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Inch Cape Offshore Wind Farm

Geophysical and Geotechnical Surveys - European Protected Species Risk
Assessment

16 February 2023

IFS 1307825

Inch Cape

Document history

Author	[REDACTED]	07/02/2023
Checked	[REDACTED]	08/02/2023
Approved	[REDACTED]	10/02/2023

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Issue	Date	Revision Details
A	10/02/2023	First draft
B	16/02/2023	Section on designated sites and cumulative impacts added

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Contents

1.	Introduction	1
2.	Geophysical and Geotechnical Survey Methods	2
2.1.	Geophysical Survey	2
2.2.	Geotechnical Survey	2
2.3.	Proposed Vessels	2
2.4.	Timing and Duration of Activity	3
3.	Legal Requirements	4
3.1.	Guidance	5
4.	European Protected Species in the Forth and Tay Area	6
4.1.	Cetaceans	6
4.2.	Marine Turtles	7
4.3.	Other (Non-EPS) Species	7
5.	Risk Assessment	8
6.	Mitigation Measures	13
6.1.	Pre-Work Searches	13
6.2.	Previous Licence Conditions	13
6.3.	Transit Watches	14
7.	Conclusion	15
8.	References	16

1. Introduction

Inch Cape Offshore Limited (ICOL) has consent to develop an offshore wind farm (OWF) in the outer Firth of Tay region within Scottish Territorial Waters (STW). The Development Area is located approximately 15 km to the east of the Angus coastline in water depths of between 40 - 57 m (Figure 1.1).

Prior to the installation of Inch Cape OWF, a geophysical and geotechnical survey within the Development Area concentrated at the Offshore Substation (OSS) and at and between the optimised border locations is required in order to verify seabed conditions to inform the detailed foundation design and installation methods.

This document assesses the potential risk to marine European Protected Species (EPS) and basking sharks from the proposed geotechnical and geophysical surveys in order to ascertain whether EPS and basking shark licences are required and can be awarded. Detail has also been provided for pinnipeds.

