mean a disturbance to cetacean species, it will only be temporary in nature, be a risk to a small number of individuals and, with the mitigations that will be put in place, there is no potential for injury. The benefit of undertaking this geophysical survey and allowing for the Project to progress has the potential for long-term benefit to Scotland and the renewables industry and helping Scotland to reach the overall target for greenhouse gas emissions.

Test 2: There must be no satisfactory alternative (Regulation 44, 3a).
Alternative options were considered prior to the inclusion of a geophysical survey with regards to the scope and extent of the survey within the WDA. A geophysical survey is required to map the seabed and sub-surface characteristics of the WDA. This geophysical survey is considered essential due to the need to accurately assess the WDA for further development. The proposed geophysical survey method outlined in

this RA is the only viable way to ensure the accurate planning and assessment of the Project.

There are no satisfactory alternatives to the use of survey equipment required during the geophysical survey. Although there might be different types of survey equipment that could be used, this is often constrained by the specific purpose of the geophysical survey and the alternative equipment may not be effective. A geophysical survey is required to detail the seabed and sub-surface characteristics within the WDA. This geophysical survey is required to provide sufficient detail for the design phase of the Project. However, it is important to note:

Survey Location, Duration and Extent: the smallest survey area possible (the WDA plus 1.5 km buffer) has been proposed. The smallest number of survey lines within the WDA results in the minimum survey duration possible (70 noisy days). Reducing the size of the survey area and / or the number of survey lines any further would reduce data coverage quality and materially reduce the value that would be gained from the survey and resultant data. This would prevent characterisation of the WDA environment to a level required for the EIA process and to inform preliminary design considerations.

Survey Equipment/Methodology: the geophysical survey has been chosen to provide the most efficient dataset that can be used to assess the Project's engineering and environmental feasibility. The design of the geophysical survey considers the provision of the required data for the preliminary phase but without survey techniques which may be superfluous for the current objectives. The results of the geophysical survey will allow the most effective development and design decisions to be made. For future site investigation, it will provide data to allow the design of the most effective surveys. Overall, the geophysical survey meets the preliminary survey requirements with the minimal practicable impact to marine mammals and basking sharks. Existing site specific data gathered in 2023 alongside desktop studies at the WDA have enabled an understanding of ground conditions and UXO risk. This has allowed refinement of survey methodologies to ensure the most efficient geophysical survey is implemented. Therefore, the Project considers that the 'no satisfactory alternative test' has been met.

Test 3: The action authorised must not be detrimental to the maintenance of the population of the species concerned at a FCS in their natural range (Regulation 44, 3b).
The percentage of the reference population of each species, which has the potential to be temporarily disturbed, over a relatively small area for a short period of time, by use of the geophysical survey, is considered to be negligible (less than 1% for all the cetacean species which occur in the WDA), and therefore not detrimental to the maintenance of the population of the species concerned at a FCS level.

6 Conclusions

While the geophysical survey presents a temporary disturbance to a localised marine environment, the development of the Project is an important addition to Scotland's growing contributions to the UK's renewable energy sector. It will provide additional support to the UK Government's national and international commitments to reduce greenhouse gases.

The assessment above demonstrates that, with the implementation of the mitigation measures detailed in **Section 4**, there will be no injury resulting from the proposed geophysical survey due to underwater noise and, therefore, no offence related to injury of any cetacean species under the inshore regulations. In this context, an EPS Licence would not be required.

It is possible that a small number of animals may experience some level of disturbance for the short period they may encounter noise emissions from the geophysical survey operations. Given the short term and temporary impacts of the geophysical survey to cetaceans, it is considered that there is no potential for a significant impact on the wider populations of harbour porpoise, Atlantic white-sided dolphin, bottlenose dolphin, Risso's dolphin, short beaked common dolphin, white-beaked dolphin and minke whale, with a negligible risk of disturbance to any species of cetacean.

