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Simply Blue Group

Salamander Offshore Wind Farm

EPS Risk Assessment and Protected Sites Assessment

Inshore Surveys

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Acronyms

Term	Definition
APD	Area of Potential Disturbance
CES	Crown Estate Scotland
CTD	Conductivity, Temperature and Depth
DDV	Drop Down Video
ECC	Export Cable Corridor
EPS	European Protected Species
EU	European Union
FCS	Favourable Conservation Status
FLOW	Floating Offshore Wind
INTOG	Innovation and Targeted Oil & Gas
LSE	Likely Significant Effect
MBES	Multi-Beam Echosounder
MMO	Marine Mammals Observers
MS-LOT	Marine Scotland Licensing Operations Team
MW	Mega Watts
NCMPA	Nature Conservation Marine Protected Area
Nm	Nautical Miles
NMPi	National Marine Plan Interactive
PAM	Passive Acoustic Monitoring
PMF	Priority Marine Features
PTS	Permanent Threshold Shift
ROV	Remotely Operated Vehicle
SAC	Special Areas of Conservation
SBES	Simply Blue Energy (Scotland) Limited
SBG	Simply Blue Group
SBP	Sub-Bottom Profilers
SPA	Special Protection Areas
SSS	Side Scan Sonar
TTS	Temporary Threshold Shift
UKCS	United Kingdom Continental Shelf
USBL	Ultra-Short Baseline positioning
UXO	Unexploded Ordnance

1 Introduction

Simply Blue Energy (Scotland) Limited (herein referred to as SBES), a Joint Venture between Simply Blue Group (SBG), Ørsted and Subsea7 are planning to develop the Salamander Offshore Wind Project (hereafter referred to as the 'Project'), a proposed Floating Offshore Wind (FLOW) development off the east coast of Scotland. The plans for the Project will be to develop an offshore wind farm consisting of:

- Up to 100 Mega Watts (MW) generating capacity, along with the associated subsea infrastructure;
- Inter-array cables and offshore export cable(s) to landfall;
- Onshore cabling between landfall and the substation; and
- Development of one onshore substation.

SBES originally undertook a European Protected Species (EPS) Risk Assessment and Protected Sites Assessment for geophysical and environmental baseline surveys which took place between July and September 2022 ('the Previous Survey'). These surveys covered the Offshore Array Area and Offshore Export Cable Corridor (ECC) from the Offshore Array Area up to approximately 8 km from shore. As a result, SBES now plan to undertake geophysical and environmental baseline surveys of the remaining section of the Offshore ECC encompassing Scottish Territorial waters (<12 nm), from the shoreline out to approximately 8km offshore. The proposed geophysical surveys will use the following techniques: high and low frequency Sub-Bottom Profilers (SBP), Multi Beam Echosounder (MBES), Side Scan Sonar (SSS), Magnetometer, and Ultra-Short Baseline (USBL) positioning. The proposed environmental baseline surveys will also utilise USBL, as well as Drop Down Video (DDV), grab sampling, Multi-parameter Conductivity, Temperature and Depth (CTD), and water sampling.

1.1 Purpose of Document

The purpose of this EPS Risk and Protected Sites Assessment is to:

- Assess potential impacts on cetaceans and determine the need for an EPS Licence under the Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland) ('the Habitats Regulations'). Where an EPS licence is required, this document also provides the EPS Risk and Protected Sites Assessment to support the application;
- Assess potential impacts on basking sharks, and determine whether a derogation licence will be required under the Wildlife and Countryside Act 1981 (as amended) ('the Wildlife and Countryside Act');
- Assess the potential for Likely Significant Effects (LSE) on designated sites as required by the Habitats Regulations, the Marine (Scotland) Act 2010; and
- Assess the potential to harass (intentionally or recklessly) any seals at designated seal haul-outs, as defined by section 117 of the Marine (Scotland) Act 2010, as amended by the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Amendment Order 2017.

1.2 Project Background

The Offshore Array Area and Offshore ECC are located off the coast of Peterhead, Scotland, illustrated in Figure 1-1. The Offshore Array Area will consist of up to 7 floating wind turbines located approximately 35 km east of Peterhead. As previously mentioned, geophysical and environmental baseline surveys are planned within the Offshore ECC not covered by the Previous Survey in order to ascertain the seabed characteristics and the potential for protected features within the area.

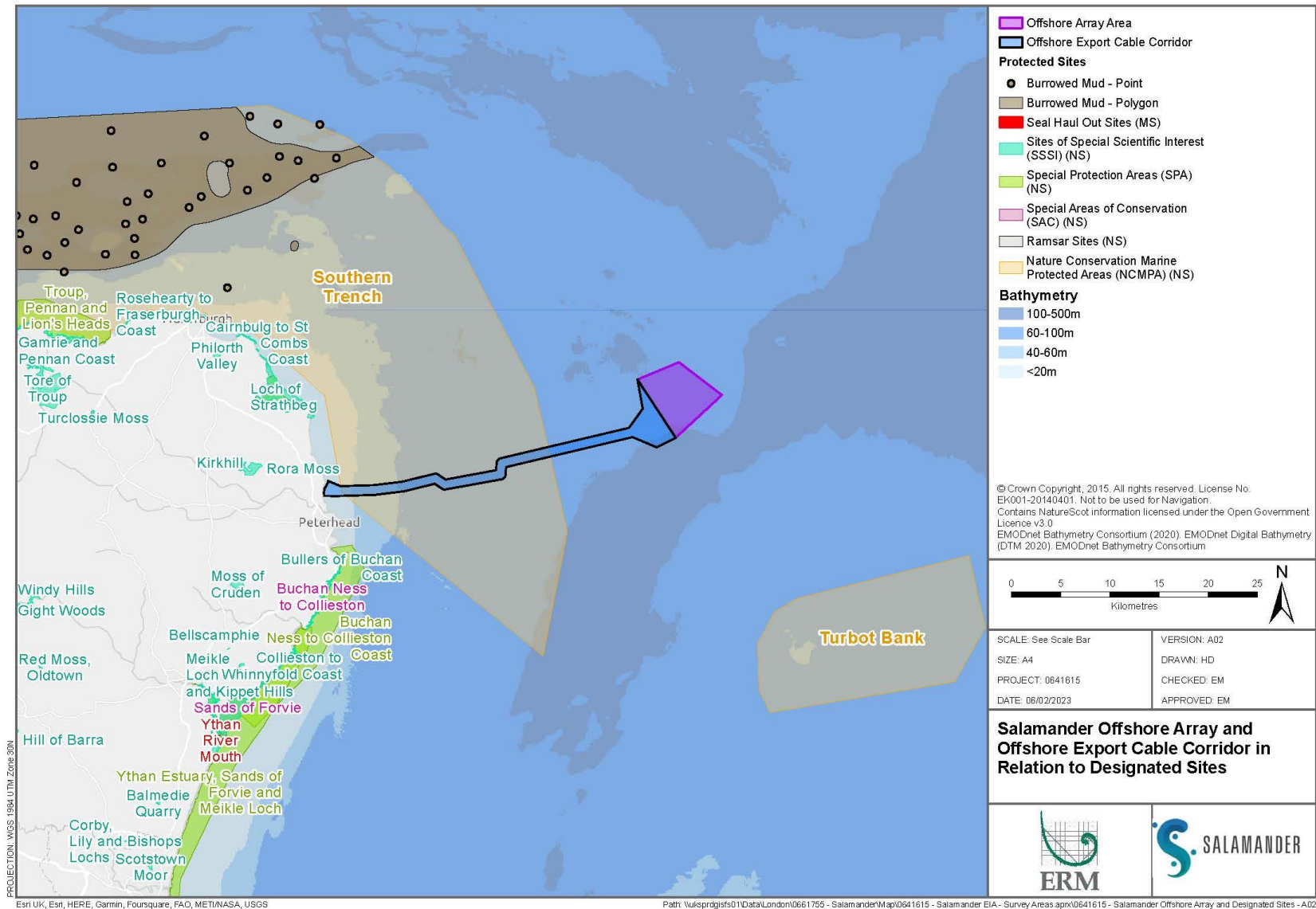


Figure 1-1 The Project location, including the Offshore Export Cable Corridor, Offshore Array Area and protected sites

2 Legislative Background

2.1 European Protected Species

In Scotland, the European Habitats Directive (European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is implemented by the Habitats Regulations 1994 (The Conservation (Natural Habitats, &c.) Regulations 1994) (as amended) ('the Habitats Regulations'). The Habitats Regulations provide protection of European Sites that are internationally important for threatened habitats and species and a legal framework for EPS. Annex IV of the Habitats Directive lists certain species that are strictly protected across their entire European range; the animals from Annex IV whose natural range includes any area in Great Britain are listed in Schedule 2 of the Habitats Regulations in Scotland as EPS.

Under Regulation 39 (1) the Habitats Regulations in Scotland, it is an offence to -

- a) Deliberately or recklessly capture, injure or kill a wild animal of a European protected species;
- b) Deliberately or recklessly -
 - i. Harass a wild animal or group of wild animals of a European protected species;
 - 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 deny the animal use of a breeding site or resting place;
 - v. Disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;
or
 - vi. Disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

Cetaceans are further protected in Scottish waters under Regulation 39 (2) of the Habitats Regulations which states that it is an offence to deliberately or recklessly disturb any dolphin, porpoise, or whale. Disturbance includes any temporary disturbance that has the potential to cause significant harm to the cetaceans present.

An EPS Licence permits activities which have the potential to disturb cetaceans to lawfully take place under Regulation 44 (1) of the Habitats Regulations. As the Project involves the construction of a renewable

energy development, the licence is issued and authorised by Marine Scotland Licensing Operations Team (MS-LOT).

If it is determined that an activity would cause an offence under Regulation 39, it is possible to apply for an exemption to these species' protection provisions, in certain specified circumstances, provided that:

- there is a licensable purpose;
- there are no satisfactory alternatives; and
- the actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status (FCS) in their natural range.

If these conditions are met, an EPS Licence can be granted to allow works to be undertaken that would otherwise cause an offence under the regulations.

2.2 Protected Fish Species

The Wildlife and Countryside Act 1981 (as amended) ('the Wildlife and Countryside Act') implements the Birds Directive (EU Council Directive 2009/147/EC on the conservation of wild birds) and Bern Convention and applies to the terrestrial environment and inshore waters (up to 12 nm from land). The schedules of this Act describe the protection provided for different species. Schedule 5 gives full protection to basking sharks, vendace and powan fish species.

Under Schedule 5 of the Wildlife and Countryside Act in Scotland, it is an offence to:

- a) intentionally or recklessly kill, injure, or take fish;
- b) possess or sell fish; or
- c) intentionally or recklessly disturb or harass fish.

The Wildlife and Natural Environment (Scotland) Act 2011 added a new licensing purpose to the Wildlife and Countryside Act, adding in section 16(3) (i) '*for any other social, economic or environmental purpose*' for certain protected species including basking sharks.

Basking sharks are further protected by the Nature Conservation (Scotland) Act 2004. Under Schedule 6 of this legislation which states it is an offence to deliberately or recklessly capture, kill, or disturb basking sharks.

