European Protected Species (EPS) Risk Assessment
KINCARDINE OFFSHORE WINDFARM PROJECT

Prepared	Checked	Reviewed	Approved
30/11/2020	30/11/2020	30/11/2020	30/11/2020
Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL
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Revision History

Date	Rev. Status	Purpose of Issue*	Remarks	Initials
30-11-2020	A1	Internal Review	Issued for Internal Review	CF
30-11-2020	B1	Issue to MS-LOT	No updates	CF

*Purpose of Issue: for information, for review, for approval

Detailed Change Log

Date	Rev. Status	References	Description of changes	Initials
30.11.2020	A1	-	INTERNAL REVIEW	CF
30.11.2020	B1	-	No further changes	CF

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ACRONYMS, ABBREVIATIONS and DEFINITIONS

AOWFL	Aberdeen Offshore Windfarm Limited
DVL	Doppler Velocity Log
EOWDC	European Offshore Wind Deployment Centre
EPS	European Protected Species
HDD	Horizontal Directional Drilling
HiDef	High Definition
Hz	Hertz
JNCC	Joint Nature Conservation Committee
kHz	Kilohertz
KOWL	Kincardine Offshore Wind Limited
M	Marine Mammal
MHWS	Mean High Water Springs
MMO	Marine Mammal Observer
MS-LOT	Marine Scotland Licencing and Operation Team
MW	Megawatt
OAS	Object Avoidance Sonar
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SFF	Scottish Fishermen's Federation
SSC	Suspended Sediment Concentrations
TTS	Temporary Threshold Shift
USBL	Ultra-Short Base Line
WROV	Work Class Remotely Operated Vehicle
WTG	Wind Turbine Generator

1. INTRODUCTION

1.1. Purpose of the Document

The Marine Scotland Guidance document on 'The Protection of Marine European Protected Species from Injury and Disturbance' (Marine Scotland, 2014) outlines that construction works (including UXO removal) have, in certain situations, the potential to be associated with the disturbance, injury and/or killing of cetaceans and thus require a European Protected Species (EPS) Licence. Due to the nature of the Project, the majority of the construction works for the Project will take place in port, there is, however, some limited activity that will be undertaken on site for the removal of a UXO located in close proximity to the KIN-02 structure.

This document has been authored to accompany the EPS licence application to Marine Scotland Science Licensing and Operations Team (MS-LOT) relating to the removal of an Unexploded Ordnance (UXO). This document assesses the neutralisation of the UXO.

1.2. Project Overview

The Project is considered a commercial demonstrator site, which will utilise floating foundation technology, and will be the world's second floating wind turbine farm array. It has been included within the Survey, Deploy and Monitoring scheme for offshore renewable systems (similar to wave and tidal devices).

The Project is located south-east of Aberdeen approximately 8nm (15km) from the Scottish coastline, in a location that provides suitable water depth for a floating offshore wind demonstrator development (approximately 60-80m) (Figure 1-1).

