Scottish & Southern Electricity Networks

AULTBEA TO ULLAPOOL

EPS and Protected Sites and Species Risk Assessment

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EXECUTIVE SUMMARY

Scottish Hydro Electric Power Distribution plc (SHEPD) holds a licence under the Electricity Act 1989 for the distribution of electricity in the north and west of Scotland. SHEPD has a statutory duty to provide an economic and efficient system for the distribution of electricity to ensure that its assets are maintained so as to ensure a safe, secure and reliable supply to customers.

SHEPD has identified a need to reinforce the network between Aultbea and Ullapool (the Proposed Development). To support project consenting, SHEPD has commissioned the preparation of this Risk Assessment to inform European Protected Species (EPS) and Basking Shark licence applications as the proposed cable route includes a subsea section across Loch Broom. This Risk Assessment considers a range of proposed geophysical, geotechnical and environmental survey activities, required to inform the subsea cable route and installation.

The proposed survey area is located approximately 2 km from the boundary of the Inner Hebrides and the Minches Special Area of Conservation (SAC), designated for harbour porpoise (*Phocoena phocoena*). Due to the localised and temporary nature of proposed geophysical surveys, in combination with a range of proposed mitigation, no adverse impact through injury to cetaceans is anticipated. However, the use of geophysical survey equipment may cause disturbance to cetaceans in the vicinity and as such, an application for an EPS Licence will be submitted to Marine Scotland Licensing Operations Team (MS-LOT).

The primary risk to basking sharks (*Cetorhinus maximus*) during the proposed activities in Loch Broom relates to the presence of vessels and thus potential for injury via collision. However, vessels associated with the proposed survey activities will be slow moving and thus the potential for significant injury is minimal. The potential to impact basking sharks is considered very low and will be reduced further through the implementation of mitigation measures. However, as disturbance to basking sharks remains a possibility, an application for a Basking Shark Licence will be submitted to MS-LOT.

Seals (and designated seal haul-out sites), otters and seabirds are considered not to be at significant risk of disturbance from the proposed survey activities.

Overall, the proposed survey activities constitute work of an overriding public need (required to inform cable installation) while presenting a trivial and temporary disturbance in a limited area.

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1 INTRODUCTION

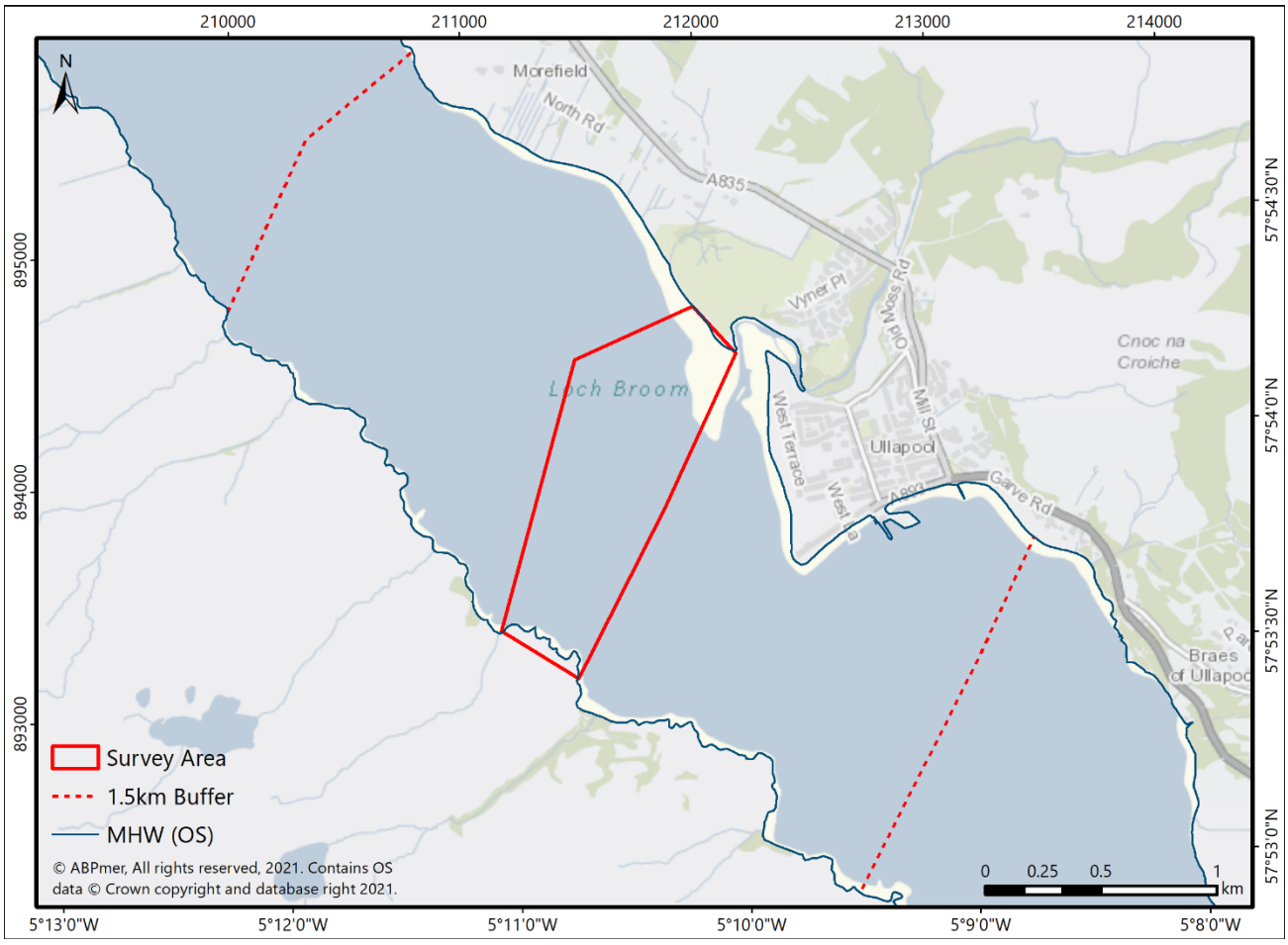
1.1 BACKGROUND

1.1.1. Scottish Hydro Electric Power Distribution plc (SHEPD) holds a licence under the Electricity Act 1989 for the distribution of electricity in the north and west of Scotland. SHEPD has a statutory duty to provide an economic and efficient system for the distribution of electricity to ensure that its assets are maintained so as to ensure a safe, secure and reliable supply to customers.

1.1.2. Fifty-nine Scottish Islands are currently connected to the electricity network that services Great Britain by the Scottish Hydro Electric Power Distribution network. These are connected by submarine electricity cables which supply electricity to homes and businesses on the islands.

1.1.3. As part of this remit, SHEPD has identified a need to reinforce the network between Aultbea and Ullapool (the Proposed Development). SHEPD has commissioned the preparation of this Risk Assessment to support European Protected Species (EPS) and Basking Shark licence applications as the proposed route includes a subsea section. The Risk Assessment considers a range of geophysical, geotechnical and environmental survey work required to inform cable installation along the approximately 2 km subsea cable route from Ullapool across Loch Broom towards Aultbea (Figure 1-1). A 1.5 km buffer has been included as part of the Risk Assessment.

Figure 1-1 – Location of proposed survey area in Loch Broom



1.2 CONSENTS AND LICENCES

1.2.1. Ahead of any survey work in the marine environment, below mean high water springs (MHWS), all relevant consents and licences need to be in place. This document provides the necessary information to support the following:

- An application for an EPS Licence required to disturb EPS. An EPS Licence is required under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), commonly referred to as the Habitats Regulations[1], where there is potential for the presence of vessels or underwater noise from the proposed survey activities to injure or cause disturbance to an EPS;
- An application for a Basking Shark Licence required to disturb basking shark. Assessment provided for potential impact on basking sharks as per the Wildlife and Countryside Act 1981 (as amended) (the WCA);
- The Habitats Regulations Appraisal (HRA) process, which is conducted by the Competent Authority as prescribed by the Habitats Regulations, to asses if the proposed activities have the potential to result in a Likely Significant Effect (LSE) on a Natura 2000 site (either alone or in combination with other plans or projects). The Habitats Regulations state that 'the effects of a project on the integrity of a European site need to be assessed and evaluated as part of the HRA process'. This includes any European sites with a marine component as well as any terrestrial or coastal European sites with qualifying features that could potentially be impacted;
- An assessment of impacts on Nature Conservation Marine Protected Areas (NCMPAs) as per Section 82 of the Marine (Scotland) Act 2010;
- An assessment of potential impacts on designated seal haul-out sites as per Section 117 of the Marine Scotland Act (2010); and
- Notice of intention to carry out a Marine Licence exempted activity for geotechnical and benthic sediment sampling of less than 1 m^3 volume per sample.

1.2.2. For end to end cable route installation, a Marine Licence application will be submitted and supported by separate environmental supporting documents which will be informed by, and incorporate the findings of, the above listed marine surveys and geotechnical investigations. Separate EPS and Basking Shark Licences will be applied for to cover the cable installation works; this Risk Assessment relates to proposed survey works only.

1.3 PROTECTED SPECIES

EUROPEAN PROTECTED SPECIES

Cetaceans and Otters

1.3.1. All species of cetacean (whale, dolphin and porpoise) occurring in UK waters and the Eurasian otter (*Lutra lutra*) 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 per Article 12 of the Directive. This protection is

[1] Note, the Habitats Regulations have been amended in Scotland, most recently by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019, as a result of the UK leaving the European Union (EU).

afforded in Scottish territorial waters, out to 12 nautical miles (nm), under the Habitats Regulations. Regulation 39(1) makes it an offence to (Scottish Government, 2020):

(a) Deliberately or recklessly capture, injure or kill a wild animal of a EPS;

(b) Deliberately or recklessly:

- i. Harass a wild animal or group of wild animals of a 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.

1.3.2. Further protection is afforded through an additional disturbance offence provided under Regulation 39(2) of the Habitat Regulations which states that "it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean)" (Scottish Government, 2020). An EPS Licence is therefore required for any activity that might result in disturbance or injury to cetaceans or otters.

OTHER PROTECTED SPECIES

Seals

1.3.3. All species of the family Phocidae (earless or 'true' seals) are listed in Annex V of the Habitats Directive, with the exception of Mediterranean monk seal (*Monachus monachus*; listed in Annex IV as an EPS), as animals whose taking in the wild and exploitation may be subject to management measures. This protection is afforded in Scottish territorial waters, out to 12 nm, under Schedule 3 of the Habitats Regulations which specifically lists a range of seal species which may not be taken or killed in certain ways.

1.3.4. The Marine (Scotland) Act 2010 protects both harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) around Scotland's coast. This Act provides the Scottish Ministers with the power to designate Seal Conservation Areas. The Habitats Regulations prohibits certain methods of catching or killing seals. The Protection of Seals (Designated of Haul-Out Sites) (Scotland) Order 2014 introduced additional protection for seals at 194 designated haul-out sites, where harbour seal and grey seal come ashore to rest, moult or breed.

Basking Sharks

1.3.5. Basking sharks (*Cetorhinus maximus*) 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 Basking Shark Licence under the WCA is therefore required for any activity which may result in disturbance or injury to basking sharks.

Seabirds

1.3.6. The primary legislation for the protection of birds in the UK is the WCA, 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 WCA, and it is an offence to disturb those species at their nest while it is in use.

1.3.7. The activities associated with the Proposed Development are unlikely to result in the intentional or reckless killing of wild birds or the destruction of their nests, but if carried out during the breeding season, such works could result in an offence by disturbing nesting Schedule 1 bird species. Licensing for wild birds does not cover development purposes, so any activity that could result in disturbance of a nesting Schedule 1 species should not proceed unless outwith the breeding season.

1.4 PROTECTED SITES

NATURA 2000

1.4.1. The Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) are transposed into Scottish Law in the terrestrial environment and out to 12 nm by the Habitats Regulations. European sites protected under this legislation (referred to as Natura 2000 sites) include Special Areas of Conservation (SAC) and Special Protected Areas (SPA) as designated under the aforementioned Directives respectively, as well as Ramsar sites (listed under the Ramsar Convention on Wetlands of International Importance).

1.4.2. The Habitats Directive aims to promote the maintenance of biodiversity, by requiring EU Member States (and effectively in Scotland through the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019) to maintain or restore representative natural habitats and wild species at a Favourable Conservation Status (FCS), through the introduction of robust protection for those habitats and species of European importance. As part of these protection measures, Member States are required to undertake assessments to determine whether a plan or project is likely to have an adverse effect on the integrity of a European site. This is implemented in Scotland through the HRA process.

1.4.3. The HRA process requires that any proposal which has the potential to result in an LSE to a Natura 2000 site or its designated features, to be subject to an HRA by the Competent Authority, and if necessary, an Appropriate Assessment (AA). The HRA and AA processes ensure that no activity can be consented if it may cause adverse effects on the integrity of a Natura 2000 site, unless there are no alternatives, and there is an Imperative Reason of Overriding Public Interest (IROPI) for the development to proceed.

NATURE CONSERVATION MARINE PROTECTED AREA

1.4.4. Under Section 82 of the Marine (Scotland) Act 2010, the Marine Scotland Licensing Operations Team (MS-LOT), acting as the relevant public authority, 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 of any NCMPA, then they must notify the relevant conservation bodies (in this case, NatureScot).

1.4.5. Section 95 of the Marine (Scotland) Act 2010 states that it is an offence to intentionally or recklessly kill, injure, remove, damage or destroy any protected feature of an NCMPA. Therefore, MS-LOT must be sure that consenting/licensing decisions do not cause a significant risk to the conservation objectives of any NCMPA.

DESIGNATED SEAL HAUL-OUT

1.4.6. Seal haul-outs are coastal locations that seals use to breed, moult and rest. As noted above, 194 seal haul-out sites have been designated through The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014. 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.

1.5 DETERMINING THE NEED FOR AN EPS LICENCE

1.5.1. The purpose of the assessments presented in this report is to determine whether, when considering appropriate mitigation as presented in Section 5, there is potential for the proposed survey activities to injure or disturb cetaceans, otters or other protected species. Where there is still potential for harm or disturbance to occur, an EPS or Basking Shark Licence may be required. The need for an EPS or Basking Shark Licence will be determined based on findings from the Risk Assessment.

1.5.2. MS-LOT's consideration of whether an EPS (or Basking Shark) Licence will be required comprises the following three tests based on the Habitats Regulations (Scottish Government, 2020):

- 1. The licence application must relate to one of the purposes referred to in Regulation 44(2), including (among others) 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;
- 2. There must be no satisfactory alternative (Regulation 44(3) (a)) (i.e. alternatives that would avoid the risk of offence). The applicant must show, based on best available information, that alternatives were sought that would not impact on EPS and that none were found or they were not satisfactory. for the 'no satisfactory alternative' test to be passed, MS-LOT as a licensing authority must be satisfied that no other option presented or possible can meet the identified and proven need for which a licence is sought; and
- 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(3) (b). Applicants should provide the necessary information to enable an assessment to be undertaken.