Therefore, activities that are to be carried out within Scottish inshore waters must obtain a licence from Marine Scotland to undertake the work lawfully should they be likely to cause disturbance or injury to basking sharks.

2.3 Protected Sites

2.3.1 European Sites

The term 'European site' is being used to refer to what were previously known as 'Natura' sites. This recognises that Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) protect species and habitats shared across Europe and were originally designated under European legislation.

European sites (SACs and SPAs) form a unique network of protected areas that stretches across the European Union (EU). Prior to leaving the EU, Scotland's sites contributed to the Natura network. Now they form part of the Emerald Network, spanning Europe and into Africa.

Natura sites were originally designated under The European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC). European Sites continue to be designated under Scottish domestic law and are now referred to as the UK Site Network:

- In the terrestrial environment and within Scottish Territorial Waters (12 nm limit) by:
 - The Conservation (Natural Habitats, &c.) Regulations 1994 (Current Scottish legislation); and
 - Habitats Directive and Birds Directive (EU legislation).
- Out-with Scottish Territorial waters by:
 - The Offshore Habitats Regulations.

SACs were designated under the Habitats Directive for habitats and non-bird species. The Habitats Directive sets out how such European sites should be protected and has a number of wider implications such as those relating to EPS. The Birds Directive protects all wild birds and their nests, eggs and habitats within the European Union. SPAs are classified under the Birds Directive to protect birds that are rare or vulnerable in Europe as well as all migratory birds that are regular visitors.

The guidance within, and associated with, the Habitats and Birds Directive continues to inform how our European sites are managed. The Habitats Regulations have been amended as a result of leaving the EU so that European sites are both protected, and continue to operate, as they have done since their original designation. The changes to the Regulations also mean that the requirements of the Directives continue to be relevant to the management of European sites.

2.3.2 Nature Conservation Marine Protected Areas

Under section 82 of the Marine (Scotland) Act 2010, MS-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 MS-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; NatureScot in this case (previously known as Scottish Natural Heritage).

It is an offence to intentionally or recklessly kill, remove, damage, or destroy any protected feature of an NCMPA. MS-LOT must be sure that consenting/licensing decisions do not cause a significant risk to the conservation objectives of any NCMPA.

2.3.3 Designated Seal Haul-Outs

Seal haul-outs are coastal locations that seals use to breed, moult and rest. Nearly 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. These haul-out sites are protected under Section 117 of the Marine (Scotland) Act 2010. The Act is designed to strengthen the protection of seals when they are at their most vulnerable and, as such, provides additional protection from intentional or reckless harassment whilst seals occupy these important coastal sites.

2.3.4 Selection Criteria for Protected Sites

Over and above potential impacts on protected species, the potential for the proposed survey activities to impact protected sites (including designated seal haul-outs) needs to be considered. The following criteria has been used to select those designated sites where potential impacts need to be assessed:

- SACs and NCMPAs with cetaceans as qualifying features within 50 km of the proposed Survey Area (defined in section 3.2);
- SACs with harbour seal features within 50 km of the proposed Survey Area and breeding grey seal within 20 km of the proposed Survey Area;
- Designated seal haul-outs or seal breeding and/or otter sites that overlap with or are located within 500 m of the proposed Survey Area;
- SPAs and NCMPAs with birds as qualifying features that overlap with or are located within 2 km of the proposed Survey Area;
- SACs and NCMPAs with otter features that overlap with or are located within 500 m of the proposed Survey Area; and
- SACs and NCMPAs with vegetation or ground features that overlap with or are located within the proposed Survey Area.

3 Proposed Surveys

As the nearshore section of the Offshore ECC was not surveyed in 2022 (from the shoreline out to 8 km), this remaining section will be surveyed (geophysical and environmental) in 2023 to determine the seabed conditions ('the Proposed Survey'). A geophysical survey is required in order to map the seabed, measure water depth and characterise layers of sediment or rock below the seabed. The environmental survey will take water samples and seabed samples and is required to map the distribution and extent of marine benthic biological communities and habitats, to inform the Project's development.

3.1 Testing and Calibration of Survey Equipment

Before survey activities commence, survey equipment and sensors will need to be calibrated and tested. The vessels, equipment and activities required for testing and calibration will be the same as those used during the geophysical and environmental baseline survey activities, therefore any potential impacts on protected species and sites resulting from testing and calibration will not be specifically considered by this assessment. Testing and calibration are anticipated to take approximately 2 days to complete. Test site locations will be over two shipwreck sites, Bel Lily and Muriel, coordinates for which are illustrated in Table 3-1. Both shipwreck sites are located with the Proposed Survey Area, outlined below in section 3.2.

Table 3-1 Survey Equipment Calibration and Testing Sites - Coordinates of Shipwrecks Bel Lily and Muriel

Shipwreck	Latitude	Longitude
Bel Lily	57° 32.736' N	001° 42.371' W
Muriel	57° 32.102' N	001° 44.220' W

3.2 Survey Locations

Figure 3-1 illustrates the location of the proposed geophysical and environmental baseline surveys. The surveys will encompass approximately 8 km of the Offshore ECC from shore ('the Proposed Survey Area'). The Proposed Survey Area is divided into two sections, a Shallow Water Section (~5 m depth contour to shore) and an Offshore Section (1°40' mark to ~5 m depth contour). The Proposed Survey Area is based on the unsurveyed section of the Offshore ECC with an additional buffer of 750 m to allow for vessel turns between transect lines. The figure also illustrates a further 5 km buffer around the Proposed Survey Area, which represents the area of potential disturbance from the surveys, as recommended by JNCC guidance for assessing noise disturbance (JNCC, 2020). The 5 km buffer applied to the Proposed Survey Area to represent potential disturbance is based on two studies, Crocker & Fratantonio (2016) and Crocker, *et al.* (2019).

As shown in Figure 3-1, the Proposed Survey will be carried out over an area of 27.7 km², which includes the Shallow Water Section (4.6 km²) and the Offshore Section (23.1 km²). With the inclusion of a 5 km buffer around the Proposed Survey Area, the total potential area of disturbance is 187.6 km² ('the Area of Potential Disturbance' (APD)). Coordinates associated with the Proposed Survey Area are provided in Table

3-2 and Table 3-3. The geophysical survey will encompass the entirety of the Proposed Survey Area and will be undertaken on one vessel (as outlined in section 3.3). The environmental baseline survey will be divided between the Shallow Water Section and the Offshore Section of the Proposed Survey Area. The part of the environmental baseline survey which encompasses the Shallow Water Section ('the shallow water environmental baseline survey') will be undertaken on the same vessel as the geophysical survey. The environmental baseline survey which encompasses the Offshore Section ('the offshore environmental baseline survey') will be carried out on a separate vessel and will be assessed separately in this EPS Risk and Protected Sites Assessment.

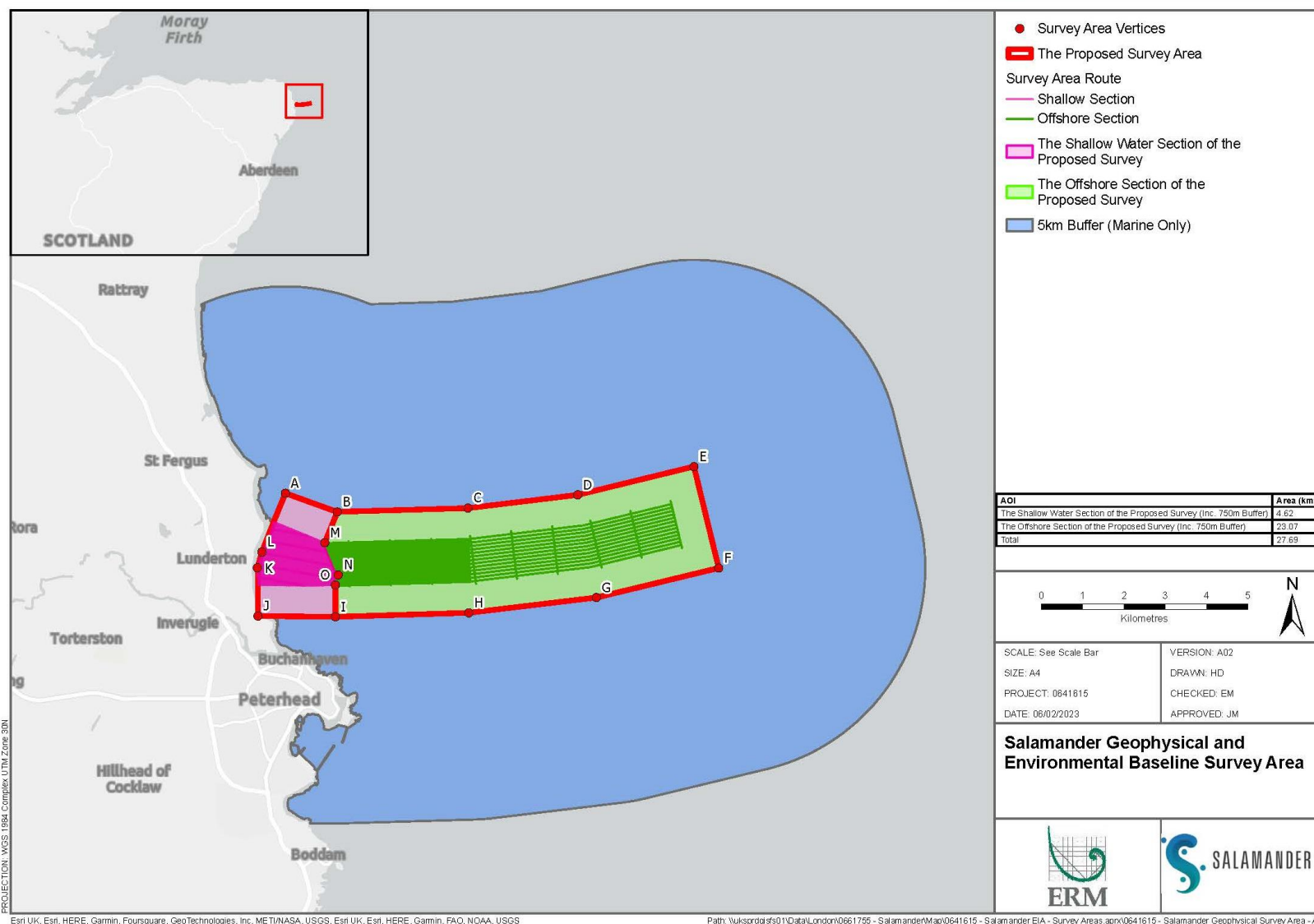


Figure 3-1 Location of the Proposed Survey Area, including the Shallow Water Section and Offshore Section, and Area of Potential Disturbance

Table 3-2 and Table 3-3 outline the coordinates for the Shallow Water Section and Offshore Section of the Proposed Survey Area shown above in Figure 3-1.