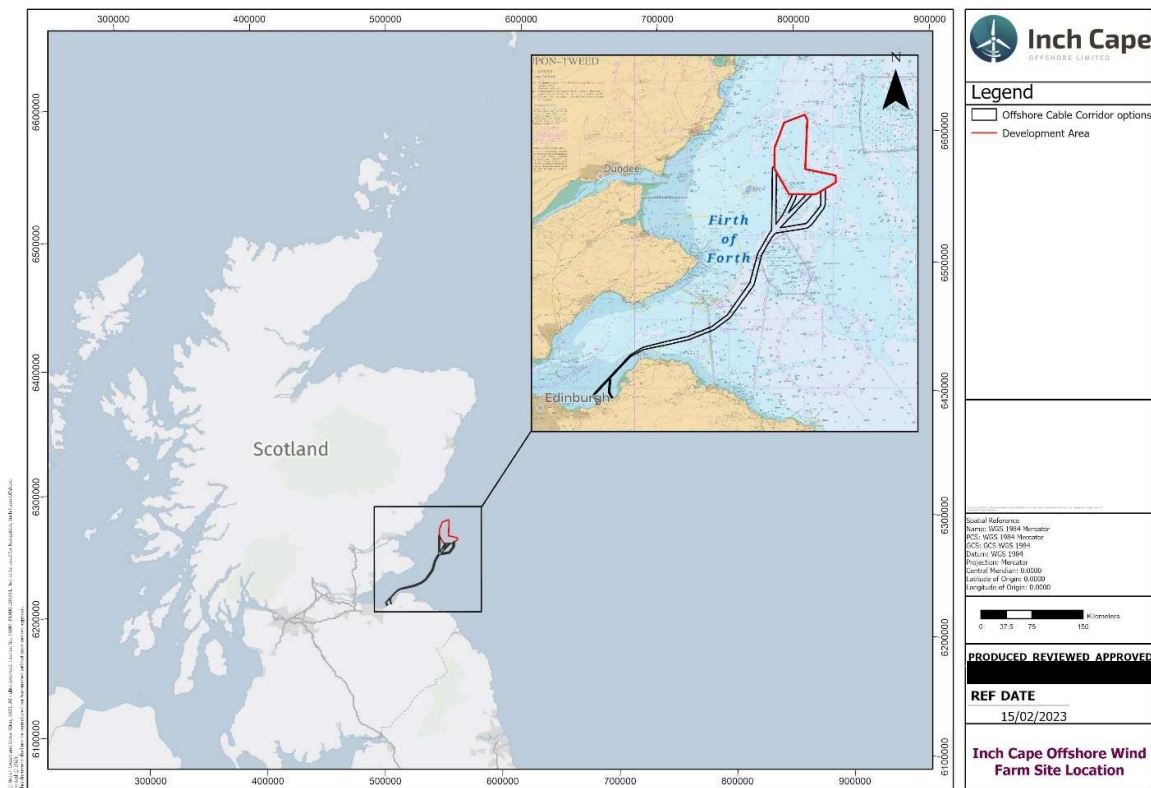


Figure 1.1: Inch Cape Offshore Wind Farm Site Location

2. Geophysical and Geotechnical Survey Methods

2.1. Geophysical Survey

The survey will be conducted using electromagnetic or acoustic tools (Table 2.1) at the OSS location and within the wider Development Area between all the proposed turbine locations to inform the placement of inter-array cables. .

Table 2.1: Equipment proposed for the geophysical survey within the Inch Cape Development Area

Equipment type	Frequency range (kHz)	Maximum Source Pressure Level (dB re 1 μ Pa @ 1 m)
Multi Beam Echo Sounder (MBES)	>200	216
Sub Bottom Profiler (SBP) - Sparker	Up to 15	149 – 225
Sub Bottom Profiler (SBP) - Pinger/chirper*	85 – 115 (HF) 2 – 22 (LF)	240 – 250
Ultra Short Baseline System (USBL) positioning equipment	19 - 34	191 – 220

*Innomar parametric sub-bottom profiler

2.2. Geotechnical Survey

Standard cone penetration tests (CPTs) will be required at each of the four corners locations of the OSS, plus at up to an additional 14 locations within the Development Area (up to 18 CPT locations in total). A target depth of thirty metre (30 m) Below Seabed (BSB) down hole sampling will be potentially required at the centre and each of the four corner locations of the OSS, plus at up to an additional 14 locations within the Development Area.

Table 2.2: Geotechnical survey work proposed within the Inch Cape Development Area

Equipment type	Frequency range	Maximum Source Pressure Level (dB (rms) re 1 μ Pa @ 1 m)	Maximum Source Pressure Level (dB (peak) re 1 μ Pa @ 1 m) ¹
Cone penetration testing (CPT)	28 Hz	166	172
Ultra Short Baseline (USBL) ²			See Table 2.1

Source: CPT frequency from Campanella et al. (1986) and SPL from Nedwell et al. (2011)

2.3. Proposed Vessels

The geotechnical survey will likely be undertaken by a single vessel, however two vessels have been included within the assessment to account for the potential for use of two vessels working to undertake geophysical and/ or

¹ NOAA's User Spreadsheet Tool (<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>) was used to convert metrics from rms to peak values. Despite limitations (e.g., accuracy reduced as distance from source increases/created for seismic sources) this conversion is considered adequate for SPL at 1 m from the sound source.

² The USBL equipment will be assessed under the geophysical survey, but any conclusions and mitigation will be applied during both surveys.

geotechnical works concurrently. An indicative, representative geotechnical survey vessel <100 m in length is assumed to be used for the surveys.

Although vessels to be used for the proposed geophysical surveys are yet to be confirmed, it is expected a smaller vessel than that used during the geotechnical works will be used for the geophysical survey.

2.4. Timing and Duration of Activity

The geotechnical survey is anticipated to take up to 30 days and the geophysical survey up to 10 days. However, there may be significant periods of downtime for weather, so this may not be continuous. Works will be undertaken 24 hrs a day where weather and equipment allow. The anticipated start date of the surveys is on or after the 1st of April 2023, with an end date no later than the 30 of September 2023.

3. Legal Requirements

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

The need to consider EPS in waters off Scotland comes from two articles of legislation, these are:

- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) which transposes the Conservation of Natural Habitats and Wild Fauna and Flora Directive (Council Directive 92/43/EEC; referred to as the Habitats Directive) into Scottish law. This legislation covers Scottish Territorial Waters; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (known as the Offshore Regulations) which transpose the Habitats Directive into UK law for all offshore activities. This legislation covers UK waters beyond the 12 nm limit.