There is potential for cumulative impacts from a number of different sources, although there is significant uncertainty when these may arise. Based on current and likely future activities and the predicted level of impact, along with the potential mitigation that will be in place, the level of cumulative disturbance is predicted to be relatively small. However, the impacts arising from disturbance from each activity will be temporary and there will be no impact on the favourable conservation status of any EPS.

Therefore, an EPS Licence is required for activities where there is potential for disturbance to cetaceans as per Regulation 39(2); this disturbance will not be sufficient to cause any population level effects, and it is considered that an EPS licence to disturb can be issued.

There is also the potential risk for injury or fatality to basking shark due to vessel collision. Although, mitigation will be in place to reduce the risk of injury to basking shark, an EPS licence for potential injury to basking shark can be issued.

7 References

Antichi, S., Urbán, J., Martínez-Aguilar, S. and Viloria-Gómora, L., 2022. Changes in whistle parameters of two common bottlenose dolphin ecotypes as a result of the physical presence of the research vessel. *PeerJ*, *10*, p.e14074.

Argyll Marine (2024). https://argyllmarinesac.org/DS_TreshnishIsle.htm

Baines, M.E. and Evans, P.G.H. 2012. Atlas of the Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition. 139pp.

Braithwaite, J. E., Meeuwig, J. J., and Hipsey, M. R. (2015). Optimal migration energetics of humpback whales and the implications of disturbance. Conserv. Physiol. 3:cov001. doi: 10.1093/conphys/cov001

Cerchio, S., Strindberg, S., Collins, T., Bennett, C. and Rosenbaum, H., 2014. Seismic surveys negatively affect humpback whale singing activity off northern Angola. PloS one, 9(3), p.e86464.

CMACS. (2011). West coast HVDC link environmental appraisal. Assessment of EMF effects on sub tidal marine ecology.

Culloch, R. M., P. Anderwald, A. Brandecker, D. Haberlin, B. McGovern, R. Pinfield, F. Visser, M. Jessopp, and M. Cronin. (2016). Effect of construction-related activities and vessel traffic on marine mammals. Marine Ecology Progress Series 549:231-242.Cunningham, L., Baxter, J.M., Boyd., I.L., Duck, C.D., Lonergan, M., Moss, S.E. and McConnell, B. (2009) 'Harbour seal movements and haul-out patterns: implications for monitoring and management'. Aquatic Conservation: Marine and Freshwater Ecosystems, 19 398-407

DECC (2016). Offshore Energy SEA 3: Appendix 1 Environmental Baseline -Marine and other mammals. Department of Energy and Climate Change. March 2016.

Dunlop, R.A., Noad, M.J., McCauley, R.D., Kniest, E., Slade, R., Paton, D. and Cato, D.H., 2017. The behavioural response of migrating humpback whales to a full seismic airgun array. Proceedings of the Royal Society B: Biological Sciences, 284(1869), p.20171901.

Foote, A. D., & Nystuen, J. A. (2008). Variation in call pitch among killer whale ecotypes. Journal of the Acoustical Society of America, 123(3), 1747–1752. https://doi.org/10.1121/1.2836752

Gilles, A., Authier, M., Ramirez-Martinez, N.C., Araújo, H., Blanchard, A., Carlström, J., Eira, C., Dorémus, G., Fernández-Maldonado, C., Geelhoed, S.C.V., Kyhn, L., Laran, S., Nachtsheim, D., Panigada, S., Pigeault, R., Sequeira, M., Sveegaard, S., Taylor, N.L., Owen, K., Saavedra, C., Vázquez-Bonales, J.A., Unger, B., Hammond, P.S. (2023). Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. https://tinyurl.com/3ynt6swa (Accessed January 2024)

Harris, R.E., Miller, G. W. and Richardson, W. J. (2001). Seal responses to air gun sounds during summer seismic surveys in the Alaskan Beaufort Sea. Mar Mam Sci. 17:795-812.