Table 3-2 Shallow Water Section of the Proposed Survey Area - Coordinates and Location Points as shown in Figure 3-1

Shallow Water Section				
Point	WGS84 (Decimal Degree)		WGS84 (Degree Decimal Minutes)	
	Longitude	Latitude	Longitude	Latitude
A	-1.79324892	57.5515884	001° 47.59493521' W	57° 33.09530373' N
B	-1.77241368	57.54732275	001° 46.34482067' W	57° 32.83936506' N
M	-1.77772749	57.54067419	001° 46.66364969' W	57° 32.44045112' N
N	-1.77253368	57.53362223	001° 46.35202070' W	57° 32.01733376' N
O	-1.77375427	57.5314441	001° 46.42525621' W	57° 31.88664604' N
I	-1.77397167	57.52455221	001° 46.43829999' W	57° 31.47313277' N
J	-1.80520717	57.52500845	001° 48.31243033' W	57° 31.50050689' N
K	-1.80513014	57.53550224	001° 48.30780858' W	57° 32.13013428' N
L	-1.8032033	57.53887524	001° 48.19219801' W	57° 32.33251440' N

Table 3-3 Offshore Section of the Proposed Survey Area - Coordinates and Location Points as shown in Figure 3-1

Offshore Section				
Point	WGS84 (Decimal Degree)		WGS84 (Degree Decimal Minutes)	
	Longitude	Latitude	Longitude	Latitude
B	-1.77241368	57.54732275	001° 46.34482067' W	57° 32.83936506' N
C	-1.71960808	57.54763226	001° 43.17648455' W	57° 32.85793569' N
D	-1.67515846	57.55004651	001° 40.50950737' W	57° 33.00279047' N
E	-1.62795381	57.55567828	001° 37.67722868' W	57° 33.34069656' N
F	-1.61879686	57.5335451	001° 37.12781185' W	57° 32.01270578' N
G	-1.66840459	57.52766331	001° 40.10427550' W	57° 31.65979857' N
H	-1.72004822	57.52486135	001° 43.20289332' W	57° 31.49168125' N
I	-1.77397167	57.52455221	001° 46.43829999' W	57° 31.47313277' N
O	-1.77375427	57.5314441	001° 46.42525621' W	57° 31.88664604' N
N	-1.77253368	57.53362223	001° 46.35202070' W	57° 32.01733376' N
M	-1.77772749	57.54067419	001° 46.66364969' W	57° 32.44045112' N

For the environmental baseline surveys, the specific sampling locations are not yet determined. However, they will be spread across the Proposed Survey Area so that the maximum variety of geological conditions and benthic habitats can be identified. The determination of the locations will be based on the results of the geophysical survey. The locations will also be screened by geophysical survey techniques prior to execution of environmental sampling activities for identification of potential hazards such as obstacles, objects, or potential for unexploded ordnance (UXO).

3.3 Equipment

3.3.1 Geophysical and Environmental Baseline Survey Vessels

Due to vessel draughts and capabilities, two survey vessels (Mersey Discovery and Geo Ranger) will undertake different aspects of the Proposed Survey within the Shallow Water Section and the Offshore Section of the Proposed Survey Area. Vessel specifications are listed in Table 3-4 and

Table 3-5 below. Mersey Discovery is proposed for the geophysical survey covering the entire Proposed Survey Area and the of the shallow water benthic scope. Geo Ranger is proposed for the offshore benthic scope only. It may be necessary to swap out the nominated vessels for a vessel of similar dimensions due to availability. However, the nominated sensor listings and frequencies will remain the same and the assumptions made in this assessment will remain valid.

Table 3-4 Survey Vessel Specifications – Mersey Discovery

Vessel Specifications	
Length	11.5 m
Beam	3.2 m
Draught	0.45 m
Operating Code	MCA Cat 2 – 60 miles from safe haven
Operating Frequency	Acoustic energy from vessels is strongest at frequencies <1 kHz
Indicative Noise Level (SPL) (SPLRMS dB re 1µPA)	Approximately 160 – 175
Survey Scope	<p>Geophysical Survey:</p> <ul style="list-style-type: none"> Shallow Water Section and Offshore Section of the Proposed Survey Area <p>Environmental Baseline Survey:</p> <ul style="list-style-type: none"> Shallow Water Section of the Proposed Survey Area

Table 3-5 Survey Vessel Specifications – Geo Ranger

Vessel Specifications	
Length	41 m
Beam	8 m
Draught	2.1 m
Geographical limit	G4 – 250 nm from safe coast
Operating Frequency	Acoustic energy from vessels is strongest at frequencies <1 kHz
Indicative Noise Level (SPL) (SPLRMS dB re 1µPA)	Approximately 160 – 175

Vessel Specifications

Survey Scope

Environmental Baseline Survey:

- Offshore Section of the Proposed Survey Area

3.3.2 Geophysical Survey and Shallow Water Environmental Baseline Survey Equipment on the Mersey Discovery

The geophysical survey will require noise emitting equipment on the Mersey Discovery including:

- MBES to gather bathymetry data;
- SSS to provide information on seabed debris/features;
- USBL positioning systems and positioning transponders to monitor positioning of the remotely operated equipment such as the SSS, SBP (Sparker) and Magnetometer;
- SBP systems to identify and measure the various marine sediment layers that exist below the sediment/water interface; and
- Magnetometer to measure magnetic field variations caused by deposits and other buried or submerged objects.

Details of the equipment is described in Table 3-6 and the assessment is based on a worst-case scenario. Back-up equipment options are also provided in case of potential equipment failure or damage.

Table 3-6 Summary of Survey Equipment, operating frequency (kHz) and indicative noise level (SPLRMS dB re. 1 µPa) on the Mersey Discovery

Survey	Equipment	Operating Frequency (kHz)	Indicative Noise Level (SPL) (SPLRMS dB re. 1 µPa)
Subsea Positioning Ultra Short Baseline (USBL)			
Primary	Sonardyne MiniRanger2	19 – 34	207
	Sondardyne WSM6+ Omni Transponder	19 – 34	207
Back-up	IXBLUE GAPS	22 – 30	207
	MT9 Transponder	21 – 31	207
Back-up	Sonardyne Scout Plus	35 – 55	207
	Sondardyne WSM6+ Omni Transponder	19 – 34	207
Multibeam Echo Sounder (MBES)			

Survey	Equipment	Operating Frequency (kHz)	Indicative Noise Level (SPL) (SPLRMS dB re. 1 μ Pa)
Primary	Norbit Winghead i77h	Typical ranges: 200 - 700 kHz (planned 400)	180 – 240
Back-up	Norbit WBMS	200 – 700 (planned 400)	180 – 240
Side-Scan Sonar (SSS)			
Primary	EdgeTech 4200	Typical ranges: 300 – 600	190 – 230
Sub-bottom Profiler (SBP)			
Primary	INNOMAR SES 2000 compact (high frequency)	85 – 115 kHz	247
	Applied Acoustics AA200 Boomer (low frequency)	1.5 kHz	228
Magnetometer			
Primary	Geometrics G882	N/A	N/A

The shallow water environmental baseline survey will require the following equipment:

- DDV using SeaSpyder Nano Drop Camera System (or similar);
- Multi-parameter CTD;
- Water sampler; and
- Van Veen grab sampler (or similar) (note, there will be just one grab sample taken in the Shallow Water Section of the Proposed Survey Area and the sample size will be less than 1 m³).

Note, due to shallow water depth there is no requirement for the use of USBL for the shallow water environmental baseline survey.

3.3.1 Offshore Environmental Baseline Survey Equipment on the Geo Ranger

The offshore environmental baseline survey will require the following equipment on the Geo Ranger:

- DDV using SeaSpyder Drop Camera System (or similar);
- Multi-parameter CTD;

- Water sampler;
- Hamon or Day grab sampler (up to 6 grab samples will be taken); and
- USBL.

The only noise emitting equipment used during the offshore environmental baseline survey is the USBL; details of this including operating frequency and indicative noise level are presented in Table 3-7. Seabed sediment samples in the Offshore Section of the Proposed Survey Area will each be less than 1 m³ and will be spaced approximately every 2 km along the Offshore ECC, totalling approximately six grab samples.

Table 3-7 Summary of Survey Equipment, operating frequency (kHz) and indicative noise level (SPLRMS dB re. 1 µPa) on the Geo Ranger

Survey	Equipment	Operating Frequency (kHz)	Indicative Noise Level (SPL) (SPLRMS dB re. 1 µPa) (peak)
Subsea Positioning Ultra Short Baseline (USBL)			
Primary	Kongsberg HiPAP 502	21 – 31	207
	CNODE Transponder	21 – 31	206
Back-up	IXBLUE GAPS	22 – 30	207
	MT9 Transponder	21 – 31	207
Back-up	Sonardyne MiniRanger2	19 – 34	207
	Sondardyne WSM6+ Omni Transponder	19 – 34	207

3.4 Duration

The proposed geophysical survey activities are scheduled to be undertaken from a date no earlier than the 1st May 2023, with the total survey activities expecting to take up to 32 days collectively. This duration includes up to 22 days for the geophysical survey and up to 10 days for the environmental baseline surveys. The geophysical survey will be undertaken first and will inform the locations of the subsequent shallow water environmental baseline survey on the Mersey Discovery, followed by the offshore environmental baseline survey on the Geo Ranger. To prepare for possible delays due to inclement weather and/or operational delays, the EPS licence is requested to cover 3 months between 1st May 2023 and 31st July 2023.

4 Baseline

4.1 Cetacean Presence

There are a range of cetaceans that inhabit the waters around Scotland, many of which have been recorded around the northeast coast coming from the North Sea or are resident in Scotland's inshore waters. Data from Marine Scotland's National Marine Plan Interactive (NMPi); Hague, Sinclair, & Sparling, (2020); SCANS III density estimates report by Hammond *et al.* (2021); Marine Scotland (2022); and the SeaWatch Foundation (2022), have been used to determine the presence of species that may be within the vicinity of the Project and to inform section 4.2 which provides background on the species and their distribution.

Table 4-1 Cetacean Species Likely Present within the Vicinity of the Project

Common Name	Latin Name	Occurrence
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Recorded mainly >10 km from the coast, rare in nearshore waters
Beaked whale spp.	All species	Sighted in the surrounding area
Beluga whale	<i>Delphinapterus leucas</i>	Sighted in the surrounding area
Bottlenose dolphin	<i>Tursiops truncatus</i>	Common and present year-round, peak numbers between July and October
False killer whale	<i>Pseudorca crassidens</i>	Sighted in the surrounding area
Harbour porpoise	<i>Phocoena phocoena</i>	Present year-round, peak numbers between July and September
Humpback whale	<i>Megaptera novaeangliae</i>	Sighted in the surrounding area
Killer whale	<i>Orcinus orca</i>	Recorded annually mainly between June and September
Long-finned pilot whale	<i>Globicephala melas</i>	Common and present year-round, peak numbers between June and January
Minke whale	<i>Balaenoptera acutorostrata</i>	Seasonal (July – October)
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	Sighted in the surrounding area
Risso's dolphin	<i>Grampus griseus</i>	Present year-round but peaks in summer months
Short-beaked common dolphin	<i>Delphinus delphis</i>	Sighted in the surrounding area
Sperm whale	<i>Physeter macrocephalus</i>	Sighted in the surrounding area
Striped dolphin	<i>Stenella coeruleoalba</i>	Rare
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	Present year-round, peak numbers between June and September

Source: Hague, *et al.*, 2020; Hammond, *et al.*, 2021; SeaWatch Foundation, 2022.