1.6 DOCUMENT STRUCTURE

1.6.1. This document provides the information to support the EPS and Basking Shark Licence application and risk assessment process:

- Section 2 provides a description of the proposed survey activities and location;
- Section 3 provides an assessment of the risk to EPS and other protected species;
- Section 4 provides an assessment of potential impacts on protected sites and designated seal haul-outs;
- Section 5 outlines the proposed species protection measures to be implemented; and
- Section 6 presents the overall conclusions of the risk assessment.

2 DESCRIPTION OF PROJECT ACTIVITIES

2.1 LOCATION OF PROJECT ACTIVITIES

2.1.1. The Proposed Development includes a range of geophysical, geotechnical and environmental survey work, required to inform the subsea cable route and installation across Loch Broom (Figure 1-1). Coordinates for the survey area, plus an additional 1.5 km buffer, are provided in Table 2-1. The area (including buffer) is approximately 5 km^2 and it is anticipated that the subsea cable route will be approximately 2 km in length in crossing Loch Broom.

Table 2-1 – Co-ordinates (WGS84) for proposed survey area and 1.5 km buffer

Point	Survey Area		1.5 km Buffer	
	Latitude	Longitude	Latitude	Longitude
1	57.889954	-5.186956	57.901778	-5.207972
2	57.900571	-5.182562	57.908611	-5.202833
3	57.902876	-5.174156	57.912194	-5.195389
4	57.901134	-5.170845	57.894583	-5.148556
5	57.895051	-5.17544	57.889778	-5.152167
6	57.888265	-5.18117	57.880528	-5.160000

2.2 SUMMARY OF PROJECT ACTIVITIES

OVERVIEW

2.2.1. A range of survey work will be undertaken to confirm the subsea cable route across Loch Broom. The following sections provide an overview of the key survey activities, including:

- Testing and calibration of survey equipment; and
- Geophysical, geotechnical and environmental surveys (including sediment/benthic sampling).

TESTING AND CALIBRATION OF SURVEY EQUIPMENT

2.2.2. Prior to survey activities commencing, the survey equipment and sensors will need to be tested and calibrated. Testing and calibration may be required for all survey equipment that will be utilised during the survey activity, as detailed in Table 2-2. It is anticipated that the testing and calibration will take approximately 12 hours per survey campaign.

2.2.3. The exact location of the testing and calibration sites is unknown at this stage, but this activity will be carried out within the area bound by coordinates provided in Table 2-1. It is noted, however, that specific bathymetric conditions and features are required to facilitate testing and calibration; where these are not available within this boundary, an alternative location will be utilised.

2.2.4. Since the vessels, equipment and activities required for testing and calibration of survey equipment will be the same as those used during geophysical survey works, the potential impacts on protected species and sites resulting from testing and calibration will be analogous to those resulting from the main survey phase. As such, testing and calibration is not specifically considered by this assessment.

GEOPHYSICAL, GEOTECHNICAL AND ENVIRONMENTAL SURVEYS

2.2.5. It is anticipated that the geophysical surveys will be carried out by one or two vessels, potentially operating simultaneously in Loch Broom. Survey operations are likely to be executed on a 12-hour basis (e.g. daylight working only), although 24-hour operation may be possible depending on the vessel commissioned.

2.2.6. Survey vessel selection and deployment will be informed both prior to and during survey operations by a number of factors including environmental considerations, weather and sea state, survey requirements and water depth. In addition to the survey vessels, there may also be small supporting vessels in attendance, depending on the activity. Table 2-2 presents the types of activity that are associated with the geophysical, geotechnical and environmental surveys. Examples of the potential vessels utilised during survey activities are provided in Table 2-3.

Table 2-2 – Summary of the activities associated with the Proposed Development

Summary Activities	
Vessels and Vehicles	Survey vessel
	Rigid Inflatable Boat (RIB) / Multicat
	Diving Support Vessel (DSV)
	Autonomous Underwater Vessel (AUV)
	Unmanned Aerial Vehicle (UAV)
	Remotely Operated Vehicle (ROV)
	Remotely Operated Towed Vehicle (ROTV)
	Cable laying vessel
	Intertidal vessel / vehicle
Geophysical Survey	Ultra-short Baseline (USBL) positioning system
	Side Scan Sonar (SSS)
	Multi Beam Echosounder (MBES) / Single Beam Echosounder (SBES)
	Sub-Bottom Profiler (SBP)
	Magnetometer (MAG)
	Subsea altitude metre

Summary Activities	
	Sound Velocity Profiler (SVP)
	Acoustic Doppler Current Profiler (ADCP)
	Obstacle avoidance sonar
Geotechnical Survey	Geotechnical sampling / Vibrocoring / Piezocone Penetration Testing (PCPT)
Benthic Habitat Analysis	ROV survey / inspection
	Drop-down camera video / photo
	Benthic sediment grab sampling
Landfall Area Investigations	Landfall topographical survey

VESSELS AND VEHICLES

2.2.7. Vessels will be mobilised as required from an agreed mobilisation port, likely to be Ullapool. The contractors that will be employed to undertake the survey activities have not been selected yet, and therefore exact details of the vessels to be used are not available. The vessels detailed in Table 2-3 below are of a similar type and size that could be deployed and have been used as proxy vessels for the purpose of this risk assessment. The vessels detailed go up to the maximum size that could be provided by the contractors, thereby providing the worst-case scenario and offering maximum flexibility in the procurement process.

Table 2-3 – Example vessels that could be used during the proposed survey activities

Activity	Example Vessel / Vehicle	Description
Survey	Vessel for ROV surveys – DP2 vessel	Purpose-designed vessel for ROV surveys, Inspection Repair and Maintenance (IRM) and construction support. Generally, diesel-electric, DP2 vessel that has advanced DGPS, USBL acoustic system and a Seapath 200. These vessels typically utilise Launch and Recovery System (LARS). The typical lengths of vessel can be 85 m, with breadth 20 m, deck area 630 m^2 and draught 6m.
	Multi-purpose vessel – both geophysical and geotechnical survey	Multi-purpose vessel which will typically have diesel-electric propulsion and a specially designed hull. Vessel will be suitable for geophysical and geotechnical survey operations up to 1,000 m water Depth. Typical length is expected to be 54 m, beam 12.5 m, deck area 250 m^2 and draught 3 m.

Activity	Example Vessel / Vehicle	Description
	Multi-purpose DP1 vessel – shallow and medium depth water	Multi-purpose DP1 vessel designed for survey operations in shallow and medium water depths. The vessel will be suitable for geophysical surveys, ROV support operations for up to light Work-Class vehicles, geotechnical CTP and vibrocoring, and environmental surveys. Typical length is expected to be 54 m, beam 12.5 m, deck area 250 m^2 and draught 3 m.
	Vessel for hydrographic and geophysical surveys	Purpose built vessel for hydrographic and geophysical surveys which is typically equipped for 12-hour operations up to 60 nm from safe haven. Typical length is expected to be 12 m, beam 5 m and draught 2 m.
	Vessel for geophysical and hydrographic surveys	Geophysical survey equipped with permanently mobilised geophysical and hydrographic survey spreads. This type of vessel often has diesel-electric propulsion and specially designed hulls. The equipment of this vessel will include MBES, single beam echosounders, sub bottom profilers and side scan sonar. Typical length of vessel is expected to be 65 m, beam 14 m, deck area 250 m^2 and draught 5 m.
	Vessel for deep water	Purpose built IMR and ROV vessel, designed for deep water remote intervention, renewables, construction and survey works. Typical length of this type of vessel is expected to be 130 m, breadth 24 m, and draught 7.5 m.
	Unmanned Surface Vehicle (USV)	A 2-3 m long remotely-operated, untethered vehicle which floats on the water's surface as a platform of deployment for geophysical survey equipment used in seabed or water column mapping. Operated using battery power.
	Autonomous Underwater Vehicles (AUV)	An unmanned, untethered subsea vehicle which is remotely piloted from a surface operator and are often battery powered.
	Remotely Operated Vehicle (ROV)	An unmanned vehicle which is tethered to a vessel/mothership which is powered via electrical cables and hydraulic pumps. ROVs house various instruments, image and sampling equipment used in benthic surveys and, on occasion, some geophysical survey equipment.
	Remotely Operated Towed Vehicle (ROTV)	An unmanned towed vehicle used to deploy survey sensors including MBES, MAG, SSS and SBP.
	Unmanned Aerial Vehicle (UAV)	Also known as 'drones', UAVs are unmanned aircraft deployed for a variety of purposes, including aerial imagery used in surveys.

SURVEY TECHNIQUES

2.2.8. A range of different equipment will be employed during the survey work (see Table 2-2). The survey techniques are described in detail in Table 2-4. They have also been assessed for their potential to introduce noise into the marine environment and/or interact with protected species or seabed habitat. The most significant noise related aspects potentially generated by this project are detailed within Table 3-1, along with a determination as to whether each requires further assessment.

2.2.9. It is recognised that unexploded ordnance (UXO) could, as in many areas, be identified during survey operations. Should UXO be identified, SHEPD will consult with all relevant agencies prior to determining a course of action. No removal or remediation activities would be progressed in advance of such consultation, and SHEPD recognise the potential need for further assessment and licensing should UXO remediation be required.

Table 2-4 – Details of potential survey equipment

System / Survey Equipment	Description
Geophysical Survey	
Ultra-Short Baseline (USBL)	USBL systems are used to determine the position of subsea survey items, including ROVs, towed sensors, etc. This involves the emission of sound from a vessel-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. A USBL system consists of a transducer, which is mounted on the vessel and a transponder attached to the ROV. The transducer transmits acoustics through the water and the transponder sends a response which is detected by the transducer. The USBL calculates the bearing and time taken for the transmissions to be completed and thus the position of the subsea unit / sampling equipment is determined. These systems can either be used continuously or intermittently through the operation they are supporting. In the shallow areas, alternative positioning methods (e.g. layback and position calculations) may need to be considered.
Multi-beam echo-sounder (MBES)	Multi-beam echo-sounders are used to obtain detailed 3-dimensional (3D) maps of the seafloor which show water depths. They measure water depth by recording the two-way travel time of a high frequency pulse emitted by a transducer. The beams produce a fanned arc composed of individual beams (also known as a swathe). Multi-beam echo-sounders can, typically, carry out 200 or more simultaneous measurements. With regards to this project, the MBES specifications are to be high resolution; Max ping space of 25 cm or 9 pings/m^2 with towed set up. Frequency levels below 200 kHz will not be used during survey activities and have therefore been scoped out of further assessment on the basis that they are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Sidescan Sonar (SSS)	Side-scan sonar is used to generate an accurate image of the seabed, which may include 3D imagery. 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 frequencies used by side-scan sonar are generally very high and outside of the main hearing range of all marine species (National Oceanic and Atmospheric Administration (NOAA),

System / Survey Equipment	Description
	2018). The higher frequency systems provide higher resolution but shorter-range measurements. Frequency levels below 200 kHz will not be used during survey activities and have therefore been scoped out of further assessment on the basis that they are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Single Beam Echosounder (SBES)	Single-beam echo-sounders operate in a similar manner to MBES; rather than measuring multiple points per acoustic echo wave (echo) emitted, SBES can only measure one point at a time. The nature of the sound emitted by SBES is impulsive. The preferred equipment is a Kongsberg EA600.
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. SBPs comprise of either pingers or boomers. Pingers operate at a higher frequency but smaller bandwidth than boomers, which operate on a lower broadband frequency spectrum. The higher frequencies of operation provide the highest resolution but are limited in amount of penetration below the sea floor. The high frequency profilers are particularly useful for delineating shallow features such as faults, gas accumulations and relict channels. The lower frequencies yield more penetration but provide less resolution; lower frequency systems are more general-purpose tools that provide a good compromise between penetration capacity and resolution. Parts of the sound pulse from both systems will penetrate the seafloor and be reflected off the different sub-bottom layers, providing data on the sub-floor sediment layers. Unlike the pinger system which has a combined transducer/transceiver deployed in-water from the vessel, the boomer system requires the deployment of a boomer plate and a receiver array that is a separate floating unit from the emission source.
Magnetometer Survey (MAG)	MAG is used to detect any ferrous metal objects on the seabed, such as wrecks, unexploded ordinance (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. These surveys use equipment to record spatial variation in the Earth's magnetic field.
Subsea altitude metre	Subsea altitude metres (altimeters) utilise sonar technology to make precision underwater distance measurements by measuring the time it takes for sound pulses to travel from the altimeter to the seafloor and back to the altimeter. The altimeter will be attached to the magnetometer (see above). These devices emit high frequency pulses to measure distance.
Sound velocity profiler (SVP)	The SVP continuously emits high frequency pulses as it is lowered towards the seafloor in order to measure the speed of sound within the water column. This technology also makes use of sonar to determine how quickly sound attenuates in the marine environment, which can aid in calibrating geophysical survey equipment.

System / Survey Equipment	Description
Acoustic Doppler Current Profiler (ADCP)	An ADCP is a hydro-acoustic current meter similar to a sonar, used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column. Transducers on the ADCP transmit and receive sound signals in the form of high frequency pulses, and the data is then processed to calculate the Doppler shift, and thus the water velocity along the acoustic beams. ADCPs are generally deployed from a small vessel, using a davit arm, and placed on the seabed where it remains for one lunar cycle, transmitting and recording continuously. To aid location at the end of the lunar cycle, an acoustic beacon (which lies passively during the survey period) is activated when the vessel returns. An ROV or diver attaches a line and it is then recovered onto the vessel.
Obstacle avoidance sonar	High frequency pulses created by obstacle avoidance sonar systems produce sound waves which are used to identify small objects and hazards on the seabed. Higher frequency pulses provide higher resolution imaging.
Geotechnical Sampling	
Vibrocoring (with PCPT)	Geotechnical sampling will also be undertaken as part of the marine survey. This may include both vibrocoring operations and Piezocone Penetration Testing (PCPT). PCPT is an *in situ* testing method used to determine the geotechnical engineering properties of soils and assessing subsurface stratigraphy, relative density, strength and equilibrium groundwater pressures. Vibrocoring operations will be undertaken using a high power vibrocorer deployed from the vessel. The PCPT will be carried out using piezocones that will be pushed into the seabed to collect samples in order to allow determination of the geotechnical engineering properties of the sediment and delineation of the seabed stratigraphy. The vibrocoring equipment, including PCPT, does not have the potential to generate significant levels of noise. Therefore, this technology does not require any further consideration with respect to possible injury or disturbance to protected species and sites. The USBL system may be used to determine the sampling locations when undertaking vibrocoring and PCPT operations.
Benthic Habitat Analysis	
ROV survey / observations	An ROV is a tethered underwater mobile device. ROVs are commonly used for visual surveys of the seafloor. For underwater positioning, a USBL system is used. The ROV is manoeuvrable by the use of thrusters.
Drop-down video / photography	Ground-truthing of acoustic data will be undertaken using drop-down video/photography (drop frame and/or ROV) and grab sampling techniques (see below). Drop-down video/photography does not interact with the seabed. It is required to provide detail on epifaunal species (animals living on the surface of the substrate), habitats and geological features. Consultation will be undertaken with NatureScot and Marine Scotland to ensure sufficient sampling frequency.
Benthic sediment sampling	Grab sampling of the seabed may be undertaken to provide detail on the sediment itself and infauna (animals living within the substrate) which cannot be provided by the use of video and photography (see above).