Both of these regulations (collectively known as the 'Habitat and Offshore Marine Regulations') provide for the designation of protected European sites (SACs) and the protection of EPS as designated under the Habitats Directive.

The Offshore Regulations state in section 45, that it is an offence to:

- Deliberately capture, kill or injure any wild animal of a EPS, as listed under Annex IV of the Habitats Directive;
- Damage or destroy, or cause deterioration of the breeding sites or resting places of a EPS; and
- Deliberately disturb EPS (in particular disturbance which is likely to impair the ability of a significant group of animals of that species to survive, breed, rear, or nurture their young, or which might affect significantly their local distribution or abundance).

The Conservation of Habitats and Species Regulations 1994 (as amended in Scotland) state, under section 39, that it is an offence to:

- Deliberately or **recklessly** capture, kill or injure a wild animal of a EPS, as listed under Annex IV of the Habitats Directive;
- Damage or **recklessly** destroy, or cause deterioration of the breeding sites or resting places of an EPS; and
- Deliberately or **recklessly** disturb EPS (in particular disturbance, which is likely to impair their ability to survive, breed, reproduce, nurture their young, migrate or hibernate, or which might affect significantly their local distribution or abundance).
- Disturb any EPS in a matter that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;
- **Deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean) through Regulation 39 (2).**

The additional protection afforded by the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland) has been shown in **bold** in the list above. It is therefore an offence to deliberately or recklessly disturb a single cetacean in Scottish Territorial Waters.

In addition, any means of capturing or killing which is indiscriminate and capable of causing the local disappearance of - or serious disturbance to - any population of EPS is an offence.

Licences may be granted by Marine Scotland (on behalf of the Scottish Ministers) which would allow otherwise illegal activities to go ahead.

Three tests must be passed before a license can be granted:

1. The license must relate to one of the purposes referred to in Regulation 44;
2. There must be no satisfactory alternative (Regulation 44, 3a); and

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

FCS is defined in the Habitats Directive as the following:

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

The proposed Development Area is within the 12 nm limit of Scotland's Territorial Waters. However, sound from the proposed works has the potential to affect animals within both Scottish Territorial and Offshore waters. Both the Habitats and Offshore Regulations therefore apply.

3.1. Guidance

Draft guidance entitled 'The Protection of Marine European Protected Species from Injury and Disturbance' was first published in March 2010, with a subsequent revision dated June 2010, by the JNCC, Natural England and the Countryside Council for Wales (now the Natural Resources Wales) and is intended as resource when a view is needed as to whether there is potential for an offence of deliberately disturbing or injuring/killing a marine EPS to occur outwith 12 nm, as a result of any activity associated with the proposed works.

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

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

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

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

As a consequence of Regulation 39 (2) in the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland), disturbance that might be considered trivial through consideration of the JNCC guidance (JNCC *et al.*, 2010), and thus not be deemed to cause an offence under EPS legislation outside the 12 nautical mile Scottish Territorial limit, may require a licence to disturb EPS species within Scottish Territorial Waters. Marine Scotland and Scottish Natural Heritage (SNH) produced guidance for Scottish inshore waters 'The protection of Marine European Protected Species from injury and disturbance' in March 2014 (Marine Scotland and SNH, 2014). This guidance was updated in July 2020 (Marine Scotland and SNH, 2020). Marine Scotland recognise that the guidance represents a very precautionary approach to the interpretation of the Habitats Directive with regards to EPS '...This guidance reflects a precautionary approach...', and requires the careful examination of the potential impact of proposed offshore activities, and the resultant noise produced, on individual animals likely to be present at the location.

4. European Protected Species in the Forth and Tay Area

4.1. Cetaceans

The Small Cetaceans in European Atlantic waters and the North Sea (SCANS) III surveys were undertaken in the summer of 2016 (Hammond *et al.*, 2021). Densities for most common cetacean species encountered during the survey were estimated for the different survey blocks. The Inch Cape OWF is located within SCANS III Block R.