Hartny-Mills, L., Hampson, J. and Lomax, A. 2024. Hebridean Cetacean Research Programme, 2021-2024. NatureScot Research Report 1364.

Hurrie, J.J., McCordic, J.A., Olson, G.L., Machernis, A.F. and Stack, S.H., 2021. The impact of vessels on

humpback whale behavior: The benefit of added whale watching guidelines. Frontiers in Marine Science, 8, p.601433.

IAMMWG (2023). Updated abundance estimates for cetacean Management Units in UK waters.

JNCC. (2015a). Standard Data Form for sites within the 'UK national site network of European sites'. Treshnish Isles. UK0030289. Updated 2015-12. Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030289.pdf

JNCC. (2015b). Standard Data Form for sites within the 'UK national site network of European sites'. South- East Islay Skerries. UK0030067. Updated 2015-12. Available at: https://jncc.gov.uk/jncc-assets/SAC- N2K/UK0030067.pdf

JNCC (2017). JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available on line: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf

JNCC, Natural England and Countryside Council Wales (CCW) (2010). Draft EPS Guidance - 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. Joint Nature Conservation Committee, Natural England and Countryside Council for Wales. October 2010.

JNCC, Department of Agriculture, Environment and Rural Affairs (DAERA) and Natural England (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). June 2020.

JNCC. (2023). Marine Noise Registry Help and Guidance.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. 2001. Collisions between ships and whale'. Marine Mammal Science 17 (1) 30-75.

Louis, M., Viricel, A., Lucas, T., Peltier, H., Alfonsi, E., Berrow, S., Brownlow, A., Covelo, P., Dabin, W., Deaville, R. and De Stephanis, R., (2014). Habitat-driven population structure of bottlenose dolphins, Tursiops truncatus, in the North-East Atlantic. Molecular Ecology, 23(4), pp.857-874.

Lucke, K., Siebert, U., Lepper, P. A. and Blanchet, M. A. (2009). Temporary shift in masked hearing thresholds in a harbor porpoise (Phocoena phocoena) after exposure to seismic airgun stimuli. J. Acoust. Soc. Am., 125 (6), pp. 4060-4070.

Macleod, K., Lacey, C., Quick, N., Hastie, G. and Wilson, J. (2011). Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 2. Cetaceans and Basking Sharks. Unpublished draft report to Scottish Natural Heritage and Marine Scotland.

Martin, K.J., Alessi, S.C., Gaspard, J.C., Tucker, A.D., Bauer, G.B. and Mann, D.A. (2012). Underwater hearing in the loggerhead turtle (Caretta caretta): a comparison of behavioral and auditory evoked potential audiograms. Journal of experimental Biology, 215(17), pp.3001-3009.

Mickle, M.F., Pieniazek, R.H. and Higgs, D.M. (2020). Field assessment of behavioural responses of southern stingrays (*Hypanus americanus*) to acoustic stimuli. Royal Society open science, 7(1), p.191544.

Moray West. 2018. Moray West Technical Note A – Protected Sites and Species Assessment.

Morris, C.D., Duck, C.D., and Thompson, D. 2021. Aerial surveys of seals in Scotland during the harbour

seal moult, 2016-2019. NatureScot Research Report 1256.

NatureScot. (2020a). Conservation and Management Advice. Inner Hebrides and The Minches SAC. July 2020. https://apps.snh.gov.uk/sitelink-api/v1/sites/10508/documents/59

NatureScot. (2020b). Conservation and Management Advice. Sea of the Hebrides possible MPA. November 2020. https://apps.snh.gov.uk/sitelink-api/v1/sites/10474/documents/59

NMFS (National Marine Fisheries Service). (2018). 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS- OPR-59. Available at: https://www.federalregister.gov/documents/2018/06/21/2018- 13313/2018-revision-to-technical- guidance-for-assessing-the-effects-of-anthropogenic-sound-on-marine.