System / Survey Equipment	Description
	Grab samples will not be collected on hard substrates or at locations with sensitive habitats (e.g. Maerl); therefore, grab sampling will be preceded with video/camera drops. Grabs will be collected at selected video/photo sites on sedimentary substrate unless they support sensitive habitats; data collected will therefore be complementary and allow biotope classification to include consideration of infaunal components. A sediment sub-sample will also be retained from the grab for Particle Size Analysis (PSA) with the remainder sieved for infaunal analysis. Consultation will be undertaken with NatureScot and Marine Scotland to ensure sufficient sampling frequency. The benthic sediment sampling equipment does not generate potentially significant levels of noise. Therefore, this technology does not require any further consideration with respect to potential injury or disturbance of protected species.
Landfall Area Investigations	
Landfall topographical survey	The intertidal part of the cable route will be inspected by an onshore survey team, using standard topographic survey equipment. This survey activity will include two surveyors carrying the equipment along the beach. The landfall topographic survey technique does not generate potentially significant levels of noise, nor does it interact with the seabed. Therefore, this technology does not require any further consideration with respect to potential noise-generated injury or disturbance of EPS or impacts to protected sites. However, while the landfall topographical survey will not generate significant levels of noise to generate injury or disturbance to EPS, there is potential for disturbance to semi-aquatic EPS (i.e. otters) from human presence at the landfall sites.

ACTIVITY SCHEDULE

2.2.10. The proposed survey activities in Loch Broom are scheduled to be undertaken sometime between 01 September 2021 and 31 August 2022; whilst this is a period of 1 year in total, survey activities will be for a much shorter duration. Vessel presence and survey activities (including equipment calibrations) are expected to take approximately 14 days in total. The duration includes an allowance for weather downtime, transit to the survey area and waiting on tides.

2.2.11. For all survey activities, no allowance for time has been included for the following categories as estimation of these is considered to be beyond the reasonable limits of the assessment. Nonetheless, each has the potential to impact on ability to complete the task and increase the overall timescale of the works:

- 3rd party activities (e.g. fishing, other users);
- Technical equipment issues;
- Environmental mitigation standby; and
- Force majeure.

3 EPS AND OTHER PROTECTED SPECIES RISK ASSESSMENT

3.1 OVERVIEW

3.1.1. The primary function of this risk assessment is to identify the potential for injury and disturbance to EPS and other protected species from proposed survey activities within Loch Broom. This section of the risk assessment addresses potential impacts to protected species, including EPS, regardless of their inclusion as qualifying features of protected sites. An assessment of potential impacts to protected sites and their qualifying features is provided in Section 4. An overview of proposed survey activities and their potential impacts to protected species is provided in Table 3-1 below.

3.1.2. Underwater noise emitted by vessels and the physical presence of the vessels during activities associated with the project have the potential to cause injury or disturbance to EPS and other protected species. While some techniques may introduce noise to the marine environment, other activities do not generate sufficient levels of noise to be considered as potential sources of noise-related injury or disturbance to protected species and have been screened out of the detailed assessment, as indicated in Table 3-1.

Table 3-1 – Overview of potential impacts of Proposed Development on EPS and other protected species

Activity / Equipment	Potential Impacts	Further Information Required?
Vessels and Vehicles		
Survey and post survey vessels Guard vessels RIB / Multicat / DSV	Propellers, engines, and propulsion activities form the primary noise sources of vessels. Vessel noise is generally continuous and comes in both narrowband and broadband emissions. Potential impacts on EPS and other protected species depend on the duration and location of the activities and species of cetacean potentially present in the area. Increased vessel activity also has the potential to cause injury from collisions. The risk of collision with an animal is influenced by the dimensions of the vessel and its speed.	**No** – the source levels associated with vessels are likely to be too low to result in injury, and the vessel presence does not constitute a change from baseline conditions in Loch Broom. It is acknowledged that vessels pose a collision risk to EPS and other protected species. While this does not constitute a change from baseline, all vessels will adhere to The Scottish Marine Wildlife Watching Code (Scottish Natural Heritage (SNH), 2017), as detailed in Section 5.2.
Unmanned Surface Vehicle (USV)	USVs are controlled and manoeuvred using batteries which power propellers and thrusters. Noise generated by USVs is similar to other vessels (i.e. continuous and broadband) but reduced in power due to their smaller size.	**No** – the predominant noise source during USV deployment is the SBP, with the MBES forming a secondary noise source. Both of these survey technologies will mask the sounds generated by the USV and have thus been considered separately (see below).

Activity / Equipment	Potential Impacts	Further Information Required?
Autonomous Underwater Vehicles (AUV) Remotely Operated Vehicle (ROV) Remotely Operated Towed Vehicle (ROTV)	Potential impacts to EPS and other marine mammals include disturbance from noise emissions associated with movements underwater. However, these are anticipated to be limited in scale, given the small size of the submerged vehicles. Collision risk is considered an unlikely impact, given the high level of manoeuvrability and slow movement associated with AUVs, ROVs and ROTVs.	**No** – the predominant noise source during such activities is the USBL, and other geophysical survey sensors deployed on the vehicle, which is expected to mask any sound generated by the vehicle itself. Noise generated by geophysical survey devices has been considered separately (see below).
Unmanned Aerial Vehicle (UAV)	Disturbance from UAVs may result from noise emissions or visual cues associated with UAV presence, such as its movement or shadow. Flight altitude appears to be the most important factor in determining the behavioural response of marine mammals, including EPS, to UAVs. However, environmental factors, including ambient noise levels and weather (i.e. sunniness), also play an important role in the likelihood of a disturbance event transpiring.	**No** – while the source levels associated with the UAV are too low to result in injury (Christiansen *et al*. 2016), there remains the potential for a disturbance offence to EPS (Fettermann *et al*. 2019; Ramos *et al*. 2018). Dolphins have been observed exhibiting low overall responsiveness to UAVs, which tended to be when they were directly approached or followed by the UAV (Ramos *et al*. 2018). Dolphin's responses involved investigational behaviour including side-roll and spin-and-orient. The duration of the response was short, and the animals seemed minimally impacted (Ramos *et al*. 2018). Disturbance responses were observed when UAV's were flown at 10 m altitudes, whereas no significant disturbance was recorded at 25 m or higher (Fettermann *et al*. 2019). However, if required, UAV surveys will only be conducted at landfall and very nearshore locations, where marine mammals are unlikely to be present.
Geophysical Survey		
Ultra-Low Baseline (USBL) positioning system	USBL systems involve the emission of impulsive sound from a hull-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. The potential impacts of this sound on cetaceans depends upon the abundance, distribution and sensitivity of the species, and the duration of the operations.	**Yes** – the pressure levels and frequencies at which the USBL emit are not of a level where injury is expected, but have the potential to cause disturbance to marine mammals and other protected species.

Activity / Equipment	Potential Impacts	Further Information Required?
Side Scan Sonar (SSS)	SSS equipment produces impulsive sound emissions through high frequency pulses used to image the seabed habitat. Potential impacts to EPS and other marine mammals depend upon the frequency, location, and duration of the pulses.	**No** – the SSS used for the proposed survey operations will operate at frequencies above 200 kHz. This is above the hearing threshold of all marine mammals and protected species which may be present in the area (see Table 3-3). Hence, there is no potential for injury or disturbance (NOAA, 2018).
Multibeam echosounder (MBES)	High frequency noise pulses created by MBES equipment generate sound waves which produce impulsive underwater noise. Depending on the frequency of the pulses, location and duration of the operations, and the species present, there could be potential impacts on cetaceans.	**No** – the MBES used for the proposed survey operations will operate at frequencies between 200-400 kHz. This is above the hearing threshold of all marine mammals and protected species which may be present in the area (see Table 3-3). Hence, there is no potential for injury or disturbance (NOAA, 2018).
Sub-bottom profiling (SBP)	SBP involves the vertical emission of sound pulses (impulsive noise) to characterise the layers of sediment comprising the seabed. Such activities introduce noise emissions into the marine environment. The potential impacts of this sound depend upon the type of profiler technology used, as well as the abundance, distribution and sensitivity of the species, and the duration of the operations. There are numerous SBP technologies that may be deployed during the survey operations including pingers, chirpers and boomers. Another SBP technology which may be employed during survey activities is a sparker. A sparker uses a spark across a pair of electrodes to create a gas bubble whose oscillations generate the sound.	**Yes** – although source pressure levels emitted by this equipment been identified as below the threshold to cause potential injury to any marine mammal species, this equipment may be a source of disturbance to marine mammals.
Subsea Altitude Meter Sound velocity profiler (SVP) Acoustic Doppler Current Profiler (ADCP)	Subsea Altitude Meters, SVPs and ADCPs all rely on high frequency pulsed sounds to gather data on the marine environment. Subsea altimeters use sonar to identify the distance to the seafloor, while SVPs are used to measure the speed of sound within the water column to calibrate geophysical survey equipment with. Alternatively, ADCPs emit very high frequency doppler waves and use the back-scatter of those sound waves to measure current	**No** – the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal species from noise emitted by this equipment.

Activity / Equipment	Potential Impacts	Further Information Required?
	speeds and directions within the water column.	
Obstacle avoidance sonar	High frequency pulses created by obstacle avoidance sonars produce high frequency sound waves which can be used to generate high-resolution images of the seabed. As such, there is potential for auditory damage to occur. Nevertheless, the high frequency emissions used by this technology causes sounds to attenuate very quickly and become rapidly lost to the marine environment.	**No** - the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal species from noise emitted by this equipment.

3.2 EUROPEAN PROTECTED SPECIES (EPS)

CETACEANS

Summary

3.2.1. 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 (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) are listed as individual EPS, while all other cetaceans are listed as "All other cetacea". Cetaceans are also protected in Scottish waters under the Habitats Regulations, 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.

3.2.2. There are 23 species of cetacean which have been recorded off the west coast of Scotland, with harbour porpoise and common dolphin (*Delphinus delphis*) observed in the Loch Broom area. White-beaked dolphin (*Lagenorhynchus albirostris*), Risso's dolphin (*Grampus griseus*), minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*) and humpback whale (*Megaptera novaeangliae*) have also been observed in the wider Minch area to the west of Ullapool (Hammond *et al*. 2017; Hebridean Whale and Dolphin Trust, 2018).

3.2.3. The distribution, density and abundance of the above cetacean species around the project area (Loch Broom and the Minches) are described in Table 3-2 below. It is noted that insufficient data is available for most cetaceans species; however, where sufficient data is available, estimates suggest a minimal proportion of the population within the relevant Management Unit would be affected by the Proposed Development (<0.01%).

Potential Impacts

3.2.4. Noise emissions constitute the greatest potential risk to cetaceans within the vicinity of the survey area. Noise has the potential to impact cetaceans and other marine species in two ways:

- Injury – physiological damage to auditory or other internal organs; and
- Disturbance (temporary or continuous) – disruptions to behavioural patterns including, but not limited to, migration, breathing, nursing, breeding, foraging, socialising and/or sheltering. This impact factor does not have the potential to cause injury.

3.2.5. To determine the potential for noise to impact cetaceans, perceived sound levels are compared to available empirically-estimated thresholds for injury and disturbance. Several threshold criteria and methods for determining how sound levels are perceived by marine mammals are available (e.g. the level above hearing threshold (dB_{ht}) method and other hearing weighted and linear measures) and each has its own advantages and disadvantages. Scottish Government (2020) guidance recommends using the injury and disturbance criteria proposed by Southall *et al*. (2007), which is based on a combination of linear (un-weighted) peak sound pressure levels (SPL) and weighted sound exposure levels (SEL). Since the publication of this seminal paper, there has been mounting evidence of marine mammal auditory abilities in novel species and well-researched species alike (e.g. harbour porpoise) which have led to amendments to the auditory thresholds for injury (NOAA, 2018; Southall *et al*. 2019).

Table 3-2 – Population parameters of cetacean species potentially present in the project area

Species	Estimated Regional Density (individuals/km^2) *	Estimated Abundance within Proposed Survey Area (~5 km^2)	Management Unit / Biogeographical Population Estimate (individuals) **	Proportion of Management Unit Potentially Affected by Proposed Survey Activities (%)
Harbour porpoise (*Phocoena phocoena*)	0.397	2	21,462	<0.01
Common dolphin (*Delphinus delphis*)	*Insufficient data*	*Insufficient data*	56,556	*Insufficient data*
Bottlenose dolphin (*Tursiops truncatus*)	*Insufficient data*	*Insufficient data*	45	*Insufficient data*
White-beaked dolphin (*Lagenorhynchus albirostris*)	*Insufficient data*	*Insufficient data*	15,895	*Insufficient data*
Risso's dolphin (*Grampus griseus*)	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*
Minke whale (*Balaenoptera acutorostrata*)	0.020	1	23,528	<0.01
Killer whale (*Orcinus orca*)	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*
Humpback whale (*Megaptera novaeangliae*)	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*

* Based on SCANS-III survey Block 'I' (Hammond *et al*. 2017).

** Based on Inter-Agency Marine Mammal Working Group (IAMMWG, 2015).

3.2.6. If a noise emission is composed of frequencies which lie outside the estimated auditory bandwidth for a given species, then disturbance is unlikely. However, noise sources which are sufficiently high can still cause physical damage to hearing and other organs, even when the frequencies lie outside an animal's auditory range. To understand the potential for noise-related impacts, the likely hearing sensitivities of different cetacean hearing groups has been summarised below in Table 3-3 below. Section 3.4 assesses the potential for injury to be incurred for each hearing group, given their estimated auditory bandwidth and the source frequencies of the technology to be deployed.

Table 3-3 – Auditory bandwidths estimated for cetaceans

Hearing Group	Estimated Auditory Bandwidth
Low-frequency cetaceans (LF): (e.g. baleen whales, such as humpback whales, minke whales, sei whales, etc.)	7 Hz to 35 kHz
High-frequency cetaceans (HF): (e.g. dolphins, toothed whales, beaked whales and bottlenose whales)	150 Hz to 160 kHz
Very high-frequency cetaceans (VHF): (e.g. marine mammal species such as harbour porpoises and other 'true' porpoises)	275 Hz to 160 kHz
Phocid carnivores in water (PW): (e.g. earless or 'true' seals, such as grey and harbour seals)	75 Hz to 100 kHz
Source: NOAA, 2018; Southall *et al*. 2019	

OTTERS

Summary

3.2.7. Otters (*Lutra lutra*) are small, semi-aquatic mammals which inhabit riverine, brackish and coastal environments throughout the UK. Although land mammals, otters depend on both freshwater and marine environments for food. Their marine habitat comprises low, peat covered coastlines with shallow, seaweed rich waters and a consistent freshwater supply (Department of Energy and Climate Change (DECC), 2016).