4.2 Cetacean Information

All cetacean species within UK waters are deemed ‘species of community interest’ under Annex IV of the Habitats Directive and thus require strict protection as EPS. Harbour porpoise and bottlenose dolphin are listed as individual EPS, while all other cetaceans are categorically listed as “all other Cetacea”. Cetaceans are also fully protected in Scottish waters under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), while bottlenose dolphin and harbour porpoise have further protection under Annex II of the Habitats Directive, which regulates the designation of SACs for those species. Additionally, in 2014, as part of the new powers and duties under The Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009, Scottish Ministers adopted a list of 81 Priority Marine Features (PMFs) – which are features characteristic of the Scottish marine environment. All species of cetaceans are included as PMFs.

As cetaceans are mobile species there is limited data on their behaviours and distributions. Cetaceans are particularly vulnerable to disturbance and possibly injury from offshore wind pre-construction activities such as geophysical surveys due to the emission of underwater noise. As they use sound for navigation, breeding and feeding, noise pollution can mask this or deafen the animals causing temporary and permanent impacts. Due diligence should be exercised to ensure that activities are carried out lawfully regarding EPS and their protection from disturbance and injury under the Habitats Regulations. This report forms part of that due diligence process.

Predominantly, eight species of cetaceans have been recorded in the waters of east Scotland (SeaWatch Foundation, 2022). According to SeaWatch Foundation, the east Scotland (including regions of inshore and offshore waters) from Eyemouth on the Scottish Borders to Cape Wrath in Highland Region is moderately rich in cetacean fauna. Along the Grampian coast and Highland coasts, eight cetacean species (just under 29% of the 28 UK species) have been recorded regularly since 1980 (Reid, *et al.*, 2003; Hague, *et al.*, 2020; Hammond, *et al.*, 2021; SeaWatch Foundation, 2022).

The following eight cetacean species are known to frequent or seasonally visit the waters off the east coast of Scotland: Atlantic white-sided dolphin; harbour porpoise; bottlenose dolphin; white-beaked dolphin; killer whale; minke whale; Risso’s dolphin; and long-finned pilot whale (Hague, *et al.*, 2020; Hammond, *et al.*, 2021; SeaWatch Foundation, 2022). Of these species, it is expected that Atlantic white-sided dolphin, bottlenose dolphin, harbour porpoise, killer whale, minke whale, Risso’s dolphin and white-beaked dolphin occur with the most frequency in the Proposed Survey Area and its surrounding waters based on survey data and available published abundance and distribution data (Reid, *et al.*, 2003; Hague, *et al.*, 2020; Hammond, *et al.*, 2021). Additionally, there is potential for humpback whales to be present within or near to the Proposed Survey Area (Wildlife Trust, 2020).

4.2.1 Bottlenose Dolphin

More common in Scottish inshore waters than offshore waters. Small resident or semi-resident populations of bottlenose dolphin occupy a few scattered coastal localities throughout Scotland (Cheney, *et al.*, 2018).

Bottlenose dolphins commonly form groups ranging in size of 2-25 individuals. Groups of several tens or low hundreds of animals have also been observed, although usually in offshore waters (Reid, *et al.*, 2003). The Project is located with Block R of the Small Cetaceans in Atlantic Waters of the North Sea (SCANS) III survey; densities within Block R were approximately 0.03 animals/km², which is slightly above average for the region (Hammond, *et al.*, 2021). In coastal waters, bottlenose dolphins favour river estuaries, headlands, and sandbanks, mainly where there is uneven bottom relief and/or strong tidal currents (Wilson, *et al.*, 1997). In Scottish waters, bottlenose dolphins occur around the west and east coasts, with relatively few records on the north coast of mainland Scotland or around the Northern Isles (Thompson, *et al.*, 2011). The Moray Firth SAC is located in the North Sea approximately 95 km west of the Proposed Survey Area, supporting a bottlenose dolphin population estimated at approximately 130 individuals (Wilson, *et al.*, 1999). While individuals associated with this protected site are primarily observed within the waters of the inner or Southern Moray Firth, infrequent sightings have been recorded in the waters of the Offshore ECC (Reid, Evans, & Northbridge, 2003; Cheney, *et al.*, 2013). However, there is evidence to suggest some bottlenose dolphin travel between the Moray Firth SAC and the Tay Estuary (located 130 km southwest of the Offshore ECC) (Civil, *et al.*, 2021). Movement patterns assessed between 2017 and 2019 found 51 individual bottlenose dolphins to be present in both areas, whilst 112 were only seen in the Moray Firth SAC and 103 were only seen in the Tay estuary. Movement patterns are seasonal, with transition intensities highest towards the Moray Firth SAC in early summer, and from the Moray Firth SAC to the Tay estuary in late summer. Whilst there is therefore potential for bottlenose dolphin to travel across the Proposed Survey Area, movement is infrequent and transitory.

4.2.2 Harbour Porpoise

Harbour porpoise are the most abundant cetacean species in UK waters and are generally observed in small groups of one to three individuals (Reid, *et al.*, 2003). The density of harbour porpoise within Block R of the SCANS-III survey was approximately 0.599 animals/km², which is above average in the context of the wider United Kingdom Continental Shelf (UKCS) region (Hammond, *et al.*, 2021). According to density modelling data (combining SCANS-III density data with environmental predictive factors), it is predicted that harbour porpoise densities within the Proposed Survey Area will be moderate, with higher densities occurring in waters to the south of the Project (Hague, *et al.*, 2020; Hammond, *et al.*, 2021). In addition, the peak calving period for harbour porpoises in Scottish waters is between April and June, indicating a possible increased sensitivity to any potential disturbance during this time. However, the annual distribution and relative abundance of harbour porpoise is moderate throughout the Proposed Survey Area (NMPi, 2022).

4.2.3 Minke Whale

Minke whales are the smallest, most prevalent baleen whales to occur in Scottish waters. They feed mainly in shallower waters over the continental shelf and regularly appear around shelf banks and mounds, or near fronts where zooplankton and fish are concentrated at the surface (Reid, *et al.*, 2003). They are also commonly seen in the strong currents around headlands and small islands where they can come close to land, even entering estuaries, bays and inlets. Minke whale density within Block R of the SCANS-III survey is considered to be moderate in comparison to the rest of the UKCS, with an estimated 0.039 animals/km²

(Hammond, *et al.*, 2021). This species shows a large seasonal variation with much lower densities in the winter months, likely driven by variations in sea surface temperature and chlorophyll concentrations (Hague, *et al.*, 2020). The annual distribution and relative abundance of minke whale is moderate to high throughout the Proposed Survey Area (0.02 – 0.1 animals per km²) (NMPI, 2022). The Southern Trench NCMPA, located 11 km to the west of the Offshore Array Area and overlaps a section of the Offshore ECC, is designated for marine megafauna, specifically the protection of minke whales which are frequently sighted in the summer months in the Outer Moray Firth (SNH, NatureScot, 2014). The Proposed Survey Area passes through the southern section of the Southern Trench NCMPA where minke whale density estimates are in line with SCANS-III Block R (Hammond, *et al.*, 2021).

4.2.4 White-beaked Dolphin

Common in Northern European continental shelf seas from Iceland and Norway south to Ireland and Southwest England, including the northern and central North Sea, the white-beaked dolphin has an estimated density within Block R of the SCANS III survey of 0.243 animals/km², making it the second most abundant species following the harbour porpoise. This is considered moderate compared to the rest of the UKCS (Hammond, *et al.*, 2021). According to SeaWatch Foundation (2022), peak numbers and frequency of sightings occur between June and September (particularly August). The north of Scotland is used both for feeding and breeding by white-beaked dolphin, primarily between May and August, when this species may be most sensitive to disturbance. The monthly distribution and relative abundance of white-beaked dolphin is low throughout the Proposed Survey Area (0.01 – 1.9 animals per km²) between the months of February, May and July through to September (NMPI, 2022).

4.2.5 Other cetacean species

Other species such as Atlantic white-sided dolphin, Risso's dolphin and killer whales are encountered intermittently throughout the year along the east coast of Scotland, with no obvious spatial or temporal patterns in abundance or distribution (Reid, *et al.*, 2003; Hague, *et al.*, 2020) or not within the Proposed Survey Area (Hammond, *et al.*, 2021). Humpback whales have been sporadically seen around the UK, with common sightings being observed in Shetland and the Outer Hebrides. Increasingly, more sightings have been recorded in the Northern North Sea (Wildlife Trust, 2020). There was one sighting of humpback whale on the east coast of Scotland between June and October 2022 (SeaWatch Foundation, 2022). Predicted density surfaces could not be developed for killer whales, Risso's dolphin, humpback whale or white-sided dolphins as there were not enough sightings (Hague, *et al.*, 2020), and subsequently have not been included within this EPS Risk and Protected Sites Assessment.

4.3 Pinnipeds

Grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) are two of the most occurring pinniped (seal) species that occur in Scottish offshore and coastal environments. Both species are listed under Annex II of the EU Habitats Directive and are PMFs. Just under 30% of the world's grey seal population breeds at colonies in Scotland, with main concentrations found in the Outer Hebrides and Orkney. Approximately 32% of the world's harbour seals are found in the UK and are widespread around the west coast of Scotland,

throughout the Hebrides and Northern Isles (SCOS, 2020). Both seal species have been observed within the waters of the Proposed Survey Area, with estimated sightings recording mean densities of 1-25 individuals per 25 km² and 0-1 individuals per 25 km², respectively (Russell, Jones, & Morris, 2017). When compared to other regions of the UKCS, these densities are considered to be moderate to low (Marine Scotland, 2017).

Sites designated for the protection of seals during breeding and pupping are termed seal haul-outs. There are a number of designated seal haul-out sites which are present along the southeast Scottish coastline (NMPi, 2022). However, the nearest of these sites is located >25 km from the Proposed Survey Area. The Ythan River mouth, an SAC designated for the protection of seal species, is located approximately 27 km southwest from the Proposed Survey Area and is a designated seal-haul out site, however, this is outwith the distances defined by the selection criteria in section 2.3.4.

The proposed survey activities will not result in the catching or killing of seals, and thus the protection provided to the two species by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) will not be breached. Further, considering information on their known distribution and location of the nearest seal haul-out sites, it is considered extremely unlikely that interactions with seals will occur. Thus, the potential for the proposed survey activities to result in intentional or reckless disturbance or harassment of this species is equally limited. Therefore, this species is not considered further in this assessment.

4.4 Eurasian Otter

The Eurasian otter is the only native UK otter species and is fully protected as an EPS and under Sections 9 and 11 of the Wildlife and Countryside Act 1981 (as amended). When considering a certain activity, the presence of an otter as an EPS is a material consideration if the proposals are likely to result in the disturbance or harm to the species.

Considering information on their known distribution, and the fact that no screened protected sites list this species as a qualifying feature (as determined by the criteria set out in section 2.3.4), it is considered extremely unlikely that interactions with otters will occur. Therefore, this species is not considered further in this assessment.

4.5 Basking Shark Presence

Basking sharks are protected under Schedule 5 of the Wildlife and Countryside Act 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 Wildlife and Countryside Act, 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 Wildlife and Countryside Act will therefore be required for any activity which may result in disturbance or injury to basking sharks.