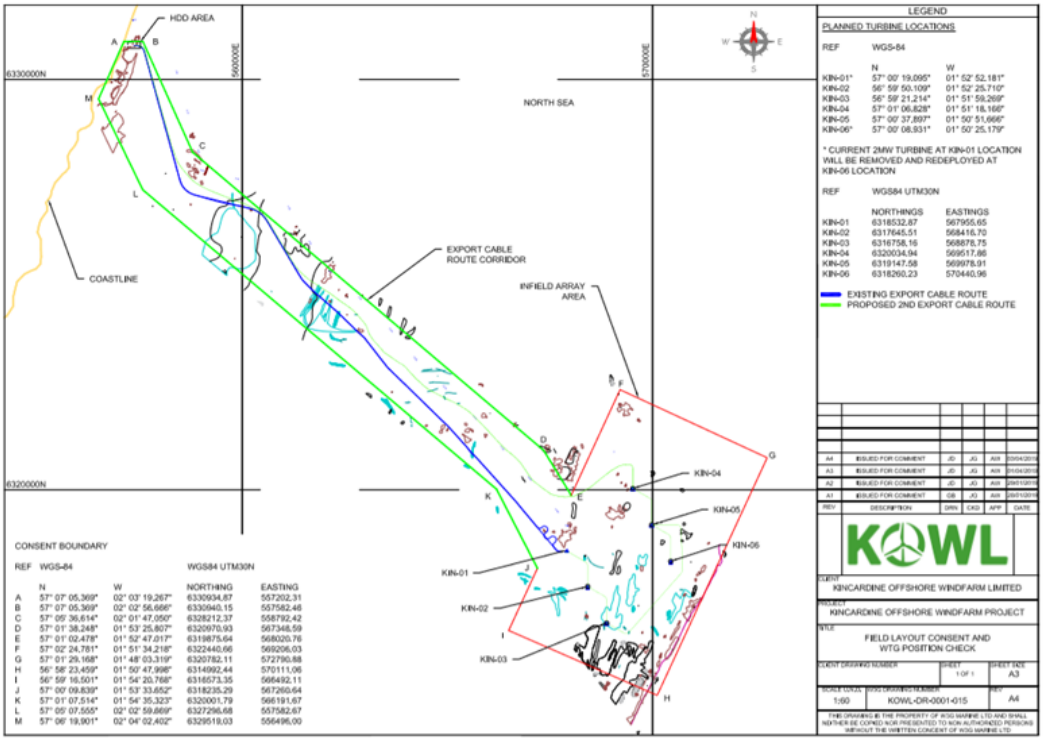

Figure 1-1 KOWL Site showing Development Area and Export Cable Corridor

The project is split into the following areas:

- The Development Area – the wind farm area including the WTGs and inter-array cables.
- The Offshore Export Cable Corridor – the area within which the proposed export cables will be laid, from the perimeter of the Development Area to the onshore area at Mean High Water Spring (MHWS).
- The Onshore Area – the onshore area above MHWS including the underground cables connecting to the onshore substation at Redmoss.

Construction Programme Overview

The construction of the Project is anticipated to occur in 'Tranches' in-line with the indicative Programme outlined below. A final Construction Programme for each tranche will be provided to Scottish Ministers prior to commencement of the construction as a requirement of the consent conditions.

Table 1-1 Indicative Construction Programme

Tranche	Activities	Indicative Start Dates
Tranche 1	Onshore works and HDD drilling Mooring installation Turbine Location 1 Export Cable 1 installation Installation of 2MW turbine to Location 1	Completed 2018
Tranche 2	Export Cable 2 installation Mooring installation Turbine Locations 1-5 Installation of inter-array cables Locations 1-6 Installation of turbines to Locations 1-6 Move 2MW to Location 6 (dependent on recertification and consultation as noted above)	Completed Completed Qtr 1-2: 2021 Dec 2020 – May 2021 Qtr 3 2020 – May 2021

2. LEGISLATIVE BACKGROUND

The Habitats Regulations 1994 implement certain requirements of the European Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) in Great Britain. Animals listed in Annex IV(a) of the Habitats Directive, whose natural range includes any area in Great Britain, are also listed in Schedule 2 of the Habitats Regulations as European Protected Species (EPS) of animals. They are species of European Community interest in need of strict protection.

Regulation 39 (1) of The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) makes it an offence to:

a) deliberately or recklessly to capture, injure, or kill a wild animal of a European Protected Species;

b) deliberately or recklessly –

i. to harass a wild animal or group of wild animals of a European Protected Species;

ii. to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;

iii. to disturb such an animal while it is rearing or otherwise caring for its young;

iv. to 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. to 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. to 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. to disturb such an animal while it is migrating or hibernating.

Due to the differing lifestyles of cetaceans and the small amount we know about them, the law gives them further protection through an additional disturbance offence.

Regulation 39(2) provides that it is an offence to – Deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean).

In order to commit an offence under regulation 39, the impact on the species must be certain or real. The activity concerned must have a "negative or adverse" impact on the conservation status of the species.

Regulation 39(1)(b)(v) specifies disturbance which is likely 'to significantly affect the local distribution or abundance of the species to which it belongs.' The Commission Guidance suggests that, for a significant effect on the local distribution or abundance of a species to occur, disturbance would need to produce more than a transient effect. Although the effect of the disturbance does not need to be permanent, it would need to have a significant effect at the time to fall within Regulation 39(1)(b)(v) of the Habitats Regulations.

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

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

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

3. DETAILS OF PREVIOUS RELEVANT LICENCES

The European Protected Species Licence MS EPS 13 2020 00 was granted to KOWL on 1st May 2020, valid until May 2021.

4. BASELINE INFORMATION

4.1. Construction Works (UXO Removal)

The Explosives Ordnance Disposal (EOD) operation will be carried from a designated construction vessel, to be called the principle vessel. The principle vessel will have a crane and include a work class ROV. The EOD operation site will be 1200m radius centred on the position of the UXO. This site will be controlled by the EOD superintendent from the principle vessel.

The wind farm site guard vessel will be deployed keep passing traffic away from the site and to stand by at a safe stand-off distance as directed by the EOD Superintendent. During the EOD disposal operation, no other construction vessels will be inside the controlled area.