Potential Impacts

3.2.8. Otters may be in the vicinity during geophysical surveys, particularly given the Inverpolly SAC (which includes otter as a protected species) is located to the north of Loch Broom. The otters may be disturbed by the presence of vessels, but are not particularly sensitive to noise and any disturbance will be temporary. Therefore, no adverse impacts to otter are expected. However, as some level of temporary disturbance is possible, SHEPD will implement appropriate mitigation as outlined in Section 5.

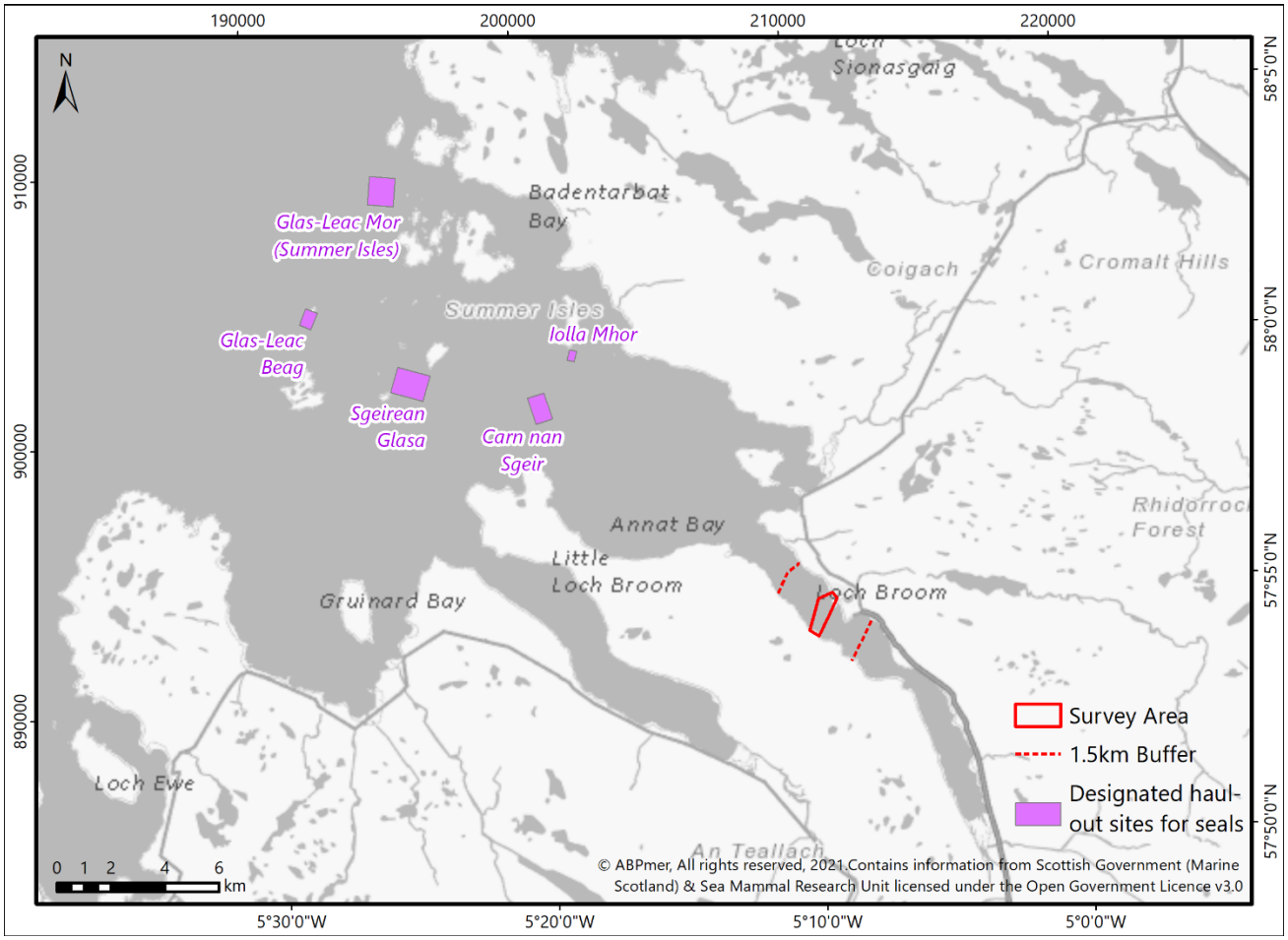
3.3 OTHER PROTECTED SPECIES

SEALS

Summary

3.3.1. Two species of seals inhabit UK waters: grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*). The waters around Scotland are important habitat for both species, which utilise the coastlines and nearshore waters year-round for breeding and feeding (Pollock *et al*. 2000). The coastlines of the west coast of Scotland make excellent habitat for haul-outs, which is why several designated seal haul-outs can be found in this region. There are five designated haul-out sites to the northwest of the proposed survey area (approximately 10 km), namely Iolla Mhor, Carn nan Sgeir, Sgeirean Glasa, Glas-Leac Beag and Glas-Leac Mor (Summer Isles) (Figure 3-1). It is noted that Glas-Leac Beag is designated as a breeding colony seal haul-out.

Figure 3-1 – Designated haul-out sites for seals in the vicinity of the proposed survey area in Loch Broom



3.3.2. The pupping season of harbour seals is mid-June to July, with moulting occurring in August. Grey seals in Scotland pup from August/September through to December and then moult until early April (Bowen, 2016; Special Committee on Seals (SCOS), 2018). For the west coast of Scotland,

pupping is generally September through to October and moulting generally November through to December (SCOS, 2018).

3.3.3. Similar to seabirds, seals are central-place foragers, utilising a terrestrial 'base' for important life history events (i.e. breeding, pupping, moulting, etc.) to rest, and then head offshore on foraging trips before returning to land. While both species are associated with shallower shelf waters, grey seals often make longer foraging trips to deeper waters than harbour seals. However, neither species regularly occur in waters beyond 200 m (Pollock *et al*. 2000).

3.3.4. The mean at-sea usage of grey seals in the vicinity of Loch Broom is moderate (5-50 animals per 25 km^2) compared with the particular hot-spots in Scottish waters (>100 animals per 25 km^2; Figure 3-2). The mean at-sea usage of harbour seals in the vicinity of Loch Broom is characteristic of the rest of West of Scotland (averaging up to 50 animals per 25 km^2), and this is relatively high compared to the wider Scottish waters (Figure 3-2).

3.3.5. Some hotspots for harbour seals are located around the Summer Isles to the northwest of the proposed survey area, where mean at-sea usage ranges from 50-100 animals per 25 km^2 (Russell *et al*. 2017). Conservation regulations covering the protection of grey and harbour seals in UK waters include the Marine (Scotland) Act 2010 and the Habitats Regulations.

Potential Impacts

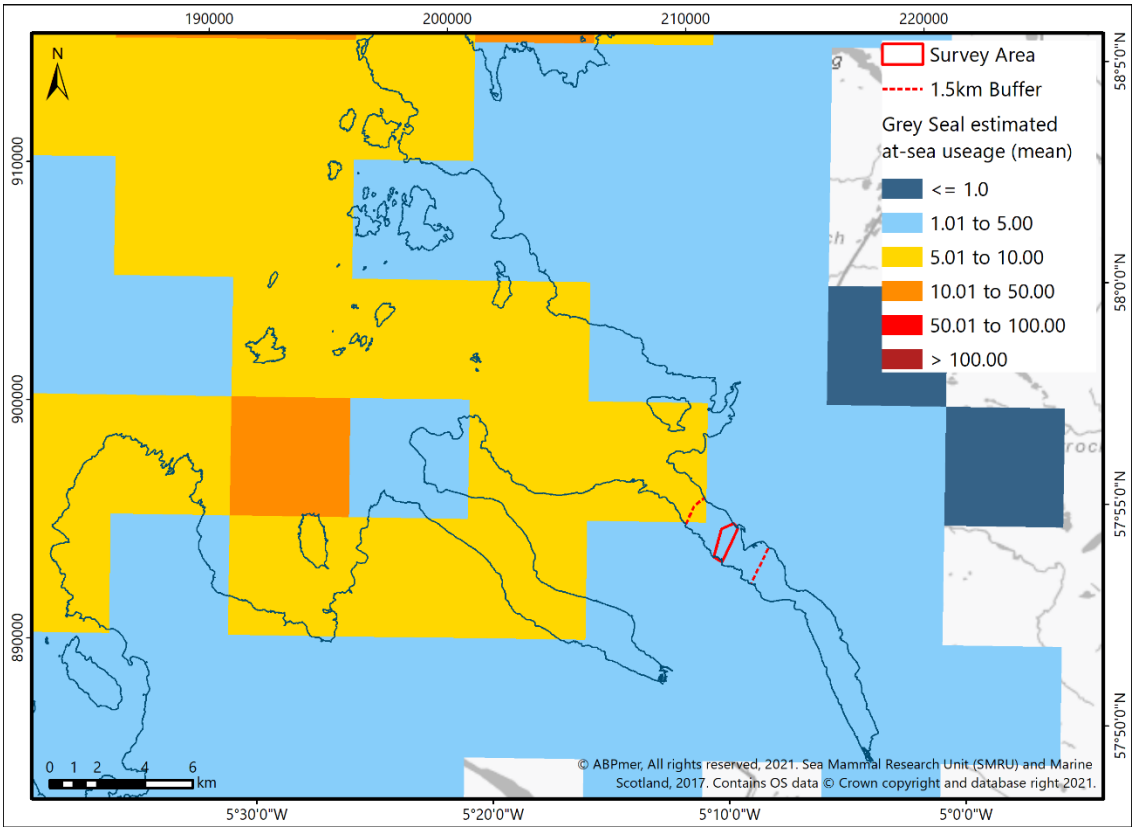
3.3.6. Potential impacts from the testing and calibration of equipment and geophysical surveys may arise from underwater noise generated during the survey activities and physical disturbance at haul-outs (i.e. from vessel or human presence), as outlined in Table 3-1. Seals are particularly susceptible to project-related impacts during their respective pupping and moulting seasons, when the residency of seals at haul-outs and in surrounding waters elevates the relative density of each species.

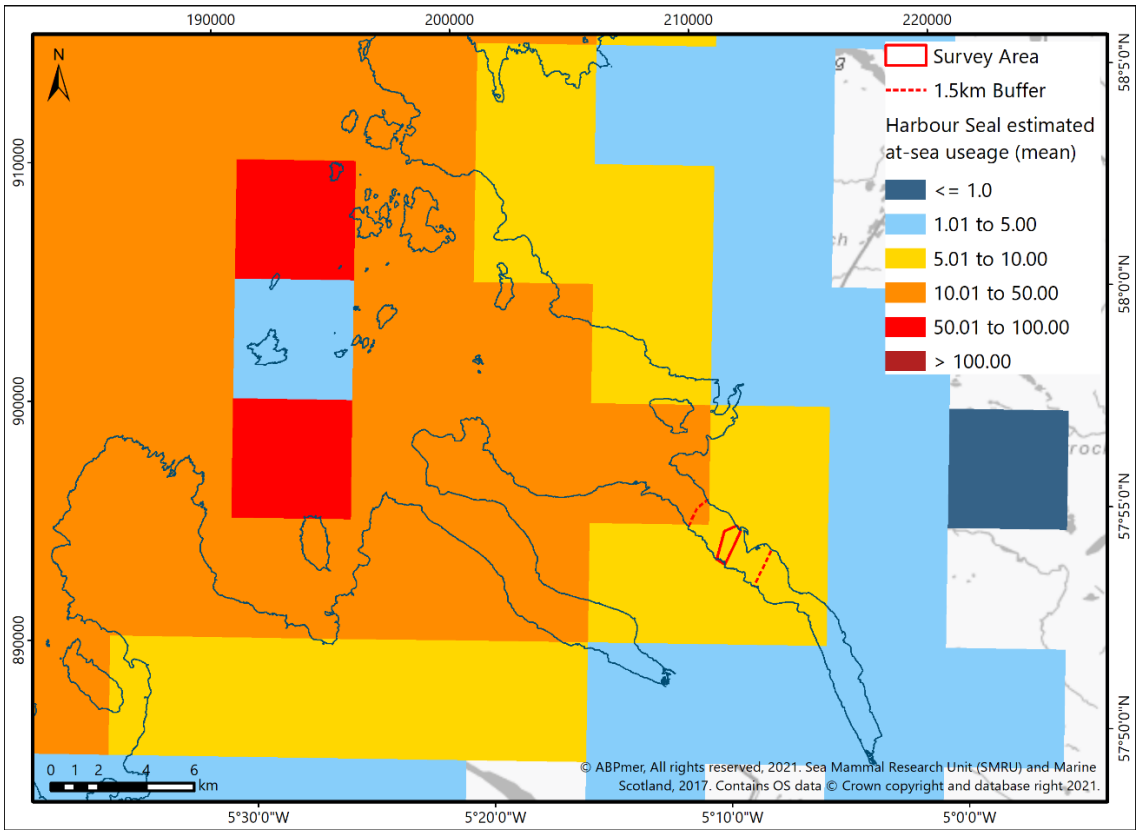
3.3.7. Underwater noise emissions have the potential to cause physical injury or disturbance to seals, particularly if they fall within their generalised hearing range of 50 Hz to 86 kHz (National Marine Fisheries Service (NMFS), 2018). However, contemporary data suggests that even with very intense noise emissions, such as those from pile driving activity, harbour seals are likely to return to the region of the noise source once the emissions have ceased (Russell *et al*. 2016). Where this leads to an animal avoiding their main feeding and breeding grounds, this can have longer term effects on the health and breeding ability of that animal (Kastelein *et al*. 2006).

3.3.8. The underwater noise emissions resulting from the survey activities will not result in the killing of seals, for which the two species are protected (Section 1.5.3) and no further assessment of underwater noise in this respect is conducted. Furthermore, the only other protection for seals is against disturbance at haul-outs, which will not occur from underwater noise (since the emissions are, by definition, not airborne). On this basis and considering also the mitigation measures to be adopted for the project (Section 5), no further assessment of underwater noise is made for seals.

3.3.9. As seals are specifically protected from disturbance at designated haul-outs, this has been considered in Section 4.

Figure 3-2 – Grey seal (top) and harbour seal (bottom) estimated mean at-sea usage in the vicinity of the proposed survey area in Loch Broom





BASKING SHARKS

Summary

3.3.10. Basking sharks (*Cetorhinus maximus*) are one of the only three species of shark which filter feed and are the second largest fish in the world (Sims, 2008). This species can be found throughout the offshore waters in the UK continental shelf and are considered frequent visitors to the west coast of Scotland (Sims, 2008; HWDT, 2018). They are widely distributed in cold and temperate waters and feed predominantly on plankton and zooplankton (e.g. barnacles, copepods, fish eggs and deep-water oceanic shrimps) by filtering large volumes of water through their wide-open mouth. They typically move very slowly (around 4 miles per hour). In the winter, they dive to great depths to get plankton while in the summer they are mostly near the surface, where the water is warmer.