Basking sharks are only very rarely present within the North Sea area (Paxton, *et al.*, 2014). Considering information on their known distribution, it is considered extremely unlikely that interactions with basking

sharks will occur, hence the potential for the proposed survey activities to result in intentional or reckless disturbance or harassment of this species is equally limited. Therefore, this species is not considered further in this assessment.

4.6 Seabirds

The primary legislation for the protection of birds in the UK is the Wildlife and Countryside Act in combination with the Nature Conservation (Scotland) Act 2004. Under these acts, it is an offence to harm wild bird species, their eggs, and nests. Additional protection is provided for certain bird species listed on Schedule 1 of the Wildlife and Countryside Act, and it is an offence to disturb those species at their nest while it is in use.

During the proposed survey activities, disturbance to birds may be caused by the physical presence of vessels in the Proposed Survey Area. Vessel light also has the potential to disorientate fledgling birds, leading to collision with vessels which may be fatal (Rodriguez, Rodriguez, & Negro, 2015). Despite this, the temporary nature of the activities precludes them from introducing significant impacts to birds in the area. The vessels will be travelling slowly and in a predetermined pattern, greatly reducing the likelihood of collision. Therefore, impacts to birds due to the physical presence of vessels is not assessed further.

4.7 Protected Sites

The only designated site located in the vicinity of the Proposed Survey Area which has the potential to be impacted by the survey activities is the Southern Trench NCMPA, as illustrated in Figure 1-1. This has been selected based on the criteria outlined in section 2.3.4. The Southern Trench NCMPA is designated for the protection of burrowed mud, minke whale, fronts and shelf deeps, and quaternary of Scotland. Within this protected area, minke whales have been observed creating “bait balls”, a method used to trap their prey (SNH, NatureScot, 2019) and are frequently sighted in the summer months in the Outer Moray Firth (SNH, NatureScot, 2014). As such, the Southern Trench NCMPA constitutes a designated site with cetaceans as a qualifying feature within 50 km of the Proposed Survey Area (as set out by the criteria in section 2.3.4).

There is not considered to be the potential for impact on benthic qualifying features as a result of geophysical survey activities, however, impacts from grab sampling as part of the environmental baseline surveys are possible. There will be approximately up to 6 grab samples within the NCMPA during the offshore environmental baseline survey. One grab sample will be taken during the shallow water environmental baseline survey, however this is outside the boundaries of the Southern Trench NCMPA. As only minor seabed impacts will be envisaged from the surveys (i.e., grab samples each < 1m³ and the use of DDV cameras), it is expected that the impacted area will recover quickly. Additionally, there are no known/mapped burrowed mud features within the southern end of the NCMPA where the survey will be conducted (NMPi, 2022), as illustrated in Figure 4-1. Therefore, protected benthic features have not been included within this assessment as the surveys are not considered to pose any risk of likely significant effect to these features; NatureScot has confirmed this conclusion via email on 26th January 2023.

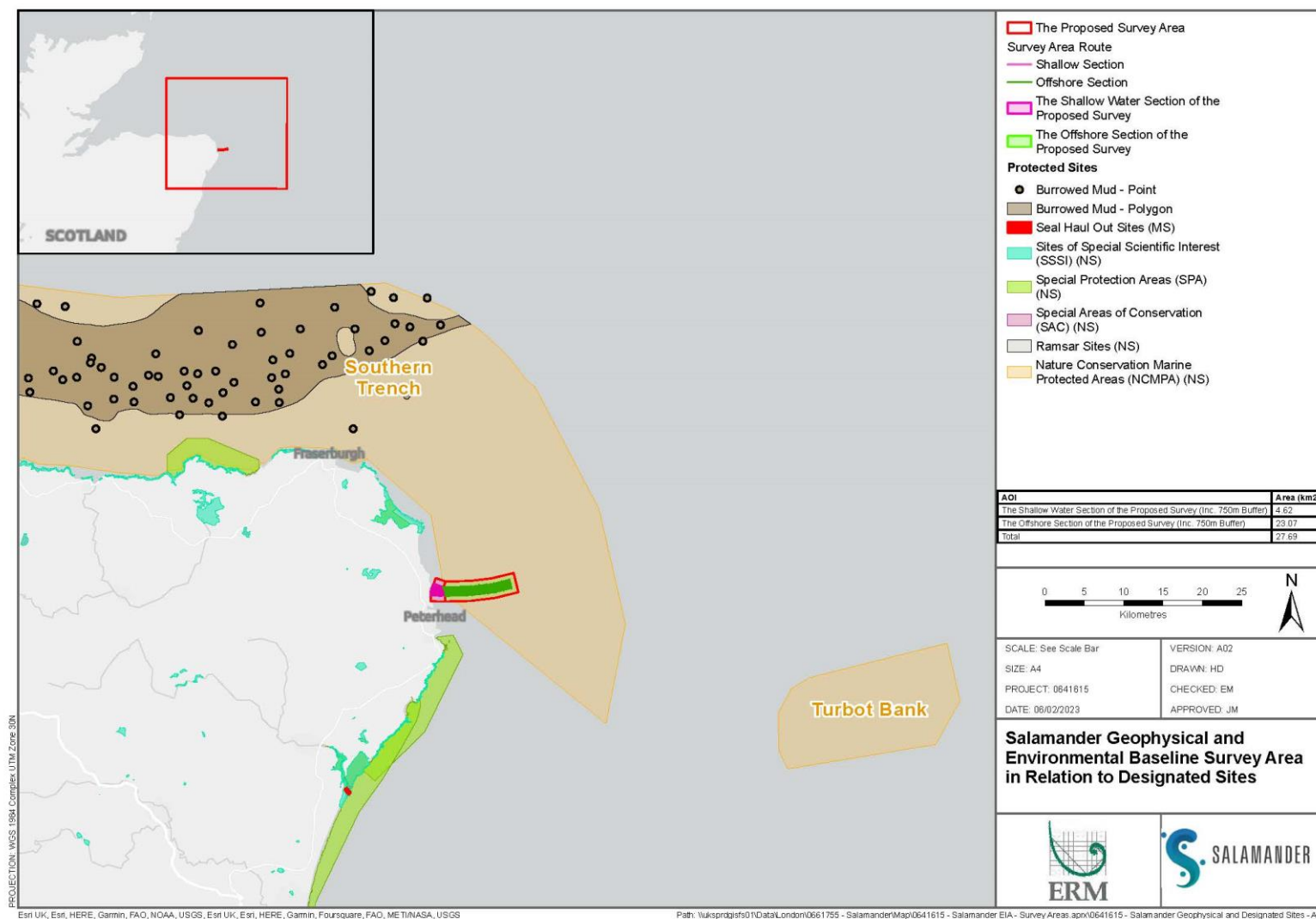


Figure 4-1 Mapped Designated Sites, including the burrowed mud features of the NCMPA, near to the Proposed Survey Area

5 EPS Risk and Protected Sites Assessment

The primary purpose of this EPS Risk and Protected Sites Assessment is to determine whether an EPS licence is required for the proposed survey activities, by identifying the potential for injury and disturbance to EPS. This section of the assessment addresses potential impacts to EPS. As discussed in section 4, a range of cetacean species are known to be present within or near to the Proposed Survey Area, potentially resulting in such species being affected by the survey activities.

The main potential impacts resulting from the Surveys are:

- collision with vessels;
- increased noise from geophysical survey systems;
- increased noise from the use of USBL during the offshore environmental baseline survey; and
- increased noise from vessels.

Collisions with vessels have the potential to cause physical injury and/or death to affected individual animals. The impacts from increased noise may cause a behavioural response in the animals resulting in a physical disturbance. Should this occur, it is likely to only be a temporary displacement during the survey activities and will not be permanent.

The increase in noise also has potential to cause auditory injury in animals such as Permanent Threshold Shift (PTS) or Temporary Threshold Shift (TTS). TTS is short term and animals recover relatively fast (minutes to hours); however, PTS permanently injures the animal by causing hearing loss which has detrimental effects, reducing their survival (Tougaard, 2021). The levels at which PTS and TTS onset occurs in different cetacean hearing groups is summarised in Table 5-1.

Southall, *et al.*, 2007 set out criteria for the levels at which species are exposed to PTS and TTS, these have since been updated and are shown in Southall, *et al.*, 2019. The level of noise impacts differs between impulsive and non-impulsive noise.

Table 5-1 PTS and TTS onset thresholds for cetacean hearing groups

Functional Group	Hearing	PTS onset, SPLR, 0-pk, flat (dB re 1µPa)	PTS onset, SELcum, 24hr (dB re 1µPa2-s)	TTS onset, SPLR, 0-pk, flat (dB re 1µPa)	TTS onset, SELcum, 24hr (dB re 1µPa2-s)
Very High Frequency Cetaceans		202	155	196	140
Medium/High Frequency Cetaceans		230	185	224	170

Functional Group	Hearing	PTS onset, SPLR, 0-pk, flat (dB re 1µPa)	PTS onset, SELcum, 24hr (dB re 1µPa2-s)	TTS onset, SPLR, 0-pk, flat (dB re 1µPa)	TTS onset, SELcum, 24hr (dB re 1µPa2-s)
Low Cetaceans	Frequency	219	183	213	168

Source: Southall, et al., (2019).

Note: peak sound pressure level measured at distance R (SPLR) and the cumulative sound exposure level (SELcum), for a recommended accumulation period of 24 hours.

It is known that some animals show natural avoidance behaviour in situations when they are disturbed including situations where noise has been introduced into their environment. This response has been observed in baleen whales, odontocetes and pinnipeds (Gordon, et al., 2003; MMT, 2022).

5.1 Likelihood of Impact

5.1.1 Protected Sites

5.1.1.1 Protected Sites with Cetaceans as a Qualifying Feature

Part of the Proposed Survey Area is located within the Southern Trench NCMPS. The Southern Trench NCMPS is protected for the presence of minke whale, burrowed mud habitat, fronts and shelf deep (NatureScot, 2020). Given the Proposed Survey Area overlaps with the Southern Trench NCMPS, which is designated specifically for the conservation of minke whale populations and foraging habitats, and the relatively high densities of cetacean species within these waters in general, there is the potential for connectivity between activities associated with the area and the identified cetacean species.

The Conservation Objectives of the Southern Trench NCMPS (NatureScot, 2020), are that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

The population percentage of minke whales that may potentially be impacted by the proposed survey activities is up to approximately 0.07% (calculated using the estimated species density within Block R of the SCANS III survey as discussed in section 5.2), which is unlikely to significantly affect the minke whale population and therefore there would be no impact to the conservation objectives of the NCMPS.

A full assessment of the potential impact on cetaceans, including minke whale, from survey activities is provided below in the following sections.

5.1.1.2 Protected Sites with Seabed and/or Benthic Protected Features

The Southern Trench NCMPA transects the Proposed Survey Area. However, as described in section 4.6, only minor seabed impacts are envisaged from the environmental baseline surveys. It is expected that the impacted area will recover quickly and represents a small area of the overall available seabed of the North Sea. Additionally, there are no known/mapped burrowed mud features within the southern end of the NCMPA where the survey will be conducted. Therefore, impacts to the seabed will be small and are unlikely to cause any significant and/or lasting damage. A separate notice of intention to carry out an exempted activity will be submitted to MS-LOT to cover the environmental surveys.