The principle vessel will set-up in position at the requisite safe range of ~350m from the intended target., all other vessels shall be outside the exclusion zone. Appropriate notifications and broadcasts will be made throughout EOD operations, as well as use of MMO's who will be using passive acoustic monitoring (PAMS) and acoustic deterrent device (ADD) equipment from the principle vessel, which will ensure minimal environmental impact.

The UXO will be neutralised with the use of an EOD Disruptor. The EOD disruptor is deployed and positioned with a stabilising concrete clump weight, by using the WROV. The disruptor will be positioned at a suitable distance (~1m) from the UXO.

The WROV is recovered to the principle vessel which will retire to a position outside the 1200m exclusion zone. After confirming the safety measures are applied, the Disruptor is fired, and the UXO neutralised.

After the UXO has been neutralised, the WROV is deployed for an as left survey, and any large debris is recovered.

Construction Timings

It is anticipated that the works will be completed within a 3-6-day time frame. This does not include delays such as unsuitable weather conditions, crew changes and vessel transit times between port and areas of construction. Also, at the time of writing this document the timing was still to be decided, but for the purposes of this assessment is it assumed that it will be undertaken in 2021.

Table 4-1 Programme neutralisation of UXO

Activity	Earliest Start Date	Latest Finish Date	2021							
			J	F	M	A	M	J	J	A
Neutralisation of UXO	**February 2021**	**End June 2021**		x	x	x	x	x		

4.2. Cetacean Information

The sea off Aberdeen is an important area for cetaceans, with up to fifteen species recorded from sighting or stranding records in Aberdeen Bay and the surrounding area. The abundance of marine mammal species that are known to occur or have been previously recorded in the Aberdeen Bay area are shown in Table 4-2. A summary of the presence, seasonal occurrence and seasonal sensitivities of these species is shown in Table 4-3.

Bottlenose Dolphins, Harbour Porpoises, White-beaked Dolphins, Minke Whales, Risso's Dolphins occur regularly in the area, with other species only being recorded occasionally or rarely (Aberdeen Offshore Windfarm Limited (AOWFL), 2012; European Offshore Wind Deployment Centre (EOWDC) surveys).

Table 4-2 Summary of abundance of marine mammals within Aberdeen Bay and Surrounding Area (AOWFL, 2012)

Common Name	Latin Name	Abundance
Bottlenose Dolphin	*Tursiops truncates*	Common / Regular
Harbour Porpoise	*Phocoena phocoena*	Common / Regular
White-beaked Dolphin	*Lagenorhynchus albirostris*	Common / Seasonal
Minke Whale	*Balaenoptera acutorostrata*	Common Seasonal
White-sided Dolphin	*Lagenorhynchus acutus*	Occasional
Killer Whale	*Orcinus orca*	Rare
Common Dolphin	*Delphinus delphis*	Infrequent / Rare
Risso's Dolphin	*Grampus griseus*	Occasional
Striped Dolphin	*Stenella coeruleoalba*	Rare
Long-finned Pilot Whale	*Globicephala melas*	Infrequent / Rare
Sperm Whale	*Physeter microcephalus*	Infrequent / Rare
Humpback Whale	*Megaptera novaeangliae*	Rare
Fin Whale	*Balaenoptera physalus*	Rare
Sowerby's Beaked Whale	*Mesoplodon bidens*	Rare
Northern Bottlenose Whale	*Hyperoodon ampullatus*	Rare

Table 4-3 Summary of the presence, seasonal occurrence and seasonal sensitivities of marine mammals in the Aberdeen Bay and surrounding area (AOWFL, 2012)

Species	Presence	Seasonal Occurrence											
		J	F	M	A	M	J	J	A	S	O	N	D
Bottlenose Dolphin	Regular				*		*	*	*	*			
Harbour Porpoise	Regular				*	*	*	*	*	*			
White-beaked Dolphin	Regular / Seasonal						*	*	*				
Minke Whale	Regular												
White-sided Dolphin	Occasional												
Killer Whale	Rare												
Common Dolphin	Occasional												
Risso's Dolphin	Occasional / Regular												
Striped Dolphin	Rare												
Long finned pilot Whale	Occasional												
Sperm Whale	Rare												
Humpback Whale	Rare												
Fin Whale	Rare												
Northern Bottlenose Whale	Rare												
Sowerby's Beaked Whale	Rare												
Key	Present in area (sighting and / or stranding)												
	Peak abundance												
	Potential to be present in the area												
	Seasonal sensitivities (e.g. calving period)	*											

This published data has been supplemented with Project specific data collection. A series of monthly aerial surveys were commissioned by KOWL to monitor bird and marine mammal species and abundances within the Development Area and Offshore Export Cable Corridor during 2013 and 2014. The survey methods used were agreed with Marine Scotland. The survey transects are shown in Figure 3-1. A summary of cetacean species abundance recorded over the HiDef aerial survey period (May 2013 – September 2014) is provided in Table 4-4.