3.3.11. Basking sharks were hunted in Scotland up to 1995. However, they are now protected in the UK waters principally under Schedule 5 of the WCA and under the Nature Conservation (Scotland) Act 2004. They are classed as a Scottish Priority Marine Feature (PMF), as well as a species on the OSPAR list. Due to their size, slow swimming speeds and preference for swimming in coastal waters during the summer months, basking sharks are considered to be at potential risk of collision with vessels associated with proposed survey activities. Given that basking sharks are slow to mature and have a long gestation period, the species can be slow to recover if populations are rapidly depleted.

3.3.12. The West Coast of Scotland has one of the highest sighting densities of basking sharks in the UK (Bloomfield and Solandt, 2006). Basking sharks are present along Scottish shores between spring and autumn, and peak sighting densities in the west coast of Scotland occur in August. However, relatively low densities (<1 sightings per hour) occur close to Loch Broom compared to other areas along the west coast of Scotland (Witt *et al*. 2012).

Potential Impacts

3.3.13. 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. 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, although 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 activities (particularly survey work), and considering the temporary nature of activities, 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.

3.3.14. Vessel collision also poses a threat to this slow-moving species. Collision risk increases with increasing vessel speed. As the vessels involved in the proposed survey activities will be slow-moving, collision risk is generally low (alongside the relatively low presence of basking sharks anticipated in the vicinity of the works). Risk will be reduced further on the basis of mitigation measures that SHEPD will introduce as described in Section 5.

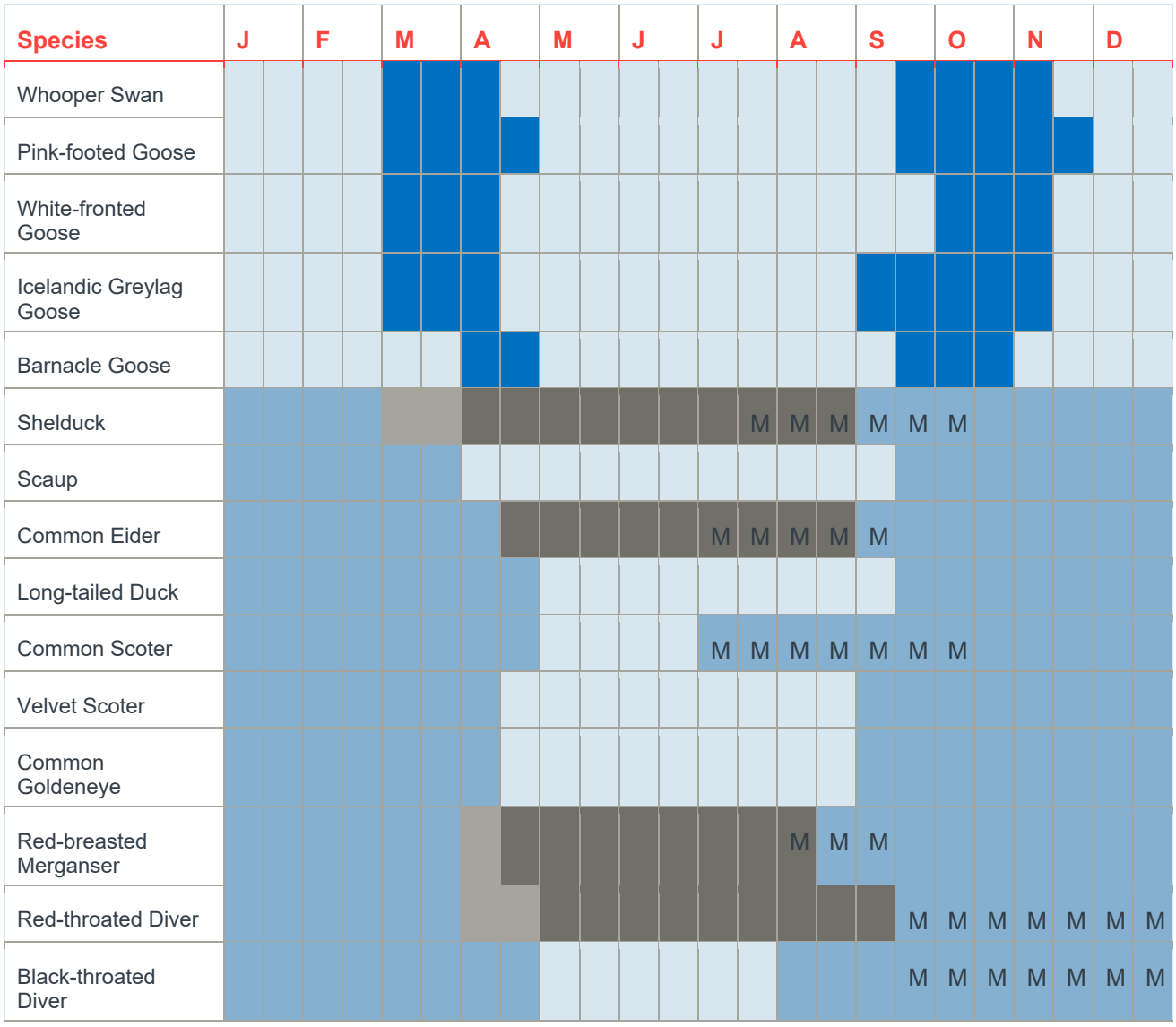
BIRDS

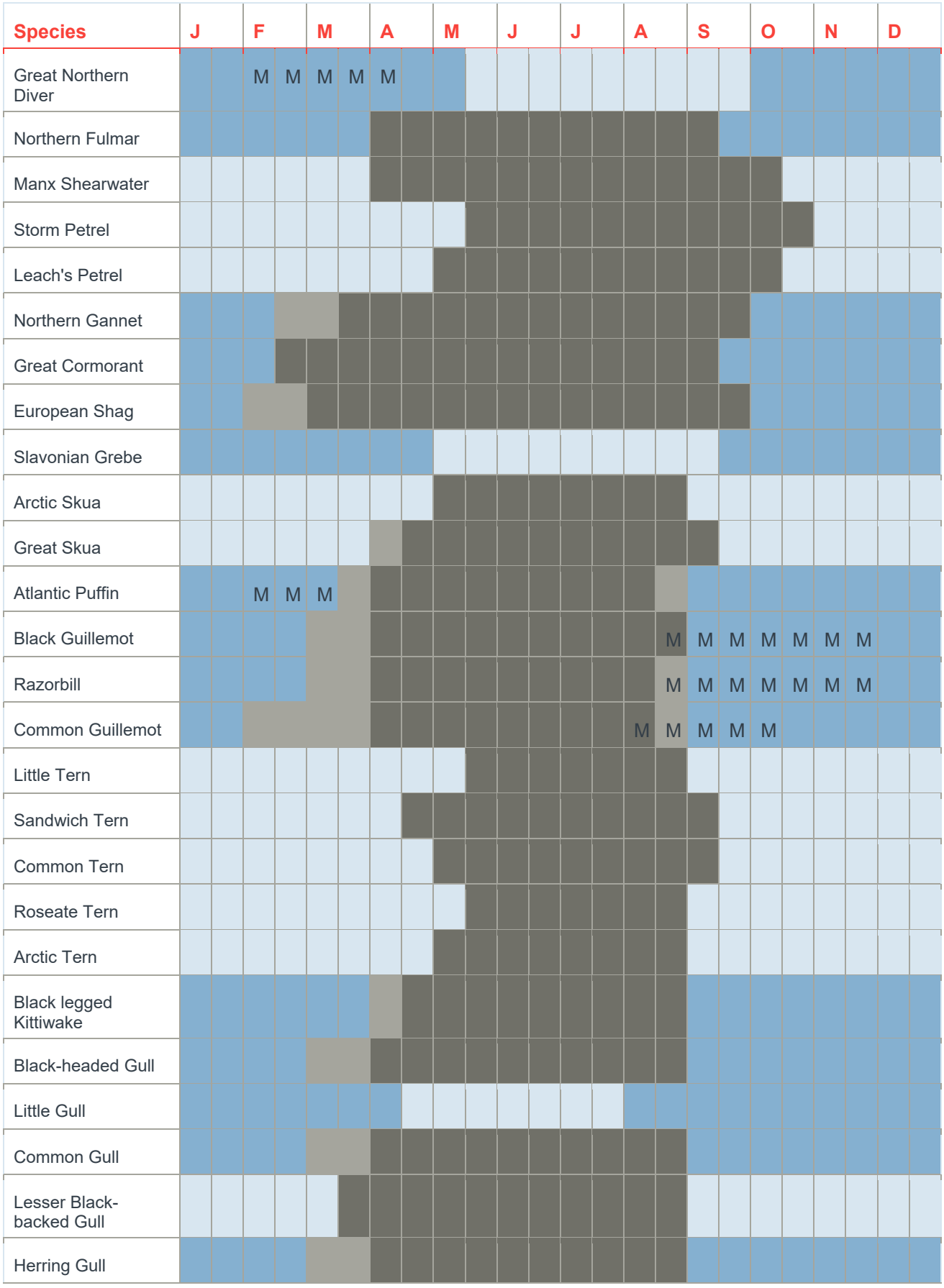
Summary

3.3.15. The Scottish marine environment forms vital habitat to a variety of seabird species (Pollock *et al*. 2000). The west coast of Scotland hosts some particularly important cliff and island habitat for nesting seabirds. While the marine environment forms important habitat to seabirds year-round, birds are most vulnerable to human disturbance at sea during the moulting season when they become flightless and spend greater time on the water's surface. The moulting season for the majority of marine birds is after the breeding season, except for puffins. After the breeding season ends, moulting birds disperse from their coastal colonies to head to offshore waters. This at-sea period increases the likelihood of interactions with vessels and the potential collision risk.

3.3.16. The important life-history periods for seabird species found in Scotland's waters are shown in Table 3-4, reproduced from NatureScot (2020).

Table 3-4 – Key seasonal periods for birds in the Scottish marine environment




Species
J
F
M
A
M
J
J
A
S
O
N
D
Great Northern Diver
Northern Fulmar
Manx Shearwater
Storm Petrel
Leach's Petrel
Northern Gannet
Great Cormorant
European Shag
Slavonian Grebe
Arctic Skua
Great Skua
Atlantic Puffin
Black Guillemot
Razorbill
Common Guillemot
Little Tern
Sandwich Tern
Common Tern
Roseate Tern
Arctic Tern
Black legged Kittiwake
Black-headed Gull
Little Gull
Common Gull
Lesser Black-backed Gull
Herring Gull

Species	J	F	M	A	M	J	J	A	S	O	N	D
Great Black-backed Gull												

Key	
	Breeding period (strongly associated with nest site)
	Breeding site attendance (not closely associated with nest site)
	Migration Period (birds in marine environment only on active passage)
	Flightless moult period
	Winter period (non-breeding)
	Not present in significant numbers (in Scottish marine areas)

Source: NatureScot, 2020

Potential Impacts

3.3.17. During the proposed survey activities, the physical presence of vessels may cause disturbance to birds in the project area. Disturbance from increased vessel light also has the potential to disorientate fledgling birds, leading to collisions with vessels which may be fatal (Rodriguez *et al*. 2015).

3.3.18. The proposed survey activities have the potential to take place at any point between the 01 September 2021 to 31 August 2022 and, therefore, have the potential to coincide with the sensitive breeding and moulting periods for birds. The proposed survey activities in Loch Broom are estimated to take up to approximately 14 days in total.

3.3.19. Despite the potential overlap between the proposed survey activities and sensitive periods for birds which utilise the marine environment, the temporary nature of the activities, and their limited spatial extent, preclude them from introducing significant impacts to birds in the area. Finally, vessels will be travelling slowly and in a predetermined pattern over the course of the surveys, which greatly diminishes the likelihood of collisions occurring. Considering that the seabirds are protected by legislation from harm to individuals, eggs, and nests, no further assessment is conducted herein since these impacts will not occur from the project activities.

3.3.20. Note; impacts on conservation sites with seabird features are considered below in Section 4, and mitigation to control impact on sites protected for seabirds is detailed in Section 5.

3.4 PROTECTED SPECIES RISK ASSESSMENT

PROTECTED SPECIES ASSESSMENT CRITERIA

Injury

Acoustic Injury Criteria

3.4.1. Injury criteria proposed by NOAA (2018) are devised for two different types of sound:

- Impulsive: sounds which are short in duration (i.e. less than 1 second long) and temporary, occupy a broadband bandwidth, and have rapid rise and decay times with a high peak pressure level; and
- Non-impulsive: sounds which may occupy a broadband, narrowband or tonal bandwidth, can be brief, prolonged, continuous or intermittent in nature, and are not characterised by rapid rise and decay times or a high peak pressure level.

3.4.2. The geophysical surveys comprise acoustic equipment which emits multiple pulsed sound. The Scottish Government (2020) guidance on sound exposure thresholds for noise-related injury to marine mammals uses the thresholds identified by Southall et al. (2007). These injury thresholds have since been amended with contemporary acoustics data on marine mammal auditory abilities, as described in the technical note by NOAA (2018) and Southall *et al*. (2019). For this reason, the noise impact assessment herein utilises the contemporary noise impact thresholds as best practice.

3.4.3. The noise emitted from the survey equipment listed above will disperse through the water column, with sound pressure reducing as distance from the noise source increases, thus marine mammals will be exposed to a lower source pressure further from the noise source. Therefore, for the survey equipment with potential to cause injury to marine mammals, the dispersion of noise through the water column has been modelled to assess the appropriate mitigation zone in which the source pressure levels received by marine mammals are reduced below potentially injurious levels.

3.4.4. A duel-metric approach has been adopted which identifies the range of potential injury to marine mammals from both the peak sound pressure level (SPLrms; also called the source level) and cumulative SEL for each equipment type identified to require consideration for noise-related injury (see Table 3-1). The thresholds above which each marine mammal hearing group may experience noise-related injury are presented in Table 3-5. These thresholds are derived from measurements of marine mammal hearing using weighting functions which account for peak hearing abilities for each hearing group (NOAA, 2018). The same weighting functions have been applied to the noise modelling approach undertaken for disturbance below.

Physical Impact Injury

3.4.5. In addition to acoustic injury, physical impacts could also result from collision involving equipment and vessels during proposed survey activities. In general, risk of collision is increased where equipment/vessels are moving at relatively high speeds, particularly if the animal's ability to avoid a potential collision is limited (e.g. basking shark), the presence of equipment/vessels reduces passage (e.g. physical barrier within a narrow channel) and/or during periods of reduced visibility.