SCANS III surveys found harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), white-beaked dolphin (*Lagenorhynchus albirostris*), white-sided dolphin (*Lagenorhynchus acutus*) and minke whale (*Balaenoptera acutorostrata*) in this block. The SCANS III data show that harbour porpoise was the most common cetacean species in the North Sea in 2016. This is in line with other data sources (Hammond *et al.*, 2013; Reid *et al.*, 2003). Species densities and Inter-Agency Marine Mammal Working Group (IAMMWG) (2022) marine mammal management unit (MU) abundance estimates are presented in Table 4.1.

The Southern North Sea Special Area of Conservation (SAC) which lists harbour porpoise as a designated feature is approximately 203 km from the Development Area and the Moray Firth SAC designated for bottlenose dolphins is approximately 210 km. The bottlenose dolphin population is known to travel south of the SAC and individuals have a higher rate of movement from the Moray Firth SAC to the Tay estuary late summer. Whilst during early summer the rate of movement is higher from the Tay estuary to the Moray Firth SAC, individuals have also been recorded further south of the Firth of Forth (Arso Civil *et al.*, 2019; Arso Civil *et al.*, 2021).

This quantitative assessment will only consider the cetacean species which are regularly found in the Forth and Tay area (i.e., the species for which density estimates are available). Whilst not considered specifically in this assessment due to their low likelihood of occurrence, any assessment of, or mitigation measures put in place for, the species assessed are considered to be appropriate for/relevant to other less commonly occurring species of cetacean.

Table 4.1: Density and abundance estimates for species in the project area from SCANS III surveys (block R)

Species	SCANS III density estimate	MU	Abundance of animals in MU
Harbour porpoise	0.599	North Sea (NS)	346,601
Bottlenose dolphin*	0.0298	Coastal East Scotland (CES)	224
		Greater North Sea (GNS)	1,885
White-beaked dolphin	0.243	Celtic and Greater North Sea (CGNS)	43,951
White-sided dolphin	0.01	CGNS	18,128
Minke whale	0.0387	CGNS	20,118

*The Development Area is located within both the Coastal East Scotland and Greater North Sea MU for bottlenose dolphins therefore both abundance estimates have been used in this assessment.

4.2. Marine Turtles

In addition to marine mammals, there are up to five species of marine turtle which have been sighted in British waters. The leatherback turtle (*Dermochelys coriacea*) is the most commonly recorded species in UK waters however the species is thought to be at the most extreme northern limit of its natural range in UK waters (BEIS, 2016). Sightings in the North Sea are uncommon, with most UK sightings occurring in the Irish Sea (BEIS, 2016). Due to the low likelihood of occurrence of marine turtles in the vicinity of the Inch Cape OWF, they have not been considered further. However, any mitigation proposed for cetacean EPS will also be applied to marine turtles.

4.3. Other (Non-EPS) Species

4.3.1. Basking Sharks

Basking sharks are protected under Schedule 5 of the Wildlife and Countryside Act 1981. There have been few sightings of this species in the North Sea (Drewery, 2012; Wilson *et al.*, 2020) which indicates a low abundance in the vicinity of the Inch Cape OWF. Due to their habit of feeding at slow speed very close to the surface, basking sharks are potentially at risk from collision with boat traffic (Wilson *et al.*, 2020). In contrast, although there is little information on sound detection in basking sharks, there is no direct evidence of sound causing basking shark mortality or stress (Wilson *et al.*, 2020). Although the potential effects of noise on basking sharks have not therefore been assessed, any mitigation measures proposed for EPS will also be applied to basking sharks.

4.3.2. Pinnipeds

There are two species of seal found in UK waters, grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*). The approximate number of seals estimated to be present within 5 km of the Inch Cape Development Area is 538 grey seals and 2 harbour seals (Carter *et al.*, 2020). The closest harbour seal SAC is the Firth of Tay and Eden Estuary SAC which is approximately 25 km from the Development Area. The most recent harbour seal count from this SAC was in 2020 with an estimated 37 individuals (SCOS, 2021). The population trend for this SAC is declining (SCOS, 2021).

The closest grey seal SACs are the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC which are approximately 32 km and 52 km respectively from the Development Area. Both these SACs are important as breeding colonies for pupping and mating between late September and January. Pup production is increasing in the Berwickshire and Northumberland Coast SAC (4,499 in 2019) and stable/declining in the Isle of May (1,885 in 2019) (SCOS, 2021). These colonies/SACs are little used at other times of the year as evidenced by the latest summer counts of 40 (Isle of May in 2016) and 71 (Berwickshire and North Northumberland Coast SAC in 2018).