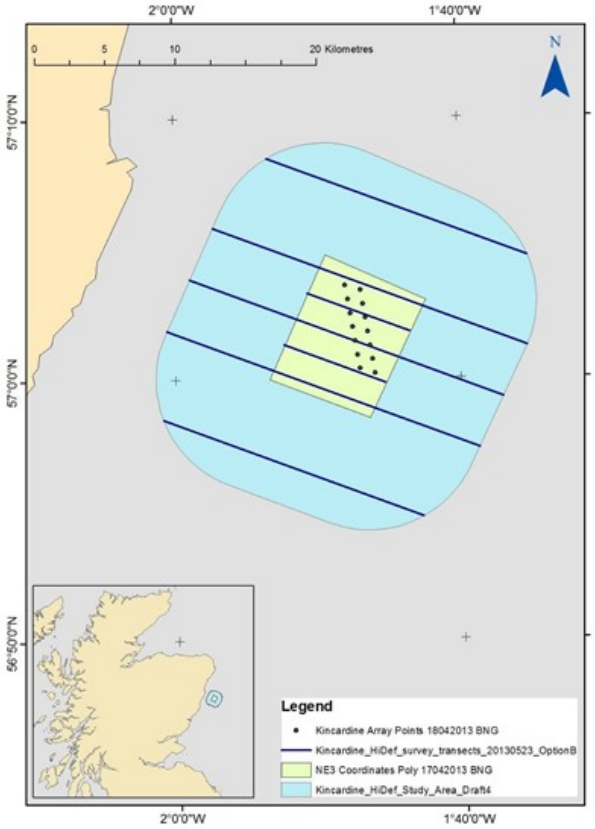

Figure 3-1 HiDef Aerial Survey Flight Plan showing transects

Table 4-4 Summary of aerial survey effort and species observations

Survey Date	Harbour Porpoise	Minke Whale	White-Beaked Dolphin
May 2013	0	0	0
May 2013*[1]	13	1	0
June 2013	7	0	0
July 2013	15	0	9
September 2013	2	0	0
October 2013	6	0	0
October 2013*	2	0	0
December 2013	5	0	0
January 2014	6	0	0
February 2014	8	0	0
March 2014	1	0	0
April 2014	0	0	0
May 2014	17	1	0
July 2014	5	0	0
August 2014	2	0	0
September 2014	0	1	0
Total	**89**	**3**	**9**

Abundance estimates of species in the Kincardine survey area during the HiDef aerial surveys are illustrated in

[1] Survey methods used were discussed with Marine Scotland and the initial transect plan was amended after the first survey to include two additional short transects in the 'high interest area', following comments from Marine Scotland in May 2013.

Table 4-5. Harbour Porpoise abundance estimates have been adjusted to account for availability bias, and thus provide an assessment of true abundance rather than relative abundance for diving species. The density, total estimated population, along with upper and lower 95% confidence intervals for each species group have been calculated using strip transect analysis and rounded to two decimal places.

Table 4-5 Abundance estimates of species in the Kincardine Survey Area during combined monthly surveys between April 2013 and September 2014

Category	Density Estimate (n/km^2)	Population Estimate (Number)	Lower 95% Confidence Limit of Population (number)	Upper 95% Confidence Limit of Population (number)
Minke Whale	0.00	2	0	4
White-Beaked	0.01	5	1	11
Harbour Porpoise*	0.29	157	115	203

*Adjusted monthly density and population estimates for Harbour Porpoise in the Kincardine survey area taking account of the potential numbers of animals that might have been unavailable for detection using only surfacing animals.

4.3. Distribution and Behaviour of Cetaceans

The below text summarises the distribution and behaviour of cetacean species that are regularly or occasionally present within Aberdeen Bay area, as identified in Table 4-3. Species that are rarely present have not been included and are not considered further in this assessment. This includes killer whales, striped dolphins, sperm whales, humpback whales, fin whales, northern bottlenose whales and Sowerby's beaked whale. For these species the area off north-east Scotland appears to be only a marginal part of their habitat, which is likely to be inhabited only during a restricted part of the year by relatively few individuals. **This means that the UXO removal is unlikely to result in a significant effect on the local distribution or abundance of these species**.