Table 3-5 – Criteria considered in this assessment for the onset of injury in marine mammals from impulsive noise

Marine Mammal Hearing Group	Impulsive Noise		Non-Impulsive Noise
	Peak pressure (dB re 1 µPa)	Cumulate SEL (dB re 1 µPa²s)	Cumulate SEL (dB re 1 µPa²s)
Low-frequency (LF) cetaceans	219	183	199
High-frequency (HF) cetaceans	230	185	198
Very high-frequency (VHF) cetaceans	202	155	173
Phocid pinnipeds (underwater)	218	185	201

Source: NOAA, 2018; Southall *et al*. 2019

Disturbance

Disturbance Regulations

3.4.6. There are two regulations which govern disturbance to EPS: Regulation 39(1) and Regulation 39(2). Regulation 39(1) defines disturbance for all EPS in UK waters and individuals which are vulnerable to disturbance due to biological or environmental circumstances. Regulation 39(2) (for which comparable offence is not found in offshore waters, or in English or Welsh inshore waters) goes beyond the disturbance guidelines provided in Regulation 39(1) by making it an offence to deliberately or recklessly disturb any cetacean in Scottish Territorial Waters (i.e. up to 12 nm) (Scottish Government, 2020; see Section 1.3).

3.4.7. To consider the possibility of a disturbance offence resulting from the proposed survey activities, it is necessary to consider the likelihood that an activity would generate a non-trivial disturbance based on the sensitives of the species present and whether the number of individuals impacted would generate population-level consequences. Where there is a possibility of disturbing an individual animal, it is necessary to apply for an EPS Licence to ensure that an offence is not committed. However, in issuing an EPS Licence, MS-LOT must consider whether the FCS of any species will be affected. Consequently, the impacts of proposed activities on the FCS of all protected species must be considered to satisfy both Regulation 39(1) and 39(2). The impact assessment below addresses the impacts of the proposed survey activities on the existing conservation status of protected species in the vicinity of Loch Broom.

Acoustic Disturbance Criteria

3.4.8. Auditory thresholds for disturbance, as defined by NOAA (2018) and Southall *et al*. (2007), have been adopted for the assessment of potential marine mammal disturbance from both non-impulsive and impulsive noise sources. These thresholds, which utilise the behavioural response severity scale detailed in Southall *et al*. (2007) for grading the strength of behavioural responses, are provided in Table 3-6.

Table 3-6 – Disturbance threshold criteria for impulsive sounds

Behavioural Effect	Threshold Criteria SPLrms (dB re 1 µPa)
Potential strong behavioural reaction (i.e. greater than 7 on the behavioural response severity scale)	160

Source: Southall *et al*. 2007

ASSESSMENT OF IMPACTS OF ACTIVITIES ON PROTECTED SPECIES

Cetaceans

3.4.9. Noise modelling has been undertaken by Xodus for a number of risk assessments associated with SHEPD subsea cable surveys in Scotland (e.g. Xodus, 2019). The model outputs, based on a number of assumptions, have been used to identify the potential range (i.e. the straight-line distance from the source) in which noise impacts to marine mammals could occur. The duel-metric modelling approach disseminated in NOAA (2018) was used by Xodus to identify impacts from:

- (1) the peak SPL from the root-mean-square (rms) pressure level (as SPLrms); and
- (2) the cumulative SEL.

3.4.10. The SEL represents the total energy produced by a noise-generating activity standardised to a one-second interval. This enables comparison of the total energy attributed to different activities with different inter-pulse intervals. Empirically-based weighting functions (NOAA, 2018; Southall *et al*. 2019) were applied to the model outputs by Xodus to account for peak hearing sensitivity for the respective marine mammal hearing groups.

3.4.11. For the proposed survey works in Loch Broom, the expected frequency range for USBL, combined SSS/SBP and SBP operations overlaps with the hearing range of all cetacean hearing groups (Table 3-3). Potential injury to cetaceans (i.e. injury which results from a permanent threshold shift in hearing abilities) is limited to impulsive noise sources which exceed the injury thresholds defined in Table 3-5. Example equipment was selected by Xodus to exemplify the worst-case scenario for each survey technique, including the greatest SPLs across source frequencies meant to encapsulate the hearing abilities of all representative hearing groups. This included the following example equipment at depths of 10 and 100 m (Xodus, 2019):

- USBL: 1000 Series Mini Beacon, Applied Acoustics Underwater Technology, 24 – 33.5 kHz, SPLrms = 200 dB re 1µPa;
- SBP/SSS: EdgeTech 2000 series (2000-CSS), combined SBP and SSS system, 0.5 – 12 kHz, SPLrms = 230 dB re 1µPa; and
- SBP: Innomar SES 2000 SBP, 4 – 100 kHz, SPLrms = 235 dB re 1µPa.

3.4.12. All of the impulsive survey technologies modelled by Xodus have the potential to cause injury to EPS and other marine mammals and, therefore, survey activities associated with the project may be potentially injurious to EPS cetaceans in the vicinity of the works without appropriate mitigations. Across modelled scenarios and metrics, the injury ranges were generally highest for the very high-frequency (VHF) hearing group of cetaceans (up to 445 m for peak SPL metric using SBP at 10 m depth at 4 kHz). This group is represented by harbour porpoise in UK waters. Conversely, high-frequency (HF) cetaceans seemed to constitute the hearing group with the lowest potential impact

ranges for the peak SPL metric (up to 98 m), while low-frequency (LF) cetaceans had the lowest impact ranges for the cumulative SEL metric (up to 73 m), when comparing between activity types (Xodus, 2019).

3.4.13. The greatest injury range came from the low frequency (i.e. 4 kHz) SBP during shallow water operations (i.e. 10 m), wherein refraction off the seabed causes nearly immediate cylindrical spreading of noise emissions, causing the sound to travel farther along the horizontal plane of the water column more quickly. Whilst deployment of a low frequency SBP in nearshore waters constitutes a worst-case image of the potential injury range attributable to this survey technique, this scenario is highly unlikely. Geophysical survey technologies generally employ higher frequency sounds in shallow waters where sound loss to absorption and transmission are much lower. As such, sound penetration below the seabed is achievable at lower powers and higher frequencies, which offer higher resolution imagery to the surveyor. Furthermore, when considering the directionality of the equipment, the impact ranges are further reduced. This is because the beam of sound generated by the equipment is directed downward towards the seabed, so the vast majority of power is contained within a roughly 45° angle from the source (the slant height of the conical noise source) to maximise penetration and the resultant imagery. Animals would need to be at the seabed below the noise source to experience the full sound levels behind the modelled impact ranges.

3.4.14. The majority of injury ranges reported by Xodus (2019) were at least slightly reduced when considering animal movement during cumulative SEL estimation. Swim speeds of the cetacean species most likely to be observed in the area are likely to be several m/s. To offer a representative model of the predicted noise exposure ranges of marine mammals moving away from the sound source, a mean swim speed of 1.5 m/s was used in the calculations. Considering that the proposed surveys themselves will take place while the vessel is moving, the cumulative SELs of all equipment types are expected to be even lower based on the premise that animals are likely to move away from the mobile noise source, opposite to the direction of vessel travel.

3.4.15. It should also be noted that the Xodus modelling scenarios were identified to define the worst-case injury ranges associated with the deployment of the example survey equipment. The *in situ* deployment of the noise-generating survey equipment in Loch Broom will occur in waters of intermediate depths (i.e. somewhere between 10-100 m as modelled by Xodus). Moreover, the frequency ranges depicted constitute the lowest and highest reasonably practicable settings for the survey activities modelled, meaning that the spread of sound in the marine environment is also likely to fall somewhere between the modelled extremes. The injury ranges anticipated to result from equipment use are thus likely to fall within the spectrum of those defined by the model outputs, thereby reducing the impact ranges associated with the low frequency survey equipment.

3.4.16. Available mitigation measures specifically designed for geophysical surveys (Joint Nature Conservation Committee (JNCC), 2017) have been incorporated into mitigation measures described in Section 5. These measures include deployment of a Marine Mammal Observer (MMO) to monitor for the presence of cetaceans within a 500 m mitigation zone prior to the commencement of, and during, any SBP surveys.

3.4.17. In consideration of the relevant mitigation measures, none of the modelled scenarios indicate any injury events are likely to exceed the 500 m mitigation zone. An EPS (in this case, cetacean) would need to come within 500 m of, and likely follow, the moving vessel or vehicular platforms from which the survey equipment will be deployed, injury from survey activities will not occur when the mitigations are applied. For these reasons, the survey activities are not anticipated to impair the

ability of an animal to survive or reproduce or result in any significant impacts on the FCS of any EPS.

3.4.18. In addition to physical injury, noise emissions have the potential to affect the behaviour of cetaceans in the vicinity of the noise source. Significant or strong disturbance (see Table 3-6; Southall *et al*. 2007) may occur when an animal is at risk of a sustained or chronic disruption of behaviour or habitat use resulting in population-level effects.

3.4.19. An assessment of potential disturbance impacts from impulsive and non-impulsive sound is provided below, based on noise modelling by Xodus for the same example equipment listed above for USBL, combined SBP/SSS and SBP (Xodus, 2019). The potential for a disturbance offence to result from these three types of technologies varies between activity type, as the predicted disturbance range is much greater for the low frequency noise sources which travel further within the marine environment. The sounds emitted by the combined SBP/SSS (operating at 0.5 kHz) and the SBP (operating at 4 kHz) form the lowest frequency sounds and have the potential to generate disturbance impacts on the order of several kilometres (up to 4.2 km for SBP at 100 m depth), whilst those from the USBL and higher frequency SBP (i.e. 100 kHz) are on the order of a couple hundred metres (up to 207 m, USBP at 10 m depth).

3.4.20. The number of individuals which may experience disturbance from the worst-case scenario for each activity type has been calculated in Table 3-7, based on the (limited) population parameters provided in Table 3-2. In these calculations, the impact range serves as a radius with which to calculate the total area of coverage for a potential disturbance event associated with each survey activity. However, it should be noted that this approach is more suited to the open coast, whereas the proposed survey activities are located within Loch Broom. Therefore, the maximum proportion of the Management Unit potentially affected by the proposed survey activities is highly conservative.

Table 3-7 – Number of cetacean individuals and proportion of the Management Unit which may experience a disturbance offence from impulsive survey activities, based on known population parameters of the most frequently occurring species

Species Name	Number of Individuals which may incur a Strong Disturbance			Maximum Proportion of the Management Unit Potentially Affected by Proposed Survey Activities (%)
	USBL (0.13 km^2 area)	Combined SBP/ SSS (33 km^2 area)	SBP – 4kHz (56 km^2 area) *	
Harbour porpoise	<0.1	13	22	0.1
Minke whale	<0.1	<1	1	<0.01

* The Innomar SES 2000 sub-bottom profiler at an operational frequency of 4 kHz has been taken as a worst case.

3.4.21. The source levels associated with the example survey equipment have the potential to elicit a strong behavioural response in cetaceans which could be classed as a disturbance offence as defined under Regulations 39(1) or 39(2). However, for the relevant biogeographical population Management Units for harbour porpoise and minke whale, which are both known to occur in the area, this will not incur significant impacts. For these species, less than 0.1% of the biogeographic

population will be impacted by noise-related disturbance (Table 3-2). As the survey vessel will not be stationary during these activities, animals within a particular area will not be exposed to extended periods of underwater noise. Rather, individuals would have to follow the moving equipment to be subjected to lasting or prolonged periods of noise which may have detrimental effects at the individual or population level (i.e. a significant disturbance).

3.4.22. The programme of geophysical surveys will take place ad hoc, with the use of survey technologies and vessels being intermittent therein. There will be periods of inactivity during weather downtime and during geotechnical data collection. Given the transient and short-term nature of the survey and vessel activities, it is highly unlikely that any disturbance offences from use of combined SSS/SBP or SBP would negatively impact upon the FCS of any of the cetacean species which may be present in the vicinity of Loch Broom. This is on the basis that the Xodus modelled level of disturbance is unlikely to affect the ability of any individual animal to survive or reproduce, and will not have significant population-level impacts to any EPS (Table 3-7). Regardless, it is possible that a small number of animals may experience some level of disturbance for the short period that they encounter the proposed survey activities.

3.4.23. While the above considerations indicate minimal risk as a result of the proposed survey activities, in conjunction with mitigation measures described in Section 5, **it is nevertheless concluded that an EPS Licence is expected to be required for the SBP-related survey activities within 12 nm, as per Regulation 39(2)** (Scottish Government, 2020).

Otters

3.4.24. Otters are particularly sensitive to anthropogenic changes to their habitats, as their coastal habitat use is highly dependent on the inclusion of freshwater features (Roos *et al*. 2015). As such, the location of their holts (or dens) is restricted, and anthropogenic changes to their habitat may have dramatic repercussions, including localised extinctions. As detailed in Section 5, SHEPD will implement pre-works otter surveys or provide an otter ecologist to advise survey personnel during shore based intertidal surveys of cable landfalls within or immediately adjacent to otter habitat. This will enable sensitive otter features to be identified and avoided, hence ensuring the proposed survey activities do not result in the destruction of, damage to, or obstruction of access to an otter holt, or other structure or place it uses for shelter or protection. Additionally, the temporary and short-term nature of any potential activities in the intertidal zone preclude significant impacts to the population from which any otters found within the project area will belong. As such, impacts on otters are expected to be extremely limited, will not impair an otter's ability to survive, breed or reproduce, or rear, or otherwise care for its young, and there will be no impact on the FCS of otters in the wider region (noting the Inverpolly SAC, which includes otter as a protected species, is located to the north of Loch Broom).

3.4.25. Additional mitigation measures for avoiding potential impacts to otters during vessel-based works, which will be implemented as a matter of best practice, are presented in Section 5. Considering the extremely limited nature of the potential effects on otters anticipated to result from the proposed survey activities, **it is concluded that an EPS Licence will not be required for otters**.

Seals

3.4.26. As described for cetaceans (see above for details), noise modelling has been undertaken by Xodus for a number of risk assessments associated with SHEPD subsea cable surveys in Scotland (e.g. Xodus, 2019). The greatest injury range to seals was reported from low frequency (i.e. 4 kHz) SBP

during shallow water operations (i.e. 10 m), at up to 188 m. However, as noted above, whilst deployment of a low frequency SBP in nearshore waters constitutes a worst-case image of the potential injury range attributable to this survey technique, this scenario is highly unlikely. Injury ranges reported by Xodus (2019) were less than 100 m when considering static and moving animals during cumulative SEL estimation.

3.4.27. Available mitigation measures specifically designed for geophysical surveys (JNCC, 2017) have been incorporated into mitigation measures described in Section 5. These measures include deployment of a MMO to monitor for the presence of seals within a 500 m mitigation zone prior to the commencement of, and during, any SBP surveys. In consideration of the relevant mitigation measures, none of the modelled scenarios indicate any injury events are likely to exceed the 500 m mitigation zone. Seals would need to come within 500 m of, and likely follow, the moving vessel or vehicular platforms from which the survey equipment will be deployed, injury from survey activities will not occur when the mitigations are applied.