At-sea usage maps (Russell *et al.*, 2017) predict low (4 – 9 individuals per 5 km x 5 km grid cell) usage of the site by grey seals and very low to low (<1 per 5 km x 5 km cell) usage by harbour seals with the exception of the very northern extent of the site which has a slightly higher usage of 8 seals. Habitat preference maps (Carter *et al.*, 2020) which show the percentage of British Isles at-sea seal population per 25 km² indicate approximately 0.01 – 0.05 of grey seals and approximately 0.001 – 0.005 harbour seals are within the Development Area.

5. Risk Assessment

Impacts on marine mammals, turtles and basking sharks are considered to have the potential to arise through increases in anthropogenic noise or increased collision risk from vessels undertaking the work.

Increased anthropogenic noise from the survey vessels themselves has been considered as a potential impact but has not been assessed individually. This is because noise from the two survey vessels is unlikely to significantly increase vessel noise in this area and any displacement due to noise from the survey vessels alone is likely to be small-scale and temporary. The vessels will be on survey, and therefore emitting other sounds, for the majority of the time they are at sea. This potential impact (increased anthropogenic noise from geophysical/geotechnical surveys and positioning equipment) has been assessed.

5.1.1. Overview of the Potential Effects of Underwater Noise on Marine Mammals

Potential effects of underwater noise on marine mammals can be summarised as:

- Auditory injury; and
- Behavioural responses.

Marine mammal species have different hearing sensitivity thresholds resulting in different species detecting underwater noise at varying frequency bands (Table 5.1). There is only considered to be potential for effect (either auditory injury or behavioural responses) where the frequency range of the equipment or activity overlaps with the hearing range of the different functional groups.

Table 5.1: Auditory range for the four different marine mammal hearing groups

Hearing group (Southall <i>et al.</i> , 2019)	Relevant species	Estimated auditory bandwidth (kHz)
Low frequency cetaceans	Minke whale	0.007 – 35
High frequency cetaceans	Bottlenose dolphin White beaked dolphin	0.15 – 160
Very high frequency cetaceans	Harbour porpoise	0.2 – 180
Phocid pinnipeds	Harbour seal Grey seal	0.5 – 86

Source: NOAA (2018), Southall *et al.* (2007)

Auditory Injury

Southall *et al.* (2019) and NOAA (2018) provide (the same) thresholds for received sound levels that have the potential to cause auditory injury (Permanent Threshold Shift – PTS) in marine mammals (Tables 5.2 and 5.3). These thresholds are based on unweighted, instantaneous peak sound pressure levels (SPLs).

Table 5.2: Comparison of PTS thresholds – SPLs (dB re 1 µPa @ 1 m) – for assessing the potential for injury to occur instantaneously

Hearing group (Southall <i>et al.</i> , 2019)	Example species	Non-pulsed sound*	Pulsed sound
Low frequency cetacean	Minke whale	230	219
High frequency cetacean	Bottlenose dolphin White beaked dolphin	230	230

Hearing group (Southall <i>et al.</i> , 2019)	Example species	Non-pulsed sound*	Pulsed sound
Very high frequency cetacean	Harbour porpoise	230	202
Phocid pinnipeds	Harbour seal Grey seal	218	218

*Values taken from Southall *et al* (2007)

Behavioural Responses

Assessment of the potential for a behavioural response has used information from various sources e.g., Thompson *et al.* (2013), Nedwell *et al.* (2011) and JNCC (2020).

5.1.2. Increased Anthropogenic Noise from Geophysical Survey and Positioning Equipment

The geophysical survey and positioning equipment used during the survey will increase levels of anthropogenic noise in the marine environment as it operates by producing and receiving sound. A summary of the equipment types proposed for use is provided in Table 2.1.

5.1.2.1. Prediction of Impacts

Auditory Injury

The maximum source levels of all pieces of equipment, with the exception of the MBES, have the potential to induce the onset of instantaneous PTS at very close range for very high frequency cetaceans, low frequency cetaceans and pinnipeds (Table 5.3). The only piece of equipment which has the potential to impact high frequency cetaceans (i.e., the dolphin species) is the SBP (Innomar). The presence of the survey vessel itself will likely cause temporary displacement of marine mammals from the zone of potential effect reducing the potential to induce the onset of PTS.