Harbour Porpoise (*Phocoena phocoena*)

Harbour Porpoise were the most recorded cetacean species during the AOWFL / EOWDC surveys with 390 observations consisting of 655 individuals recorded. They were also the most frequently recorded cetacean species during the HiDef aerial surveys, with 89 observations recorded over the total survey period (Table 4-4).

Harbour Porpoise have a wide range and distribution in both coastal and offshore areas (Figure 3-2). Although peak occurrence is between August and September, Harbour Porpoise are known to occur in the Aberdeen area throughout the year (AOWFL, 2012; EOWDC surveys).

The peak calving season for Harbour Porpoise in Scottish waters is between April and June. Calves have been observed off Aberdeenshire between May and September, indicating a possible increased sensitivity to any potential disturbance during this time (AOWFL, 2012; EOWDC surveys).

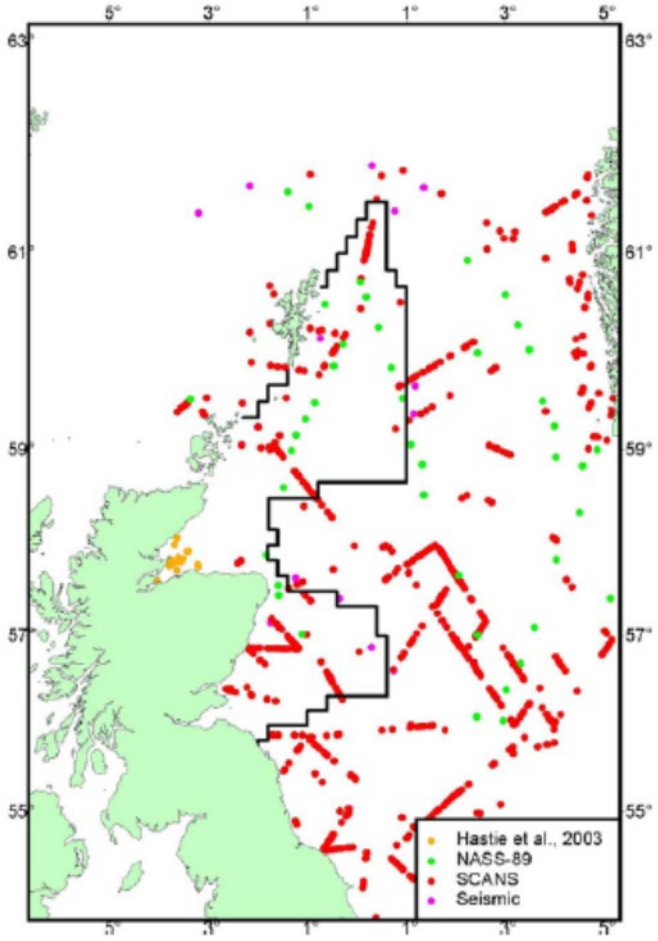

Figure 3-2 Harbour Porpoise sightings made from various surveys, AOWFL, 2012

Bottlenose Dolphin (*Tursiops truncatus*)

Bottlenose Dolphins are generally found within coastal waters, although they have been observed in offshore areas off north-east Scotland (Figure 3-3). Bottlenose Dolphins have been observed off Aberdeen throughout the year (AOWFL, 2012; EOWDC surveys). Although there appears to be an increase in occurrence between October and May (Quick *et al*., 2014).

Bottlenose Dolphins were the second most frequently sighted cetacean species during the EOWDC surveys, with a total of 25 observations of 117 individuals being observed. Many of the sightings occurred in spring and summer months. A higher number of Bottlenose Dolphins were observed in the vicinity of the entrance to Aberdeen Harbour, which is a known 'hotspot' for dolphin sightings. Bottlenose Dolphins were frequently recorded near the harbour entrance, with their presence being linked to salmon migration upriver.

Bottlenose Dolphins were not recorded during the HiDef aerial surveys. This is likely due to the HiDef survey area being focused further offshore.

Bottlenose Dolphins in the Aberdeen area form part of the resident population of the Moray Firth Special Area of Conservation (SAC). There appear to be two subgroups within the population: one group spend most of their time within the inner Moray Firth SAC, the second group has a wider range from the Moray Firth into the Firth of Forth (AOWFL, 2012; EOWDC surveys).

Young Bottlenose Dolphins have been observed in the Aberdeen area during spring and early summer, indicating a possible increased sensitivity to any potential disturbance during this time (AOWFL, 2012; EOWDC surveys).

From the available information, it is apparent that the Aberdeen area is important for Bottlenose Dolphin; however, it is unclear how reliant they are on this area in relation to other areas along the North-east coast of Scotland (AOWFL, 2012; EOWDC surveys).