5.1.1.3 Other Areas of Importance

There are no other protected sites located within the distances set out by the criteria in section 2.3.4. This includes SACs with otters as a designated feature, seal haul-outs, NCMPAs and SPAs with birds as designated features. Survey activities are highly unlikely to cause significant effects on the qualifying features of any other sites along Scotland's east coast; thus, no impacts to any other site and/or qualifying feature other than those of the Southern Trench NCMPA will be assessed further.

The Proposed Survey Area does not overlap any protected areas which have bird species or vegetation as a qualifying feature. Given the distance to the nearest site (approximately 5 km to the Buchan Ness to Collieston Coast SPA located south of the Survey Area), there may be the potential for disturbance of birds whilst foraging at-sea. However, any disturbance to birds will be localised and temporary, and these impacts are not expected to have any long-term significant effects on the bird species for which these sites are designated, and therefore no LSE are anticipated.

5.1.1.4 Conclusions of Protected Sites Assessment

The Proposed Survey Area lies outside areas for assessment (section 2.3.4) for protected sites with otters, seals, or basking sharks as qualifying features. However, a section of the Proposed Survey Area lies within the Southern Trench NCMPA for assessment of protected sites with cetaceans as qualifying features.

Due to the temporary and localised nature of the proposed survey activities and the mitigation measures outlined in section 5.5, no significant impact or LSE is anticipated on the conservation objectives of any protected site. The proposed survey operations are required to facilitate the progression of developments of a proposed offshore wind farm, which will allow an increase in renewable energy generation capacity and decrease the national reliance on fossil fuels. Hence, the survey activities constitute work of an imperative reason of overriding public interest, whilst presenting a minimal and temporary disturbance in a limited area. This is discussed further in section 6. Risk of injury to cetacean species and the potential disturbance from underwater noise emissions is further assessed below.

5.1.2 Cetacean Impacts - Impact from Geophysical Survey Equipment Noise on the Mersey Discovery

The use of geophysical survey equipment will increase the level of anthropogenic noise in the marine environment as they emit and receive sounds. As mentioned above, cetaceans are vulnerable to underwater noise as they use sound as their primary source to survive. Species have different hearing frequency ranges meaning that not all the species are equally sensitive to the levels of noise, these are summarised in Table 5-2.

Table 5-2 Functional hearing groups of the cetacean species likely to be present

Functional Hearing Group	Species
Very High Frequency (200 Hz – 180 kHz)	Harbour porpoise
	Bottlenose dolphin
Medium/High Frequency (150 Hz – 160 kHz)	White-beaked dolphin
	Risso's dolphin
	Atlantic white-sided dolphin
	Killer whale
	Minke whale
Low Frequency Cetaceans (7 Hz – 35 kHz)	

Source: Southall, et al., (2019).

5.1.2.1 Multi-beam Echo Sounder (MBES)

Very high frequency cetaceans, such as harbour porpoise, are sensitive to certain frequencies within the operational capability of some MBES systems. However, the MBES used for the Proposed Survey will operate at frequencies above 200 kHz. This is above the hearing threshold for all marine mammals and protected species outlined in section 4. Hence, there is no potential for injury or disturbance from the use of MBES during the geophysical survey (Southall, et al., 2019).

5.1.2.2 Sub-bottom Profiler (SBP)

The frequency of the noise emissions from both SPB profilers are within the marine mammal hearing ranges. Therefore, it is possible that the source level of both the SBP sound sources (228 dB re 1µPa and 247 dB re 1µPa @1 m) may cause auditory injury (PTS/TTS) for cetaceans as this is above PTS/TTS onset thresholds for all cetaceans. The frequencies generated by the SBPs have the potential to cause localised short-term impacts on behaviour for all cetaceans present in the APD, possibly resulting in avoidance at close proximities (Nedwell & Brooker, 2008).the risk to cetaceans from use of this equipment can be reduced by the orientation of the sound source (hull mounted in relatively shallow water). The equipment and resulting sound waves are directed downwards to the seabed, thus reducing the area impacted by noise.

5.1.2.3 Side Scan Sonar (SSS)

The SSS equipment operates at extremely high frequencies ranging from 300 – 600 kHz. This is above the range of all the species likely to be present in the Proposed Survey Area as the highest frequency that can be heard is up to 180 kHz by harbour porpoise, therefore is not expected to cause auditory injury or disturbance (Nedwell & Brooker, 2008).

5.1.2.4 Ultra-short Baseline (USBL)

The USBL equipment for the geophysical surveys produces sound at frequencies ranging from 19 – 55 kHz, which is within the hearing range of all species likely to be present. The relatively lower frequencies generated by the USBL have the potential to cause localised short-term impacts on behaviour for all cetaceans present in the Proposed Survey Area, possibly resulting in avoidance at close proximities (Nedwell & Brooker, 2008). USBL may be used consistently whilst the geophysical surveys are being conducted and whilst the onset of PTS and TTS from this equipment (which has a source level of 207 dB re 1µPa @1 m) may occur if marine mammals are in very close proximity to the equipment, considering natural avoidance behaviour and the transitory nature of cetaceans that may be present (Southall, et al., 2019), there is minor potential for PTS/TTS onset.

5.1.3 Cetacean Impacts - Impact from Offshore Environmental Baseline Survey Equipment Noise on the Geo Ranger

5.1.3.1 Ultra-short Baseline (USBL)

USBL equipment used for the offshore environmental baseline survey will be the same as that outlined above in section 5.1.2.4 for the geophysical survey. However, the sporadic nature of environmental sampling is such that the USBL will only be used intermittently for the positioning of equipment (a maximum of 28 locations across the whole survey area and a duration of no more than 30 minutes per deployment). USBL (and associated transponder) is the only noise-emitting equipment that will be used during the offshore environmental baseline survey, therefore, given the short term nature of noise emission and the behaviour of cetaceans which may be present, it is proposed that there is negligible potential for injury through PTS/TTS. Operating frequencies of the USBL equipment range from 19 – 55 kHz, which is within the hearing range for all cetaceans that may be present. However, as the nature of the environmental baseline survey is transitory and short-term, it is proposed that potential disturbance during the offshore environmental baseline survey will be minor.

5.1.4 Impact from Vessel Noise

The use of a vessel(s) for the surveys will increase the level of anthropogenic noise in the marine environment which in turn will increase the potential for impacts to occur to cetaceans present. An increase in vessel noise can potentially cause behavioural responses in cetaceans through disturbance and can also potentially cause auditory injury to the animals such as PTS or TTS.

Based on larger vessels that emit a sound source level of 180 – 190 dB re 1µPa @ 1m rms, there is a possibility that any cetaceans less than one meter from a vessel may suffer auditory injury (MarineSpace, 2019). However, both the Mersey Discovery and Geo Ranger are small vessels for which the source levels are likely to be too low to result in injury. Furthermore, the presence of both vessels does not constitute a change of baseline compared to the density of vessel activity in the area and it is considered highly unlikely that any animals will be within such close proximity. Following Marine Scotland guidance (Marine Scotland, 2020a) for inshore waters, it is considered that there is no potential for an offence to be committed as defined in Regulations 39 (1) (a), (b) and 39 (2) of the Habitats Regulations. As no offence described in Regulation 39 of the Habitats Regulations will be committed, an EPS licence will not be required for this potential impact (impact from vessel noise).

5.1.5 Impact from Collision

The movement of vessels in areas that support populations of cetaceans has the potential to result in collisions between vessels and cetaceans. Collisions can cause fractures, bruising, cuts, and ultimately the death of affected individuals. Whilst vessels of all sizes can cause collisions, more serious incidents are usually caused by vessels travelling at higher speeds (Wang, Lyons, Corbett, & Firestone, 2007). If a large vessel reduces its speed to 10 knots it can reduce the probability of lethal injury to whales to less than 50% (Vanderlaan & Taggart, 2007).

The vessels will travel along predefined routes from port to the survey locations and, when carrying out the surveys, the vessels will follow a linear survey route minimising unnecessary vessel movement. The vessels used in the surveys will only travel at a maximum speed of 4 knots during the surveys. As the routes of the vessel will be confined and the speed will be slow, this greatly reduces the risk of collision.

Following Marine Scotland guidance for inshore waters (Marine Scotland, 2020a), the potential for injury or disturbance to EPS, as defined in Regulations 39 (1) (a) and (b) and 39 (2) of the Habitats Regulations, from collision with vessels associated with the proposed work is negligible. As no offence described in Regulation 39 of the Habitats Regulations will be committed, an EPS licence will not be required for this potential impact (collision with vessels).

5.2 Magnitude of Impact

No detailed modelling has been carried out for this assessment, therefore it is based on existing literature and assumes the worst-case throughout. The species that have been assessed are those known to be distributed around Peterhead and the east coast of Scotland from the most recent published literature. Worst case assumptions have been used when considering the type of geophysical and environmental baseline survey equipment being used (from an underwater noise generation perspective) and the area disturbed by the surveys (based on JNCC 2020 guidance). Due to the differing nature of the surveys and the different levels of noise that will be emitted, the geophysical survey on the Mersey Discovery and the offshore environmental baseline survey on the Geo Ranger have been assessed separately. Note, there is

no assessment for the shallow water environmental baseline survey as no noise emitting equipment will be used.

5.2.1 Magnitude of Impact of the Geophysical Survey on the Mersey Discovery

Density estimates from the updated June 2021 version of SCANS III (Hammond, *et al.*, 2021) which is based on Hammond, *et al.*, (2017), have been used to determine the worst-case number of individuals of each species present within the Proposed Survey Area that may be impacted. To calculate the percentage of the reference population that may be impacted, abundances from the Inter-Agency Marine Mammal Working Group (IAMMWG) “Updated abundance estimates for cetacean Management Units in UK waters guidance” (IAMMWG, 2022) have been used for all species apart from killer whale and Risso’s dolphin for which there was not available data. The results for the geophysical survey to be undertaken on the Mersey Discovery (which encompasses the entire Proposed Survey Area and subsequent APD as calculated in section 3.2) are shown in Table 5-3.

Table 5-3 Summary of Potential Disturbance Impacts of the Geophysical Survey across the Survey Area

Species	Species Density per km ²	Management Unit	Abundance in Management Unit	No. of individuals potentially disturbed in the Area of Potential Disturbance (187.6 km ²)	Percentage of the reference population potentially affected
Harbour porpoise	0.599	NS	159,632	112	0.07%
Bottlenose dolphin	0.03	CES	224	6	2.7%
White-beaked dolphin	0.243	CGNS	20,026	46	0.23%
Risso’s dolphin	Insufficient data	CGNS	8,687	Insufficient data	Insufficient data
Atlantic white-sided dolphin	0.021	CGNS	12,293	4	0.03%
Killer whale	Insufficient data	-	Insufficient data	Insufficient data	Insufficient data
Minke whale	0.039	CGNS	10288	7	0.07%

As shown in Table 5-3, there is potential for disturbance on all species possibly present during the geophysical survey, however for the majority of species the impact will affect a very small percentage of the reference populations. Bottlenose dolphin has the potential to be most affected, with over 2.5% of their reference populations potentially impacted, however this is still considered to be low. The highest number

of individuals to be impacted is harbour porpoise with 112 individuals, which equates to 0.07% of the reference population.