Standard mitigation measures (Section 6) shall be implemented for these pieces of sound emitting equipment (SBP and USBL) to ensure that the potential for PTS onset can be considered to be negligible. Should the SBP (sparker) or USBL be able to operate (and be operated) below 202 dB re 1 μ Pa @ 1 m (the lowest level which has the potential to induce the onset of auditory injury) then mitigation will only be required for the SBP (Innomar).

Table 5.3: Potential for PTS and/or a behavioural response from geophysical survey equipment

Equipment Type	Potential for PTS	Potential for a behavioural response
MBES	Outwith hearing range	
USBL	Yes – mitigation required	Yes
SBP (Sparker)	Yes – mitigation required	Yes
SBP (Innomar)	Yes – mitigation required	Yes

Behavioural Responses

The sound emitted by the MBES will not be audible to marine mammals because the frequencies over which the equipment operates (Table 2.1) are greater than the higher frequency hearing cut-offs for each of the functional hearing groups (Table 5.1).

It is possible that the SBP (sparker and Innomar) and USBL may be detected by cetaceans and pinnipeds and therefore their use may have the potential to cause behavioural responses e.g., disturbance and/or displacement.

The most likely response will be temporary behavioural avoidance (there is evidence that short-term disturbance caused by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoises (Thompson *et al.*, 2013)).

Using information from this study, where harbour porpoise responses to geophysical (seismic) survey vessels in the Moray Firth were observed over ranges of 5 to 10 km, the number of individuals which have the potential to be affected has been estimated (Table 5.4). The use of a 10 km deterrence range is considered to result in highly conservative estimates because the noise levels produced by the oil and gas exploration surveys will be well in excess of those produced during the use of the equipment described here. Therefore, for the purposes of this assessment, a potential impact range of 5 km is considered appropriate to represent the worst-case for USBL and SBP (sparker and Innomar). This is in line with the recommended effective deterrence range for geophysical surveys for harbour porpoise (JNCC, 2020).

The area of potential effect was estimated using the formula $area = \pi r^2 = 78.54 \text{ km}^2$. The number of animals of the different species estimated to have the potential to display temporary behavioural avoidance (see Table 5.4) was estimated using the densities in Table 4.1. The percentage of the reference population estimated to have the potential to be affected was less than 1% for all of the main cetacean species occurring within the area of potential effect (see Table 5.4) except for the coastal (i.e., Coastal East Scotland population) bottlenose dolphin population. However, their distribution is coastal rather than being concentrated 15 km from the coast (see Robinson *et al.*, 2009; Quick and Cheney, 2011; Hastie *et al.*, 2003).

There is therefore considered to be potential for temporary behavioural avoidance as a result of the use of seismic sources during the geophysical surveys. However, any such avoidance is very unlikely to significantly affect the local distribution or abundance of any of the species concerned.

Table 5.4: The number of individuals estimated to have the potential to be disturbed by USBL systems and SBP (sparker and Innomar)

Species	Number of individuals within the area of potential effect	Percentage of reference population which has the potential to be affected
Harbour porpoise	47	0.01
White-beaked dolphin	19	0.04
White-sided dolphin	1	0.004
Bottlenose dolphin	2	1.04 (CES) 0.12 (GNS)
Minke whale	3	0.02

5.1.3. Increased Anthropogenic Noise from Geotechnical Survey Work

Geotechnical surveys and the associated works may increase anthropogenic noise in the marine environment, which in turn has the potential to affect marine mammals. The potential impact of the geotechnical surveys is thought to be of low concern in terms of disturbance to EPS (JNCC, 2010).

CPT works (Table 2.2) may be within audible range for low frequency cetacean species in the area (Table 5.1). However, the number of CPT samples anticipated during the works is small, with SPL levels unlikely to exceed 172 dB re 1 μPa @ 1 m (Table 2.2; Nedwell *et al.*, 2011).

5.1.3.1. Prediction of Impacts

Auditory Injury

Instantaneous, rather than cumulative, PTS was considered because information on SPLs, rather than SELs, was available from equipment manufacturers. Additionally, Southall *et al.* (2019) does not provide SPLs for non-pulsed sounds (Table 5.2) therefore 230 dB re 1 μ Pa (Southall *et al.*, 2007) has been used. The maximum source pressure levels of the CPT (Table 2.1) do not have the potential to induce the onset of auditory injury (PTS) even at very close range.