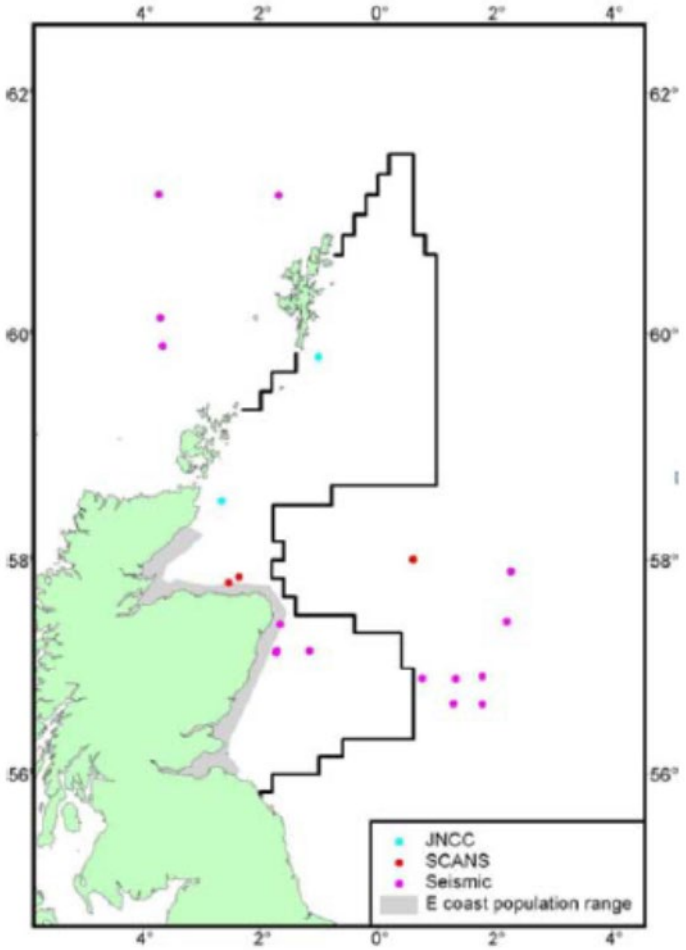

Figure 3-3 Scottish east coast range and sightings of Bottlenose Dolphins AOWFL, 2012

White-beaked Dolphin (*Lagenorhynchus albirostris*)

White-beaked Dolphins are present in the central and northern North Sea throughout most of the year. Sightings data (Figure 3-4) suggests their presence in the coastal waters off Aberdeenshire is seasonal, with sightings recorded between June and August. Evidence from stranding data also indicates that they may be present in the area between February and October (AOWFL, 2012; EOWDC surveys).

The movement of White-beaked Dolphins into coastal waters during summer months is thought to be related to calving, with calves also being observed off Aberdeenshire between June and August (AOWFL, 2012; EOWDC surveys). This indicates a possible increased sensitivity to any potential disturbance during this time.

It is possible that the seasonal movement of White-beaked Dolphins is also related to the seasonal abundance of prey species, such as Herring and Mackerel. White-beaked Dolphins appear to prefer sections of the coast adjacent to deeper waters, with a higher incidence of sightings between Aberdeen and Stonehaven compared to the area between Aberdeen and Collieston.

A total of 29 observations, consisting of a total of 117 individual White-beaked Dolphins were recorded during the AOWFL / EOWDC surveys. Twenty-eight of the observations, consisting of 114 individuals, were recorded in the surveys occurring between 2010 and 2011, which covered a region of deeper water. All observations of White-beaked Dolphins between 2010 and 2011 were recorded in water depths of 20m or more.

The EOWDC survey data supports the occurrence of White-beaked Dolphin as a seasonal summer visitor that possibly moves to coastal waters following prey such as Mackerel for calving purposes. Although White-beaked Dolphins are found throughout the central North Sea and generally in more offshore areas, it is apparent that the coastal waters off Aberdeenshire are important during the summer period (AOWFL, 2012; EOWDC surveys).

During the HiDef aerial surveys, nine White-beaked Dolphin observations were recorded (Table 4-4.).