The geophysical survey will occur over a relatively short period of time (for a total of 22 days, including anticipated weather standby). Within this timeframe, use of equipment will be intermittent with periods of inactivity during weather downtime, vessel resupplies and whilst the vessel turns between transit lines. Furthermore, impact magnitude is likely to be less than assessed in this worst-case scenario. For example, broadband received levels from SBP's, MBES, and SSS devices have been shown to rapidly attenuate with distance from sound source, including particularly pronounced fall-off for directional sources when the receiver was outside of the source's main beam (Halvorsen & Heaney, 2018). Due to the frequency ranges at which the MBES and SSS equipment will operate, there is no potential for injury or disturbance to cetaceans. There is potential for disturbance from the use of the SBP and USBL equipment, however if disturbance does occur, suitable habitat exists nearby to the Proposed Survey Area for cetaceans to inhabit. Cetaceans would be expected to return to the Proposed Survey Area quickly if disturbance had occurred. For comparison, after cessation of pile driving, which generates significantly larger amounts of impulsive noise compared to geophysical surveys, harbour porpoise return to the area within between a few hours (Tougaard, *et al.*, 2009; Brandt, *et al.*, 2012; Dahne, *et al.*, 2013) and up to 3 days (Diederichs, *et al.*, 2009; Brandt, *et al.*, 2011). If disturbance does occur it will be brief, over a small area, with recovery likely within a small timeframe. Furthermore, there is negligible potential for injury from use of USBL and, whilst there is potential for injury from the use of SBP equipment, mitigation measures will be in place to reduce this risk (see section 5.5).

All surveys on both vessels will be carried out between May 2023 and July 2023 for a total of 32 days (22 days geophysical survey and 10 days environmental survey (including anticipated weather downtime)), though the environmental survey campaign from the Geo Ranger may not necessarily follow on immediately after the Mersey Discovery due to vessel availability. This survey period aligns with the periods in which abundance of vulnerable species begin to peak in the region (from June onwards), meaning it will be more likely they are present (although the geophysical survey will likely be completed by the end of May, before peak abundance occurs). Although this increases the potential for disturbance, it is not feasible to carry out the surveys over winter months when there is a reduced likelihood that vulnerable species will be present. Furthermore, mitigation measures as described in Table 5-4 will be in place to reduce any disturbance from the geophysical survey. Any impacts caused are likely to be temporary due to the short time that the surveys will be taking place. There is not expected to be long term impacts.

5.2.2 Magnitude of Impact of the Offshore Environmental Baseline Survey on the Geo Ranger

USBL will be used up to 28 times during the offshore environmental baseline survey to assist with the deployment and positioning of the grab and water sampling equipment and the DDV camera. The use of USBL will be localised and short-term in nature, with a maximum duration of 30 minutes per deployment. The USBL has a worst-case source level of 207 dB re 1µPa @1 m, as illustrated in Table 3-7. The spherical-spreading nature of sound as it propagates results in energy intensity decreasing as the inverse square of

the range. This means that noise levels from the USBL will reduce rapidly within a couple metres distance from the source to below the injury threshold for very high frequency cetaceans such as harbour porpoise (the most sensitive species group for PTS onset). Thus, whilst disturbance may occur, injury from USBL is very unlikely. Furthermore, based on natural avoidance behaviour and the low percentages of all cetacean populations that may be disturbed within the Proposed Survey Area (Table 5-3), it is highly unlikely there will be cetaceans close to the vessel or USBL that may potentially be injured. Therefore, risk of injury from the use of USBL during the offshore environmental baseline survey is deemed negligible and mitigation measures considered not necessary. However, disturbance to cetaceans is possible, therefore an EPS licence to disturb will be required.

5.3 Cumulative Impacts

Based on current EPS licence applications on the MS-LOT website¹, no other surveys or noisy activities are planned in the vicinity of the Proposed Survey Area at the same time, therefore no cumulative impacts are anticipated.

5.4 Alternatives

Alternative methods and locations of the surveys are considered in section 6.2.

5.5 Proposed Mitigation

Impacts from the geophysical survey can be limited by reducing the amount of noise that is emitted into the marine environment. To do this, the lowest practicable power levels will be used throughout the surveys, and the SBP and other geophysical survey equipment will only be fired when necessary. To note, it is proposed that mitigation is not necessary for the offshore environmental baseline survey from the Geo Ranger, as described above. Therefore, mitigation proposed here applies to the geophysical survey carried out on the Mersey Discovery only.

JNCC has published guidance for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017). Throughout the geophysical survey this guidance will be followed ensuring that any disturbance effects on marine EPS in the area will be kept to a minimum and should not impact on the FCS of the species likely to be found within the Proposed Survey Area. The equipment used in the survey are electromagnetic sources and therefore are not required to follow the strict mitigation measures that are required for the use of airguns, however some of the measures are the same. The mitigation measures that will be followed are summarised below in Table 5-4.

¹ [All application and project documentation | Marine Scotland Information](#)

Table 5-4 Mitigation Measures to be used on the Mersey Discovery

Measure	Details
Pre-shooting search	A search must be carried out before any soft start or works can begin. This will be carried out by MMO or Passive Acoustic Monitoring (PAM) operatives and there must be clear communication between searchers and crew.
Marine Mammal Observer (MMO)	A trained, non-dedicated MMO should be present on the vessel. During mitigation periods the MMO must survey the sea surface for the presence of cetaceans within the mitigation zone of the survey site ensuring no individuals are present prior to the commencement of any survey operations.
Passive Acoustic Monitoring (PAM)	PAM on the vessel is proposed as an additional mitigation measure for survey activities undertaken in the hours of darkness or poor visibility.
Mitigation Zone	The MMO and PAM operative will monitor the agreed mitigation zone which is a standard of 500 m from the centre of the noise source location.
Duration of Search	The mitigation zone must be monitored throughout the entire pre-shooting search and soft-start procedures. The pre-shoot search must be carried out for 30 minutes prior in water less than 200 m deep.
Delay	<p>If cetaceans are detected in the mitigation zone during the pre-shoot search, the commencement of the survey or soft start where applicable, must be delayed until the animal has passed out of the mitigation zone. There must be a 20-minute delay from the last detection of the animal out with the mitigation zone before the surveying or soft-start can begin.</p> <p>If cetaceans are detected within the mitigation zone once the survey equipment is operating, either during the soft-start or full power, there is no requirement to stop.</p>
Soft Start	Some of the geophysical survey equipment that may be used in the survey operations are not capable of undertaking "soft start" procedures, however, where the devices can use this procedure, it will be used.
Line Change Rules	If line changes are expected to take more than 40 minutes, firing should be terminated in between lines and a pre-shooting search, delay and soft start should be followed before the new line begins.

Source: JNCC (2017).

5.6 Summary of Impacts

During the geophysical survey, the most likely effects relate to the harbour porpoise who utilise the very high frequency range, as harbour porpoise can be both disturbed and injured by the use of SBP equipment. Furthermore, there is potential for all cetacean species to be disturbed by the use of USBL equipment, however potential for injury is considered to be negligible. Disturbance effects are expected to be temporary, with disturbed species expected to return to the Proposed Survey Area shortly after survey activities are completed (between a few hours and up to 3 days as described in section 5.2.1). Injury will be minimised following mitigation through the presence of MMO's and other mitigation measures as detailed above in Table 5-4. Although a slightly higher percentage of the reference population of bottlenose dolphin may potentially be disturbed (2.7%), the actual likelihood of the species being within the vicinity of the Project is expected to be low as this equates to just 6 individuals; the likelihood and magnitude of impact

will be further reduced through mitigation measures being in place. The risk of collision for all species and disturbance and injury risk from vessel noise are considered to be very low.

The assessment above shows that the risk of a disturbance offence being committed during the geophysical survey is low but cannot be completely dismissed. Therefore, **an EPS licence to disturb for the geophysical survey operations will be required**. Due to the mitigation measures that will be in place aboard the Mersey Discovery during the geophysical survey, a licence to injure is deemed not necessary.

SBES propose to submit a Marine Licence Exemption for the offshore environmental baseline survey on the basis that there will be negligible impacts to protected features of the Southern Trench NCMPA, including benthic features. Due to the use of DDV and the temporary nature of sampling activities, no likely significant effects are anticipated. The only noise emitting equipment that will be used during the offshore environmental baseline survey will be the USBL. The potential for injury from USBL is negligible, however whilst the risk of disturbance is low, it cannot be dismissed. Therefore, **an EPS licence to disturb will be required, however mitigation to reduce risk of injury is deemed not necessary**.

6 EPS Licence Assessment

6.1 Test 1 'Purpose'

The licence must relate to one of the purposes referred to in Regulation 44.

Regulation 44 (2) of the Habitats Regulations 1994 (as amended in Scotland) provides a list of purposes where an EPS licence can be granted. These are as follows:

- a) Scientific or educational purposes.
- b) Ringing or marking, or examining any ring or mark on, wild animals.
- c) Conserving wild animals or wild plants or introducing them to particular areas.
- d) Protecting any zoological or botanical collection.
- 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.
- f) Preventing the spread of disease.
- g) Preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber, or any other form of property or to fisheries.

The proposed surveys associated with the development of the Salamander Offshore Wind Farm meets the requirements of Regulation 44 (2) (e) by providing environmental benefit on a national and international scale and helps to deliver national and international environmental policies in relation to climate change, the achievement of renewable energy targets and reduction of greenhouse gases. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 sets a target of net-zero emissions of all greenhouse gases by 2045. The development of renewable energy is a key factor in reaching this target to improve Scotland's environmental status. The proposed wind farm meets these requirements by providing beneficial consequences of primary importance for the environment and the surveys are an integral part of developing the wind farm and reaching the net-zero target on time.

6.2 Test 2 'Alternatives'

There must be no satisfactory alternative (Regulation 44, 3a).

6.2.1 Alternative Method

The most significant risk to EPS from the survey campaigns is the potential impacts of anthropogenic noise produced by the survey equipment. The equipment likely to cause the biggest impact is the SBP which

operates within the hearing frequency of harbour porpoise known to be in the area. The use of the SBP is vital to obtain an accurate picture of the seabed, sediment, and any likely obstructions. SBP gives greater confidence that there will be no anomalies encountered on the seabed during export cable installation, which could have severe economic and/or environmental consequences at later stages of the Project. The use of lower impact survey equipment or not using certain noise generating equipment is deemed not viable as an alternative.

6.2.2 Alternative Location

The location of the Offshore Array Area is the site that has been applied for to Crown Estate Scotland (CES) as part of the Innovation and Targeted Oil & Gas (INTOG) seabed leasing round, therefore the Project location cannot be altered and the Surveys must be carried out at this proposed location.

6.3 Test 3 ‘Conservation Objectives’

The action authorised must not be detrimental to the maintenance of the population of the species concerned at an FCS in their natural range (Regulation 44, 3b).