The potential for auditory injury as a result of the geotechnical survey is therefore considered to be negligible.

Behavioural Responses

During site specific modelling (Nedwell *et al.*, 2011), it was found that the CPT noise levels were only slightly louder than the mean background noise in the region, therefore it is highly unlikely that this survey would have a significant effect on EPS in the area. It is considered that the noise levels from the survey vessel will be the main noise source during the geotechnical survey work. Vessel activity is not likely to significantly increase vessel noise in this area and any displacement due to noise from the survey vessels alone is likely to be small-scale and temporary.

5.1.4. Vessel Collision Risk Assessment

Vessel strikes are a known cause of mortality in marine mammals, marine turtles and basking sharks (Laist *et al.*, 2001; Foley *et al.*, 2019; Wilson *et al.*, 2020). Non-lethal collisions have also been documented (Laist *et al.*, 2001; Van Waerebeek *et al.*, 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections or predation.

Avoidance behaviour by cetaceans is often associated with fast, unpredictable boats such as speedboats and jet-skis (Bristow and Reeves, 2001; Gregory and Rowden, 2001; Leung Ng and Leung, 2003; Buckstaff, 2004), while neutral or positive reactions have been observed with larger, slower moving vessels such as cargo ships (Leung Ng and Leung, 2003; Sini *et al.*, 2005).

The proposed survey work will require one or two vessels which will either be stationary (when sampling) or transiting (between sampling locations) for geotechnical surveys and one vessel following predetermined lines for geophysical surveys. There is no risk of collision when the vessels are stationary. The consistent speed and direction of travel employed by transiting and surveying vessels will mean that animals can predict the path of vessels and potentially alter their direction of travel, thus reducing the risk of collision. Additionally, the presence of the survey vessel or vessels is unlikely to significantly increase the vessel traffic in the area. Therefore, the increase in potential collision risk for marine mammals, turtles and basking sharks is considered to be negligible.

5.1.5. Potential Impacts on Designated Sites

Both the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (see Table 5.5) were designated because they are important breeding areas for grey seals. The timing of the anticipated survey works (01 April 2023 to 30 September 2023) is outside the peak breeding season for these colonies (mid-October to mid-December). Grey seals generally remain within 20 km of colonies during the breeding season and therefore, even accounting for the 5 km EDR, the likelihood of disturbance to the breeding population is negligible.

The bottlenose dolphin population which uses the Moray Firth SAC also uses the Tay estuary and Firth of Forth. However, as this population is generally found in coastal waters, the survey work (which is being carried out a minimum of 15 km from shore) will have a negligible impact on bottlenose dolphins.

The Southern North Sea SAC is 203 km from the Development Area and accounting for the 5 km EDR, there is no potential for impacts on this designated site during the proposed survey works.

The Firth of Tay and Eden Estuary is 25 km from Development Area and has the potential to overlap with foraging ranges of harbour seals (Sharples *et al.*, 2012; Tollit *et al.*, 1998). However, during the August moulting season (Morris *et al.*, 2019) harbour seals remain hauled out for an average of 72% of their time (SCOS, 2011). Harbour seals tagged in this area showed relatively local foraging ranges and high site fidelity (Sparling *et al.*, 2012). Due to this, in addition to the short temporal scale of these surveys, the potential for impacts on this designated site is negligible.

Figure 5.5: Relevant designated sites which have the potential to be impacted from increased anthropogenic noise

Relevant designated site (SAC)	Relevant designated feature	Distance from proposed works (km)
Moray Firth	Bottlenose dolphin	208
Southern North Sea	Harbour porpoise	203
Firth of Tay and Eden Estuary	Harbour seal	25
Isle of May	Grey seal	33
Berwickshire and North Northumberland Coast	Grey seal	52

Special Protection Areas (SPAs) in the vicinity of the works include Forth Islands SPA (approx. 29 km), Firth of Tay and Eden Estuary SPA (approx. 26 km), Montrose Basin SPA (approx. 20 km) and Outer Firth of Forth and St Andrews Bay Complex SPA (approx. 10 km). As the surveys are short in duration, localised and do not overlap with any SPA there will be no likely significant effect on the sites and their qualifying features.