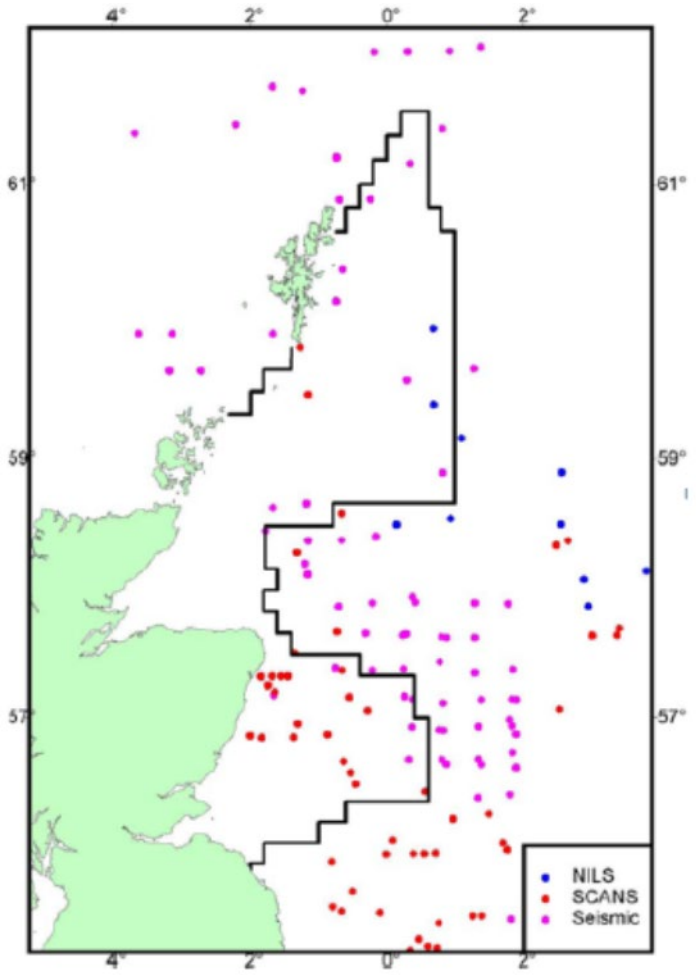

Figure 3-4 White beaked Dolphin sightings from various surveys, AOWFL, 2012

Minke Whales (Balaenoptera acutorostrata)

Minke Whales are the most common of the baleen whales in Scottish waters. Although observations indicate that they may be present throughout the year, Minke Whales occur throughout the central and northern North Sea (Figure 3-5) primarily during the summer months (July – August). They are generally observed in offshore deeper waters but appear to move into coastal waters along the North-East coast of Scotland from July (AOWFL, 2012; EOWDC surveys).

Minke Whales generally feed on small pelagic fish, such as sandeels, herring and sprat, with the seasonal movement of Minke Whales into coastal waters during the summer thought to be related to prey availability.

There was a total of 12 observations of Minke Whales during the EOWDC boat surveys. One Minke Whale was recorded during 2007 and 2008, and 11 observations, all being solitary individuals, were recorded during 2010 and 2011. During the HiDef aerial surveys, three Minke Whale observations were recorded.

Minke Whales are thought to prefer water depths of 40m or more (AOWFL, 2012; EOWDC surveys). Although Minke Whales occur regularly in the area off Aberdeen, especially during summer, it is unclear how important this area is in relation to other areas.

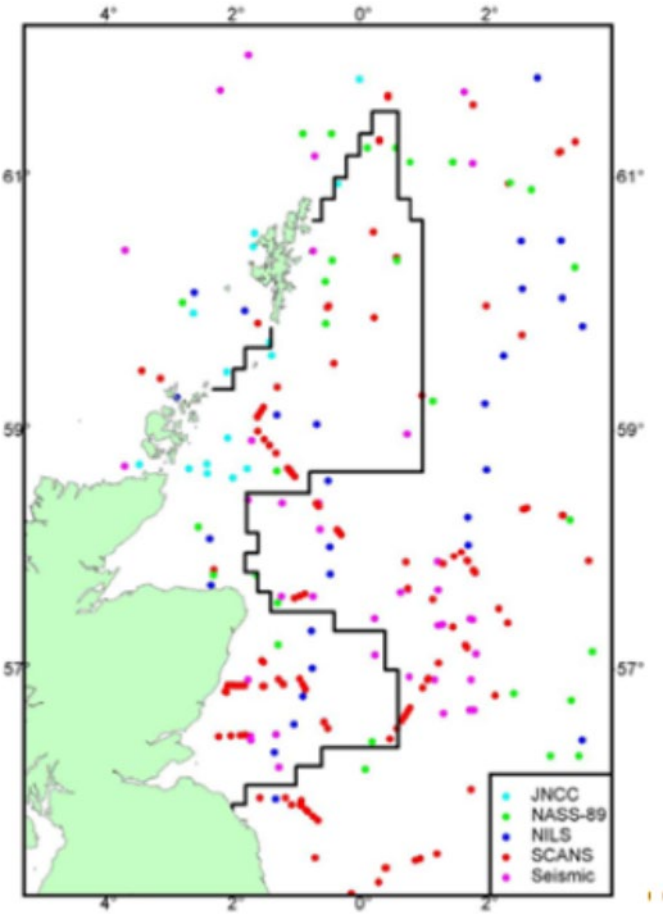

Figure 3-5 Minke Whale sightings made during various surveys, AOWLF, 2012.