Marine Scotland outlines the definition of a ‘favourable’ conservation status in “The protection of Marine European Protected Species from injury and disturbance Guidance for Scottish Inshore Waters (July 2020 Version)” (Marine Scotland, 2020a). The conservation status will be taken as ‘favourable’ when:

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

Harbour porpoise and bottlenose dolphin are listed as individual EPS under Annex IV of the Habitats Directive, and have further protection under Annex II, whilst other cetaceans are listed as “all other Cetacea”. Over 2% of bottlenose dolphin reference population may potentially be disturbed, however this is still relatively low as this equates to just 6 individuals. Approximately 0.07% of the harbour porpoise population are anticipated to be disturbed and, as outlined in section 5.1 and 5.5, with mitigation it is also considered to be precautionary.

Furthermore, as described in section 5.1, if disturbance does occur it will be brief, over a small area, with recovery likely within a small timeframe. Given the large amount of suitable habitat available surrounding the Proposed Survey Area, it is not likely that such a behavioural response (disturbance) would impair the ability of the animal to survive or reproduce or generate significant population-level impacts. Mitigation measures will be in place to ensure cetaceans are not within close proximity to the geophysical survey

allowing them to move to suitable habitats within the same management units to avoid the disturbance for the short time period.

Following the above definitions of FCS, the surveys are concluded not to have a detrimental effect to the maintenance of the population of any of the species concerned at FCS.

6.4 Summary

As demonstrated, the proposed geophysical survey satisfies all three EPS tests as the activity has a licensable purpose, there are no satisfactory alternatives, and it will not be detrimental to any species FCS. As there is a risk of disturbance impacts due to noise produced from the SBP and USBL equipment, **an EPS licence (to disturb) will be required for the Project to carry out the proposed geophysical survey.** There is a risk of injury from the use of SBP equipment, however **a licence to injure is considered not necessary due to the mitigation measures** that will be in place aboard the Mersey Discovery.

The proposed offshore environmental baseline survey also satisfies all three EPS tests. Noise emitted by the offshore environmental baseline survey has the potential to disturb cetaceans, but injury risk is considered negligible. Therefore, **mitigation to reduce the risk of injury is considered not necessary.** However, since disturbance to cetaceans may occur, **an EPS licence (to disturb) is considered necessary for the proposed offshore environmental baseline survey.**

7 References

- Barham, R., & Mason, T. (2018). East Anglia TWO and East Anglia ONE North Offshore Wind Farms: Underwater noise assessment. *Subacoustech Environmental Report, P237R0203*.
- Binnerts, B., von Benda-Beckmann, S., van der Sanden, G., & Martina, Q. (2020). Impact of USBL systems on marine life. *Memorandum TNO*.
- Brandt, M., Diederichs, A., Betke, K., & Nehls, G. (2011). Responses of harbour porpoises to pile driving at the Horns Rev II offshore wind farm in the Danish North Sea. *Marine Ecology Progress Series*, 205-216.
- Brandt, M., Diederichs, A., Betke, K., & Nehls, G. (2012). The effects of noise on aquatic life: Effects of offshore pile driving on harbour porpoises. *Advances in Experimental Medicine and Biology*, 281-284.
- Cheney, B., Graham, I., Barton, T., Hammond, P., & Thompson, P. (2018). Site Condition Monitoring of bottlenose dolphins within the Moray Firth Special Area of Conservation: 2014 - 2016. *Scottish Natural Heritage Research Report, 1021*.
- Cheney, B., Thompson, P., Ingram, S., Hammond, P., Stevick, P., Durban, J., . . . Quick, (2013). Integrating multiple data sources to assess the distribution and abundance of bottlenose dolphins in Scottish waters. *Mammal Review*, 71-88.
- Civil, M., Quick, N., Mews, S., Hague, E., Cheney, B., Thompson, P., & Hammond, P. (2021). Improving understanding of bottlenose dolphin movements along the east coast of Scotland. *Report number SMRUC-VAT-2020-10 provided to European Offshore Wind Deployment Centre (EOWDC)*.
- Crocker, S., & Fratantonio, F. (2016). *Characteristics of high-frequency sounds emitted during high-resolution geophysical surveys*. OCS Study.
- Crocker, S., Fratantonio, F., Hart, P., Foster, D., O'Brien, T., & Labak, S. (2019). *Measurement of sounds emitted by certain high-resolution geophysical survey systems*. IEEE Journal of Oceanic Engineering. doi:doi.org/10.1109/JOE.2018.2829958
- Dahne, M., Gilles, A., Lucke, K., Peschko, V., Adler, S., Krugel, K., . . . Siebert, U. (2013). Effects of pile-driving on harbour porpoises at the first offshore wind farm in Germany. *Environmental Research Letters*.
- Diederichs, A., Brandt, M., & Nehls, G. (2009). Effects of construction of the transformer platform on harbour porpoises at the offshore test field "alpha ventus". *Report to Stiftung Offshore-Windenergie BioConsult*.
- Gordon, J., Gillespie, D., Potter, J., Frantzis, A., Simmonds, M., Swift, R., & Thompson, D. (2003). A review of the effects of seismic surveys on marine mammals. *Marine Technology Society Journal*, 37(4), 16-34.

- Hague, E., Sinclair, R., & Sparling, C. (2020). Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters. *Scottish Marine and Freshwater Science*, 11(12).
- Halvorsen, M., & Heaney, K. (2018). Propagation characteristics of high-resolution geophysical surveys: open water testing. *Department for the Interior Bureau of Ocean Energy Management*.
- Hammond, P., Lacey, C., Gilles, A., Viqerat, S., Borjesson, P., Herr, H., . . . Ojen, N. (2021). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. *SCANS-III*.
- IAMMWG. (2022). Updated abundance estimates for cetacean Management Units in UK waters guidance. *JNCC*, 680.
- JNCC. (2017). *JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys*. Retrieved from JNCC: <https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf>
- JNCC. (2020). Guidance on noise management in harbour porpoise SACs. *Joint Nature Conservation Committee*.
- Marine Mammals Management Toolkit, (. (2022, August 26). *Whale and dolphin watching*. Retrieved from <https://marine-mammals.info/whale-and-dolphin-watching/>.
- Marine, S. (2020a). *The protection of Marine European Protected Species from injury and disturbance; guidance for Scottish Inshore Waters (July 2020)*. Report prepared by Scottish Government in partnership with Scottish Natural Heritage Commissioned Report. Retrieved from www.gov.scot
- MarineSpace. (2019). Caithness - Moray HVDC Link - Controlled Flow Excavation / Rock Placement Marine Protected Areas Assessment. *marine.gov.scot*.
- National Marine Plan Interactive (NMPi). (2022, January 03). Retrieved from <http://www.gov.scot/Topics/marine/seamanagement/nmpihome>
- Nedwell, J., & Brooker, A. (2008). Measurement and assessment of background underwater noise and its comparison with noise from pin pile drilling operations during installation of the SeaGen tidal turbine device, Strangford Lough. *Cowrie Ltd*, <https://tethys.pnnl.gov/sites/default/files/publications/Nedwell-Brooker-2008.pdf>.
- Paxton, C., Scott-Hayward, L., & Rexstad, E. (2014). Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking sharks. *Scottish Natural Heritage Commissioned Report*, 594.

- Reid, J., Evans, P., & Northbridge, S. (2003). An atlas of cetacean distribution on the northwest European Continental Shelf. *Joint Nature Conservation Committee*.
- Rodriguez, A., Rodriguez, B., & Negro, J. (2015). GPS tracking for mapping seabird mortality induced by light pollution. *Nature*.
- Russell, D., Jones, E., & Morris, C. (2017). Updated Seal Usage Maps: Estimated At-Sea Distribution of Grey and Harbour Seals. *Scottish Marine and Freshwater Science*, 8(25), 25.
- SCOS. (2020). Scientific Advice on Matters Related to the Management of Seal Populations: 2020. *Scientific Committee on Seals*. Retrieved from <http://www.smru.st-andrews.ac.uk/files/2021/06/SCOS-2020.pdf>
- SeaWatch Foundation. (2022, December 30). Retrieved from Recent Sightings: <https://www.seawatchfoundation.org.uk/recentsightings/>
- SeaWatch Foundation. (2022, December 30). Retrieved from East Scotland Fact Sheet: <https://seawatchfoundation.org.uk/wp-content/uploads/2012/07/EasternScotland.pdf>
- SNH. (2014, January 03). *NatureScot*. Retrieved from Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white beaked dolphin and basing shark: <https://www.nature.scot/sites/default/files/2017-11/Publication%202014%20-%20SNH%20Commissioned%20Report%20594%20-%20Statistical%20approaches%20to%20aid%20identification%20of%20Marine%20Protected%20Areas%20for%20Minke%20whale%2C%20Risso%27s%20dolphin%2C%2>
- SNH. (2019, January 03). *NatureScot*. Retrieved from Southern Trench Possible Marine Protected Area: <https://www.nature.scot/sites/default/files/2019-06/Southern%20Trench%20possible%20MPA%20-%20Site%20Summary%20Leaflet.pdf>
- Southall, B., Bowles, A., Ellison, W., Finneran, J., Gentry, R., Greene, C., . . . Tyack, P. (2007). Marine Mammal Noise Exposure Criteria. *Aquatic Mammals*, 33(4), 411-522. doi:<https://doi.org/10.1578/AM.33.4.2007.411>
- Southall, B., Fineran, J., Reichmuth, C., Nachtigall, P., Ketten, D., Bowles, A., . . . Tyack, P. (2019). Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects. *Aquatic Mammals*, 45(2), 125-232.
- Thompson, P., Cheney, B., Ingram, S., Stevick, P., Wilson, B., & Hammond, P. (2011). Distribution, abundance and population structure of bottlenose dolphins in Scottish waters. *Scottish Government and Scottish Natural Heritage funded report*, 354.

- Tougaard, J. (2021). *Thresholds for noise induced hearing loss in marine mammals. Background note to revision of guidelines from the Danish Energy Agency*. Aarhus University; DCE - Danish Centre for Environment and Energy. Retrieved from https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notater_2021/N2021|28.pdf
- Tougaard, J., Carstensen, J., Teilmann, J., Skov, H., & Rasmussen, P. (2009). Pile driving zone of responsiveness extends beyond 20 km for harbour porpoises. *Journal of the Acoustical Society of America*, 11-14.
- Wang, C., Lyons, S., Corbett, J., & Firestone, J. (2007). Using ship speed and mass to describe potential collision severity with whales: an application of the ship traffic, energy and environmental model (STEEM). *University of Delaware*. Retrieved from <https://tethys.pnnl.gov/sites/default/files/publications/Wang-et-al-2007.pdf>
- Wildlife Trust*. (2020, January 03). Retrieved from Humpback Whale: <https://www.wildlifetrusts.org/wildlife-explorer/marine/marine-mammals-and-sea-turtles/humpback-whale>
- Wilson, B., Hammond, P., & Thompson, P. (1999). Estimating size and assessing trends in a coastal bottlenose dolphin population. *Ecological Applications*, 9, 288-300.
- Wilson, B., Thompson, P., & Hammond, P. (1997). Habitat use by bottlenose dolphins: seasonal distribution and stratified movement patterns in the Moray Firth, Scotland. *Journal of Applied Ecology*, 34(6), 1365-1374.