NMPi (National Marine Plan Interactive) (2022). Marine Scotland Maps NMPI. Available at: https://marinescotland.atkinsgeospatial.com/nmpi/

Nykänen, M., Louis, M., Dillane, E., Alfonsi, E., Berrow, S., O'Brien, J., Brownlow, A., Covelo, P., Dabin, W., Deaville, R. and de Stephanis, R., 2019. Fine-scale population structure and connectivity of bottlenose dolphins, Tursiops truncatus, in European waters and implications for conservation. Aquatic Conservation: Marine and Freshwater Ecosystems, 29, pp.197-211.

Ridgway, S.H., Wever, E.G., McCormick, J.G., Palin, J., Anderson, J.H. (1969). Hearing in the giant sea turtle, Chelonia mydas. Proc Nat Acad Sci USA 64(3):884–890

SCOS (2022). SCOS Report. Scientific Advice on Matters Related to the Management of Seal Populations: 2020. Available at: http://www.smru.st-andrews.ac.uk/files/2021/06/SCOS-2022.pdf

Scottish and Southern Energy (2020). EPS and Protected Sites and Species Risk Assessment. EPS and Protected Sites and Species Risk Assessment – North Coast and Orkney Islands. Document number A-302244-S02-REPT-001. Prepared by Xodus Group. https://marine.gov.scot/sites/default/files/risk_assessment_4.pdf

Shark Trust (2020). Basking Shark Project. Report 2020 Available at: https://www.sharktrust.org/Handlers/Download.ashx?IDMF=1c911837-bbb3-4059-951c-365a9882a936

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene Jr., C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, 33 (4), pp. 411-509.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. Aquatic Mammals, 45(2), pp.125-232.

Strong, P. and Morris, S.R. (2010). Grey seal (Halichoerus grypus) disturbance, ecotourism and the Pembrokeshire Marine Code around Ramsey Island. J. Ecotourism 9(2): 117–132.

The Shark Trust. (2018). Basking Shark Project. Available at: https://www.sharktrust.org/Handlers/Download.ashx?IDMF=55251894-a915-4f33-b7f5-6bbba0cf495b

Thomsen, F., Lüdemann, K., Kafemann, R. and Piper, W. 2006. Effects of offshore windfarm noise on marine mammals and fish, on behalf of COWRIE Ltd.

Van Waerebeek, K., A. N. Baker, F. Félix, J. Gedamke, M. Iñiguez, G. P. Sanino, E. Secchi, D. Sutaria, A. vanHelden, and Y. Wang. 2007. Vessel collisions with small cetaceans worldwide and with large whales in theSouthern Hemisphere, an initial assessment. Latin American Journal of Aquatic Mammals 6:43-69.

Vanderlaan, A. S., and C. T. Taggart. 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Marine Mammal Science 23:144-156.

Waggitt, J.J., Evans, P.G., Andrade, J., Banks, A.N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C.J., Durinck, J. and Felce, T. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology, 57(2), pp.253-269.

Wieting, D.S. (2019). Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Site Characterization Surveys of Lease Areas OCS-A 0486, OCS-A 0487, and OCS-A 0500. A Notice by the National Oceanic and Atmospheric Administration on 07/26/2019. Available from: https://www.federalregister.gov/documents/2019/07/26/2019-15802/takes-of-marine-mammals- incidental-to-specified-activities-taking-marine-mammals-incidental-to-site

Williams, R., Krkošek, M., Ashe, E., Branch, T. A., Clark, S., Hammond, P. S., et al. (2011). Competing conservation objectives for predators and prey: estimating killer whale prey requirements for chinook salmon. PLoS ONE 6:e26738. doi: 10.1371/journal.pone.0026738

Wilson, S. (2014). The impact of human disturbance at seal haul-outs. A literature review for the Seal Conservation Society. Available at: http://www.pinnipeds.org/attachments/article/199/Disturbance%20for%20SCS%20-%20text.pdf