6. Mitigation Measures

Standard mitigation measures, as detailed in the “JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys” (JNCC, 2017), will be followed to minimise the potential for PTS onset to arise as a result of operation of the SBP (sparker/Innomar) and USBL. Should the SBP (sparker) or USBL be able to operate (and be operated) below 202 dB re 1 μ Pa @ 1 m (the lowest level which has the potential to induce the onset of auditory injury) then mitigation will only be required for the SBP (Innomar). Standard measures include pre-work searches, soft starts (where equipment has the capability) and protocols regarding line changes and breaks in operation. Mitigation measures will be implemented for EPS (including marine turtles), basking sharks and pinnipeds.

6.1. Pre-Work Searches

At least one dedicated Marine Mammal Observer (MMO) and/or Passive Acoustic Monitoring (PAM) operator will be available to undertake pre-work searches of 30 minutes in length prior to use of the SBP (sparker and Innomar) and USBL when operated above 202 dB re 1 μ Pa @ 1 m.

Visual searches of a 500 m radius mitigation zone will be conducted when weather conditions, daylight and sea state allow. During the hours of darkness, or when visual observation is not possible due to weather conditions or sea state, a proven PAM system (and operator) will be used.

If marine mammals are detected within the mitigation zone during a pre-work search (either visually or acoustically) or during a search after an unplanned break, the start of work will be delayed until their passage, or the transit of the vessel, results in them being outside the mitigation zone. There will be a minimum of 20 minutes from the time of the last detection within the mitigation zone to the commencement of the work. A soft-start procedure and ramp up will be carried out for the SBP, if the equipment has the capability.

As per the 2017 JNCC guidelines, unplanned breaks refer to instances where the equipment ceases pinging unexpectedly during operations. In these instances:

- Work will resume without a pre-work search after unplanned breaks of 10 minutes or less provided that no animals are detected in the mitigation zone during the breakdown period; and
- A full pre-work search will be conducted before work resumes after unplanned breaks of longer than 10 minutes. Any time the MMO/PAM operator has spent observing prior to the breakdown period will contribute to the pre-work search time.

Clear channels of communication between the MMO/PAM operator and relevant crew will be established prior to commencement of any operations. The MMO/PAM operator will be informed sufficiently in advance of any proposed work so that a full pre-work search can be completed prior to work commencing.

6.2. Previous Licence Conditions

Previously specified licence conditions (licence EPS/BS-00009543) received from Marine Scotland will be adhered to. Relevant conditions are as follows:

- The Licensee must ensure that, in the last two weeks of July and the first two weeks of August, vessels should, as far as is practicable, employ slow speeds, steady courses and avoid sailing through large rafts of birds on the sea.
- The Licensee must ensure that in the months of September to December inclusive, any survey work within 20 km of the Isle of May Special Area of Conservation starts during daylight hours and in good sea states, defined as Beaufort 3 or lower. However, please note that it is not anticipated that any survey works will be undertaken within 20 km of the Isle of May SAC.

6.3. Transit Watches

A nominated competent observer on the bridge of all vessels will keep watch for marine mammals, turtles, basking sharks and seals during all transits to and from the work sites (including between CPT locations). Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:

- The Master of the vessel will ensure that animals are avoided to a safe distance (100 m or more) where possible; and
- The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

7. Conclusion

This assessment of the potential impacts on marine EPS, pinnipeds and basking sharks from activities associated with geophysical and geotechnical survey work for the Inch Cape OWF concludes that:

- The potential for auditory injury is considered to be negligible after implementing mitigation measures;
- There is considered to be potential for a temporary behavioural response by a small number of animals as a result of the proposed geophysical and geotechnical survey work (use of USBL and SBP (Innomar and sparker));
- The potential for collision is considered to be negligible; and
- There is no potential for negative impacts on designated sites.

In the context of the Regulations applicable to STW, this potential for a temporary behavioural response by a small number of animals constitutes an offence. However, this action is not considered to be detrimental to the maintenance of the populations of the species concerned at a FCS in their natural range. Therefore, it is considered that an EPS licence covering use of SBP and USBL within STW can be granted.

In the context of the Regulations applicable to UK waters beyond 12 nm offshore, this potential for a temporary behavioural response by a small number of animals does not constitute an offence. Therefore, an EPS licence is not required for waters outwith the 12 nm limit.

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