3.4.28. Although they occupy the marine environment for the majority of the year, grey seals and harbour seals do utilise the coastal environment during their most sensitive life-history periods; breeding, pupping and moulting. They form breeding colonies and haul-outs for these purposes along rocky, often remote coastlines around the UK, though sometimes colonies may extend onto sandbanks and up cliffs (Nordstrom, 2006). Disturbance at these important terrestrial habitats through vessel presence has the potential to cause acute distress, which may lead to individuals vacating the site and returning to water. At pupping sites, this behavioural response to stressors has the potential to impact pup survival, as it can disrupt nursing and lead to energetic deficits in pre-weaned pups (NMFS, 2018).

3.4.29. The landfall sites of the cable route within Loch Broom are located approximately 12 km to the southeast of known (and protected) seal haul-outs associated with the Summer Isles. Activities within the intertidal area will be constrained to the immediate area of landfall. Best practice mitigation measures designed to minimise impacts to marine mammals, including seals, are set out in Section 5. Based on this mitigation, and the distance to the nearest designated haul-out site, there will be no significant disturbance of seals at their haul-outs. **It is concluded that an EPS Licence will not be required for seals**.

Basking Sharks

3.4.30. The primary risk to basking sharks during the proposed activities in Loch Broom relates to the presence of vessels and thus potential for injury via collision (as opposed to acoustic injury/disturbance for marine mammals). However, vessels associated with the proposed survey activities will be moving slowly and thus the potential for significant injury is low. In addition, the implementation of mitigation measures as described in Section 5, including basking shark monitoring and mitigation zones, will further reduce the risk.

3.4.31. The potential to impact basking sharks is considered very low and will be reduced further through the implementation of the mitigation measures outlined in Section 5. However, as disturbance to basking sharks remains a possibility, **an application for a Basking Shark Licence under the WCA will be submitted**.

Birds

3.4.32. Several seabird species have the potential to be disturbed by the physical presence of vessels during survey activities. However, vessel movements are relatively frequent in the vicinity of

Ullapool and, therefore, seabirds are unlikely to be significantly disturbed during the works. Given the temporary and relatively short-term nature of proposed activities, the potential impacts on protected seabirds will not result in killing of individuals or disturbance of eggs and nests, and are therefore not considered to be significant with respect to the WCA.

FINAL CONCLUSION

3.4.33. Overall, the proposed survey activities (required to inform cable routing and installation) constitutes work of overriding public need, while presenting a minor and temporary disturbance to a few individual animals in a limited area. The main risk relates to underwater noise disturbance of cetaceans with more limited scope for disturbance to basking shark. Therefore, both an EPS Licence and a Basking Shark Licence will be applied for with respect to the proposed survey activities in Loch Broom. Seals, otters and seabirds are considered not to be at significant risk of disturbance.

4 PROTECTED SITES ASSESSMENT

4.1 SELECTION CRITERIA FOR ASSESSMENT OF PROTECTED SITES

4.1.1. 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 have been used to select those designated sites where potential impacts need to be assessed:

- SACs and NCMPAs (including proposed and candidate sites) with cetaceans as qualifying features within 50 km of the survey area;
- SACs (including proposed and candidate sites) with harbour seal interests within 50 km of the Proposed Development and breeding grey seal within 20 km of the survey area;
- Designated seal haul-outs or grey seal breeding sites that overlap with or located within 500 m of the survey area;
- SACs and NCMPAs (including proposed and candidate sites) with otter interests that overlap with or located within 500 m of the survey area;
- SPAs and NCMPAs (including proposed and candidate sites) with birds as qualifying features that overlap with or are located within 2 km of the survey area; and
- SACs and NCMPAs (including proposed and candidate sites) with seabed/benthic protected features that overlap with the survey area.

4.1.2. The designated sites located in the vicinity of the survey area which have the potential to be impacted by proposed survey activities, subject to the selection criteria above, are as follows (see Figure 4-1 for location of designated sites):

- Inner Hebrides and the Minches SAC; and
- Wester Ross NCMPA.

4.1.3. For each designated site that has the potential to be impacted by the proposed survey activities, mitigation measures have been considered based upon site-specific protected features. These are provided in Table 4-1. Details of the mitigation measures are provided in Section 5. It should be noted that some of the mitigation measures included in Section 5 may not be listed in Table 4-1 if they are not related to protecting designated features of those sites. However, all mitigation measures in Section 5 will be applied to all activities, regardless of proximity to a protected site.

4.2 CONCLUSION OF PROTECTED SITES ASSESSMENT

4.2.1. A summary is presented below of the potential impacts to protected sites which will be further reduced though implementation of the specific species protection measures outlined in Section 5.

POTENTIAL IMPACT ON INNER HEBRIDES AND THE MINCHES SAC

4.2.2. The survey area does not overlap with any SAC (or NCMPA) supporting cetaceans; however, the Inner Hebrides and the Minches SAC is located approximately 2 km to the northwest, a site designated for harbour porpoise (Table 4-1). The proposed survey activities that have the potential to interact with cetaceans include geophysical survey, vibrocoring (with PCPT), benthic sediment sampling and video survey, as well as general vessel presence.

4.2.3. There will be no injurious impacts to harbour porpoise from the survey activities. Although the survey area is within 50 km of Inner Hebrides and the Minches SAC (with highly mobile megafauna

species as designated features), due to the relatively short, temporal aspect of each survey, as well as the mitigation measures outlined in Section 5, no adverse impact upon the conservation status of the designated sites is expected.

4.2.4. A full assessment of the potential impacts on cetaceans from the proposed survey activity is provided in Section 3.

POTENTIAL IMPACT ON WESTER ROSS NCMPA

4.2.5. The survey area overlaps with the Wester Ross NCMPA, a site designated for a range of benthic habitats and geological features (Table 4-1). The proposed survey activities that have the potential to interact with the seabed and benthic features include vibrocoring (with PCPT) and benthic sediment sampling.

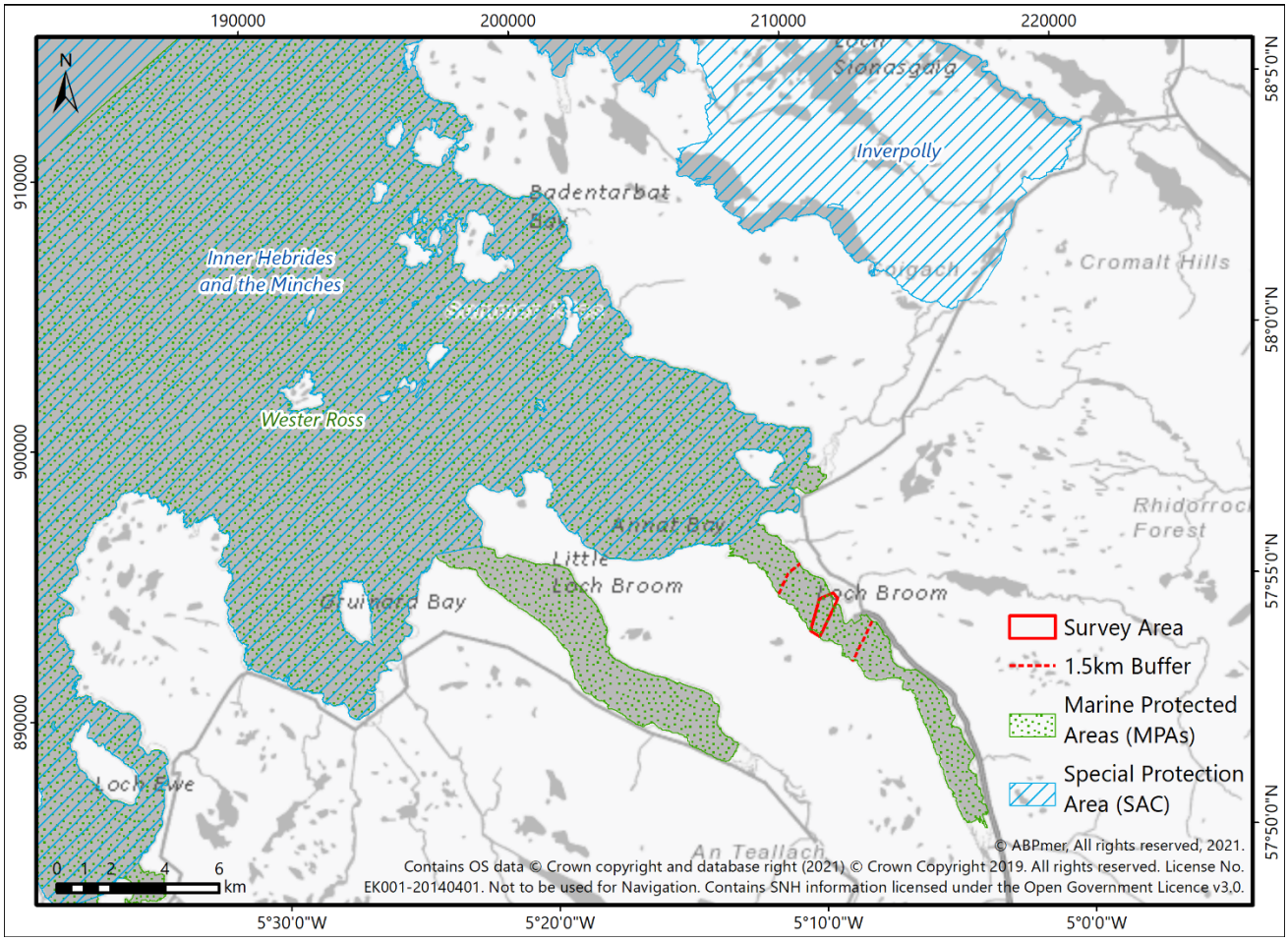
4.2.6. Given the relatively small volume of sediment which will be extracted during sediment sampling activities, and the preceding drop-down video inspection, any impacts on sensitive habitats or geological features will be avoided during survey work. Moreover, only a relatively small area will be impacted during vibrocoring, PCPT activities and benthic grab sampling. Consequently, the survey activities are not likely to have a significant effect on the integrity of benthic features of the Wester Ross NCMPA in the vicinity of the Proposed Development.

Table 4-1 – Protected sites in the vicinity of the survey area

Protected Site	Selection Criteria	Protected Features	Activity and Mitigation
Inner Hebrides and the Minches SAC	SAC with cetaceans as qualifying features within 50 km – approximately 2 km to the northwest	Harbour porpoise	Activity: Vessel presence, geophysical survey, benthic grab sampling and video survey. Proposed mitigation measures: M1, M2, M3, M4, M5, M6. Potential for LSE: No.
Wester Ross NCMPA	NCMPA with seabed/benthic protected features that overlap	Biodiversity: Burrowed mud; Circalittoral muddy sand communities; Flame shell beds; Kelp and seaweed communities on sublittoral sediment; Maerl beds; Maerl or coarse shell gravel with burrowing sea cucumbers; Northern feather star aggregations on mixed substrata. Geodiversity: Marine Geomorphology of the Scottish Shelf Seabed; Seabed Fluid and Gas Seep; Submarine Mass Movement; Quaternary of Scotland.	Activity: Geotechnical survey and benthic grab sampling. Proposed mitigation measures: None. Potential for significant effect: No.

Source: NatureScot (SiteLink; https://sitelink.nature.scot/home)

Figure 4-1 – Location of protected sites in the vicinity of the proposed survey area in Loch Broom



5 SPECIES PROTECTION MEASURES

5.1 OVERVIEW

5.1.1. This section summarises the proposed mitigation measures to be implemented for avoiding and reducing potential impacts on species that may be present in the vicinity of the survey area. Species and task-specific mitigation is provided below; however, the following measures will be implemented during all proposed survey activities:

- All vessels will adhere to the provisions of the Scottish Marine Wildlife Watching Code (SNH, 2017), and the Basking Shark Code of Conduct (MSC, undated); and
- All relevant contractors will be made aware of all protected species within the marine environment, and their responsibility to implement the mitigation in this document.

5.2 MARINE MAMMALS

5.2.1. A Marine Mammal Protection Plan (MMPP) will be prepared in order to reduce risk of injury and disturbance to marine mammals resulting from SBP, and where required, USBL and wider geophysical survey operations. This will be aligned to JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017). It is noted that neither the SBP nor other geophysical equipment may be capable of performing a soft-start, and hence this procedure is not included.

5.2.2. With regard to USBL, mitigation measures M1, M2 and M4 as detailed below will be applied, except where the frequency content of the USBL is outwith the generalised hearing ranges (NMFS, 2018) of those cetacean species considered likely to occur in the survey footprint, or it is within the generalised hearing range but the sound pressure level is below the 202 dB SPLpk injury threshold as described in NMFS (2018) and Southall *et al*. (2019). Mitigation measures M1, M2 and M4 will also be applied for all geophysical equipment operating at a frequency/noise level which can cause injury (without mitigation) to cetaceans.

5.2.3. The key components of the MMPP for SBP include:

- Deployment of a MMO to monitor for the presence of cetaceans and seals, prior to the commencement of SBP operations;
- For SBP operations during hours of darkness and/or in periods of poor visibility and/or during periods when the sea state is greater than Beaufort 3, deployment of Passive Acoustic Monitoring (PAM) system to detect for the presence of cetaceans that cannot be detected by the MMO;
- 500 m mitigation zone for cetaceans;
- 500 m mitigation zone for seals, reducing to 100 m in the event of a need to avoid critical delay to the project; and
- Reporting.

M1 – MARINE MAMMAL MONITORING

5.2.4. There will be MMO coverage for the duration of the SBP activities, with adequately trained and experienced MMO(s) working standard 12-hour shifts. They will have experience of working at sea and will have successfully deployed and used PAM equipment previously, and be equipped with binoculars offering at least 8x magnification. The MMO will be located at a high point on the vessel, providing good all-round visibility.

M2 – MARINE MAMMAL OBSERVER (MMO)

5.2.5. During daylight hours, the MMO(s) will carry out visual observations to monitor for the presence of cetaceans, seals and basking sharks before the SBP is activated. The MMO will recommend delays in the commencement of the operation should any cetaceans be detected within the 500 m mitigation zone for cetaceans. This distance will be 500 m for seals and basking sharks, except in the event of a need to avoid critical delay to the project in which case the mitigation zone for both species groups will be 100 m. The criteria as to what constitutes a critical delay leading to reduction in mitigation zone distance from 500 m to 100 m would be agreed on a case by case basis in consultation with MS-LOT.

M3 – PASSIVE ACOUSTIC MONITORING (PAM)

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

M4 – PRE-START SEARCH

5.2.7. Visual (MMO) (and acoustic (PAM) monitoring if required) will be conducted for a pre-start search of 30 minutes i.e. prior to the commencement of SBP operations. This will involve a visual (during daylight hours) or PAM watch (during poor visibility or at night) to determine if any cetaceans, seals or basking sharks are within 500 m of the activities (or 100 m in the event of the critical delay described in mitigation measure M2).

M5 – CETACEAN, SEAL AND BASKING SHARK MITIGATION ZONE

5.2.8. The mitigation zone is defined as the area within 500 m of the SBP; noting that the SBP is deployed on a ROV/ROTV, this will be the centre of the mitigation zone, and not the vessel. Should any cetaceans, seals or basking sharks be detected within the mitigation zone prior to the commencement of SBP operations (or after breaks in SBP survey activity of more than 10 minutes), operations will be delayed until their passage, or the transit of the vessel, results in the cetaceans, seals or basking sharks being outwith the mitigation zone. In all three cases, there will be a 20-minute delay from the time of the last sighting within the mitigation zone to the commencement/recommencement of the SBP operations.

5.2.9. As outlined in mitigation measure M2, the mitigation zone for seals and basking sharks may be reduced from 500 m to 100 m in the event of a need to avoid critical delay to the project, subject to agreement with MS-LOT.

M6 – REPORTING

5.2.10. All recordings of cetaceans, seals and basking sharks will be made using JNCC Standard Forms. At the end of the operations, a monitoring report detailing the cetaceans recorded, methods used to detect them, and details of any problems encountered will be submitted to Marine Scotland and SNH. The report will also include feedback on how successful the mitigation measures were. This requirement will be communicated to the MMOs at project start up meetings and at crew change.

5.3 BASKING SHARK

5.3.1. The following mitigation measures will be implemented during SBP operations in order to reduce disturbance to basking sharks:

M7 – BASKING SHARK MONITORING

5.3.2. There will be MMO coverage for the duration of the marine activities, with adequately trained and experienced MMO(s) working standard 12-hour shifts. The MMO will also monitor for the presence of basking shark following the mitigation measures described above for Marine Mammal Monitoring (see M1). Should any basking sharks be detected within 500 m of the vessel prior to the commencement of SBP surveys (or after breaks in geophysical survey activity of more than 10 minutes), operations will be delayed until their passage, or the transit of the vessel, results in the animals being outwith the mitigation zone. In all cases, there will be a 20-minute delay from the time of the last sighting within the mitigation zone to the commencement/recommencement of the operations.

M8 – BASKING SHARK MITIGATION ZONE

5.3.3. During the proposed survey works, the MMO will monitor for the presence of basking sharks, in addition to marine mammals and otters, and will delay start of the survey if any are seen within 500 m of the survey vessel. The mitigation zone for basking sharks may be reduced from 500 m to 100 m in the event of a need to avoid critical delay to the project subject to agreement with MS-LOT.

5.4 OTTERS

5.4.1. The following mitigation measures will be implemented in order to reduce disturbance to otters:

M9 – OTTER MONITORING

5.4.2. There will be MMO coverage for the duration of the vessel based SBP survey operations, with adequately trained and experienced MMO(s) working standard 12-hour shifts. The MMO will also monitor for the presence of otters (see also M1).

5.5 SEABIRDS

5.5.1. The following mitigation measures will be implemented in order to reduce disturbance to seabirds:

M10 – RAFTING SEABIRDS

5.5.2. The survey vessels will be moving at a maximum speed of 4-8 knots during survey operations, to allow any rafting seabirds time to disperse before the vessel arrives. When not on survey effort, vessels will avoid bird rafts where operationally possible and it is safe to do so.

6 CONCLUSION

6.1.1. This assessment has considered the risk posed by the proposed geophysical, geotechnical and environmental survey (including equipment calibration) associated with the Proposed Development (subsea cable route) within Loch Broom to EPS, other protected species and protected sites. This has included assessing the risk caused by noise emitted from the vessel and the geophysical survey, collision impact and disturbance to the following protected species and sites:

- Cetaceans;
- Otters;
- Seals (including seal haul-out sites);
- Basking sharks;
- Birds;
- SACs; and
- NCMPAs.

6.1.2. The survey area is located approximately 2 km from the boundary of the Inner Hebrides and the Minches SAC, designated for harbour porpoise. Due to the localised and temporary nature of proposed geophysical surveys, in combination with the proposed mitigation, no adverse impact through injury to cetaceans is anticipated. The use of geophysical survey equipment may cause disturbance to cetaceans in the vicinity and as such, an application for an EPS Licence will be submitted.

6.1.3. Otter populations may be disturbed by vessel presence and near-shore landfall activities, although the survey area is not located within 500 m of a designated site. The proposed survey (particularly intertidal) activities may result in disturbance of otters using the foreshore, however due to short survey periods in the nearshore area adjacent to landfalls compared with the overall survey period, disturbance will be temporary and localised; therefore, no adverse impacts to otters are expected. Furthermore, the proposed mitigation measures will ensure that the shore based intertidal survey works will not result in the disturbance of or damage to otter holts or other sensitive otter features. As such, no likely significant effects on the otter features of the three SACs are anticipated, and an EPS licence for otters will not be required.

6.1.4. The potential landfall sites of the cable route within Loch Broom are located approximately 12 km to the southeast of known (and protected) seal haul-outs associated with the Summer Isles. Activities within the intertidal area will be constrained to the immediate area of landfall. Due to the localised and temporary nature of proposed survey activities, and given the distance to the nearest designated seal haul-out site, no adverse impact through injury or disturbance to seals is anticipated. Best practice mitigation measures designed to minimise impacts to marine mammals, including seals, will be followed. As there will be no significant disturbance, an application for an EPS Licence will not be submitted with respect to seals.

6.1.5. The primary risk to basking sharks during the proposed survey activities in Loch Broom relates to the presence of vessels and thus potential for injury via collision. However, vessels associated with the proposed survey activities will be moving slowly and thus the potential for significant injury is low. The potential to impact basking sharks is considered very low and will be reduced further through the implementation of mitigation measures. However, as disturbance to basking sharks remains a possibility, an application for a Basking Shark Licence under the WCA will be submitted.

6.1.6. Several seabird species have the potential to be disturbed by the physical presence of vessels during survey activities. However, vessel movements are relatively frequent in the vicinity of Ullapool and, therefore, seabirds are unlikely to be significantly disturbed during the works. There are no designated sites (i.e. SPAs) located in the vicinity of the survey area. Given the temporary and relatively short-term nature of proposed survey activities, the potential impacts on protected seabirds will not result in killing of individuals or disturbance of eggs and nests, and are therefore not considered to be significant with respect to the WCA.

6.1.7. The survey area overlaps with the Wester Ross NCMPA. As relatively small benthic samples will be extracted during geotechnical and environmental surveys, of less than 1 m^3, no impacts on these sites is anticipated, but a Marine Licence Exemption application will be submitted.

6.1.8. Overall, the proposed survey operations constitute work of an overriding public need while presenting a trivial and temporary disturbance in a limited area.

7 REFERENCES

Bloomfield, A. and Solandt, J.-L. (2006). The Marine Conservation Society. Basking Shark Watch 20-year report (1987-2006). Available online at: https://www.mcsuk.org/downloads/wildlife/basking_sharks/BSW20%20Report.pdf (Accessed May 2021).

Bowen, D. (2016). *Halichoerus grypus*. The IUCN Red List of Threatened Species 2016: e.T9660A45226042. Available online at: https://www.iucnredlist.org/species/9660/45226042 (Accessed May 2021).

Christiansen, F., Rojano-Doñate, L., Madsen, P.T. and Bejder, L. (2016). Noise levels of multi-rotor unmanned aerial vehicles with implications for potential underwater impacts on marine mammals. Frontiers in Marine Science 3: 277

Department of Energy and Climate Change (DECC). (2016) Offshore Energy SEA 3: Appendix 1 Environmental Baseline. A1a.7 Marine and other mammals. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504533/OESEA3_A1a7_Marine___other_mammals.pdf (Accessed May 2021).

Fettermann, T., Fiori, L., Bader, M., Doshi, A., Breen, D., Stockin, K.A. and Bollard, B. (2019). Behaviour reactions of bottlenose dolphins (*Tursiops truncatus*) to multirotor Unmanned Aerial Vehicles (UAVs). Scientific Reports 9: 8558.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J., and Øien, N. (2017). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. May 2017.

Hebridean Whale and Dolphin Trust (HWDT). (2018). Hebridean Marine Mammal Atlas. Part 1: Silurian, 15 years of marine mammal monitoring in the Hebrides. A Hebridean Whale and Dolphin Trust Report (HWDT), Scotland, UK. 60 pp.

Inter-Agency Marine Mammal Working Group (IAMMWG). (2015). Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough.

Joint Nature Conservation Committee (JNCC). (2017). JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from geophysical surveys. August 2017. Available online at: http://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf (Accessed May 2021).

Kastelein, R.A., van der Heul, S., Verboom, W.C., Triesscheijn, R.J.V. and Jennings, N. (2006). The influence of underwater data transmission sounds on the displacement behaviour of captive harbour seals (*Phoca vitulina*). Marine Environmental Research 61: 19-39.

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. Draft report to Scottish Natural Heritage and Marine Scotland.

MSC (undated). Basking Shark Code of Conduct. Available online at: https://www.mcsuk.org/downloads/wildlife/basking_sharks/Basking_Shark_Code_of_Conduct_Poster.pdf (Accessed May 2021).

National Marine Fisheries Service (NMFS). (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 Office of Protected Resources National Marine Fisheries Service Silver Spring, MD 20910. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/NOAA%202018.pdf (Accessed May 2021).

National Oceanic and Atmospheric Administration (NOAA). (2018). Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing, Technical Memorandum NMFS-OPR-55, 2018.

NatureScot. (2020). Seasonal periods for birds in the Scottish Marine Environment. Short guidance Note. Version 2. October 2020. Available online at: https://www.nature.scot/sites/default/files/2020-10/Guidance%20note%20-%20Seasonal%20definitions%20for%20birds%20in%20the%20Scottish%20Marine%20Environment.pdf (Accessed May 2021).

Nordstrom, C.A. (2006). Haul-out selection by Pacific harbour seals (Phoca vitulina richardii): isolation and perceived predation risk. Marine Mammal Science, 18:194-205.

Pollock, C.M., Mavor, R., Weir, C.R., Reid, A., White, R.W., Tasker, M.L., Webb, A. and Reid, J.B. (2000). The distribution of seabirds and marine mammals in the Atlantic Frontier, north and west of Scotland.

Ramos, E.A., Maloney, B., Magnasco, M.O. and Reiss, D. (2018). Bottlenose dolphins and antillean manatees respond to small multi-rotor unmanned aerial systems. Frontiers in Marine Science 5: 316.

Rodríguez, A., Rodríguez, B. and Negro, J.J. (2015). GPS tracking for mapping seabird mortality induced by light pollution. Nature Scientific Reports 5: 10670.

Roos, A., Loy, A., de Silva, P., Hajkova, P. and Zemanová, B. (2015) *Lutra lutra*. The IUCN Red List of Threatened Species 2015: e.T12419A21935287. Available online at: https://www.iucnredlist.org/species/12419/21935287 (Accessed February 2021).

Russell, D.J.F., Jones, E.L. and Morris, C.D. (2017). Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals. Scottish Marine and Freshwater Science 8: 25. Available online at: https://data.marine.gov.scot/dataset/updated-seal-usage-maps-estimated-sea-distribution-grey-and-harbour-seals (Accessed February 2021).

Russell, D.J., Hastie, G.D., Thompson, D., Janik, V.M., Hammond, P.S., Scott-Hayward, L.A., Matthiopoulos, J., Jones, E.L. and McConnell, B.J. (2016). Avoidance of wind farms by harbour seals is limited to pile driving activities. Journal of Applied Ecology 53: 1642-1652.

Scottish Government. (2020). The Protection of Marine European Protected Species from Injury and Disturbance Guidance for Scottish Inshore Waters. July 2020 version. Available online at: https://www.gov.scot/publications/marine-european-protected-species-protection-from-injury-and-disturbance (Accessed May 2021).

Scottish Natural Heritage (SNH). (2017). The Scottish Marine Wildlife Watching Code. SNH Guidance. Available online at: https://www.nature.scot/scottish-marine-wildlife-watching-code-smwwc-part-1 (Accessed May 2021).

Sims, D.W. (2008). Sieving A Living: A review of the biology, ecology and conservation status of the plankton-feeding basking shark *Cetorhinus maximus*. Advances in Marine Biology 54: 171-220

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R. and Kastak, D. (2007). Marine mammal noise exposure criteria: initial scientific recommendations. Aquatic Mammals 33: 411-509.

Southall, B.L, Finneran, J.L., Reichmuth, C., Nachtigall, P.E., Ketten D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P. (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Special Committee on Seals (SCOS). (2018). Scientific advice on matters related to the management of seal populations: 2018. National Environment Research Council, 2018. Available online at: http://www.smru.st-andrews.ac.uk/files/2019/05/SCOS-2018.pdf (Accessed February 2021).

Witt, M.J., Hardy, T., Johnson, L., McClellan, C.M., Pikesley, S.K., Ranger, S., Richardson, P.B., Solandt, J.L., Speedie, C., Williams, R. and Godley, B.J. (2012). Basking sharks in the northeast Atlantic: spatio-temporal trends from sightings in UK waters. Marine Ecology Progress Series 459**:** 121-134.

Xodus. (2019). EPS and Protected Sites and Species Risk Assessment – West Highlands. Scottish and Southern Energy plc. Assignment Number: A302244-S02. Document Number: A-302244-S02-REPT-004.

8 ACRONYMS

AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AUV	Autonomous Underwater Vessel
DECC	Department of Energy and Climate Change
DSV	Diving Support Vessel
EPS	European Protected Species
FCS	Favourable Conservation Status
HF	High-Frequency
HRA	Habitats Regulations Appraisal
IAMMWG	Inter-Agency Marine Mammal Working Group
IRM	Inspection Repair and Maintenance
JNCC	Joint Nature Conservation Committee
LARS	Launch and Recovery System
LF	Low-Frequency
LSE	Likely Significant Effect
MAG	Magnetometer
MBES	Multi Beam Echosounder
MMO	Marine Mammal Observer
MMPP	Marine Mammal Protection Plan
MS-LOT	Marine Scotland Licensing Operations Team
NCMPA	Nature Conservation Marine Protected Area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PAM	Passive Acoustic Monitoring
PCPT	Piezocone Penetration Testing
PMF	Priority Marine Feature
PSA	Particle Size Analysis
RIB	Rigid Inflatable Boat
ROTV	Remotely Operated Towed Vehicle
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation

SBES	Single Beam Echosounder
SBP	Sub-Bottom Profiler
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SHEPD	Scottish Hydro Electric Power Distribution plc
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPL	Sound Pressure Level
SSS	Side Scan Sonar
SVP	Sound Velocity Profiler
UAV	Unmanned Aerial Vehicle
USBL	Ultra-Short Baseline
UXO	Unexploded Ordnance
VHF	Very High-Frequency
WCA	Wildlife and Countryside Act 1981 (as amended)

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