Risso's Dolphin (*Grampus griseus*)

In the northern and central North Sea, Risso's Dolphins are primarily observed around Shetland and Orkney. However, there has been an increase in sightings along the north-east coast in recent years and Risso's Dolphins have been recorded off Aberdeenshire since 2005 at various times of the year (Figure 3-6).

As part of the AOWFL / EOWDC surveys, Risso's Dolphins were observed during vantage point surveys, and in 2011 boat survey twice recorded observations consisting of 15 individuals. This increase in sightings may point towards an increase in the use of the Aberdeen area in comparison to historic levels. Possible reasons for the apparent increase in observations in the area are unclear, but may be related to prey availability (AOWFL, 2012; EOWDC surveys).

Risso's Dolphins were not recorded during the HiDef aerial surveys.

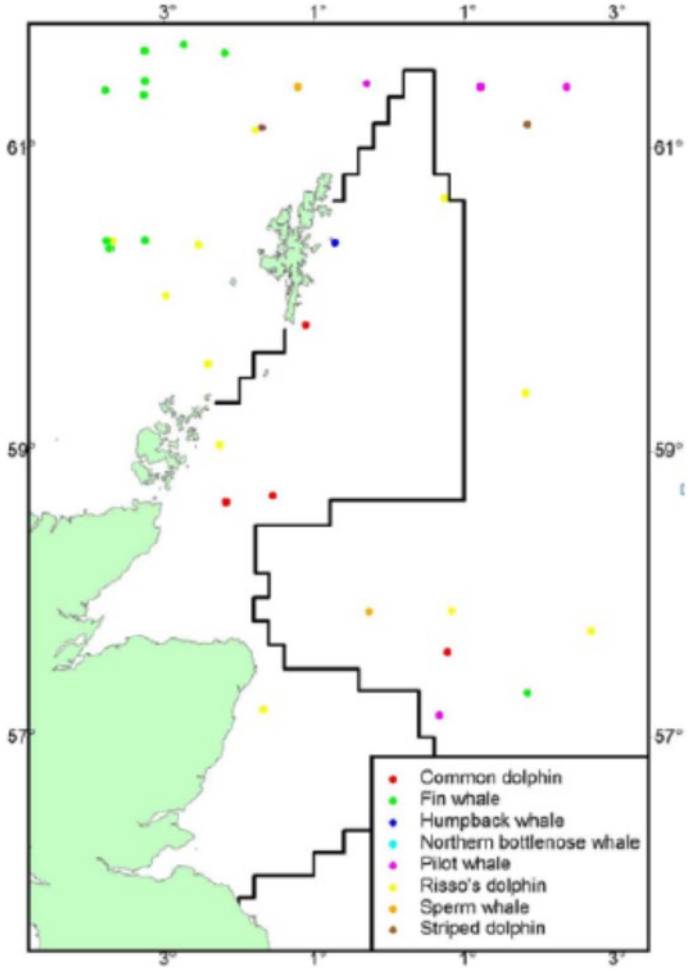

Figure 3-6 Sightings records for Common Dolphins, Fin Whales, Humpback Whales, Northern Bottlenose Whales, Pilot Whales, Risso's Dolphins, Sperm Whales and Striped Dolphins made from various surveys, AOWFL, 2012

Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)

The Atlantic White-sided Dolphin is primarily a species occurring in offshore waters but has been recorded inshore during a number of surveys in the North Sea. Atlantic White-sided Dolphins were recorded on nine occasions in groups of between one and 50 individuals during the Northern North Sea Cetacean Ferry Surveys (NORCET surveys) in the summer months between 2002 and 2006 (MacLeod *et al*., 2007). Most sightings occurred in the more northern part of the study area around Shetland, with only one recorded sighting near the Scottish mainland coast. The sightings primarily occurred between July and September, with a single sighting being recorded in May. No White-sided Dolphins have been recorded in any of the surveys carried out as part of the EOWDC or as part of the KOWL HiDef surveys. This species appears to be a seasonal but regular member of the cetacean assemblage of the northern North Sea, and primarily occurs in the more northern waters of the area (MacLeod *et al*., 2007).

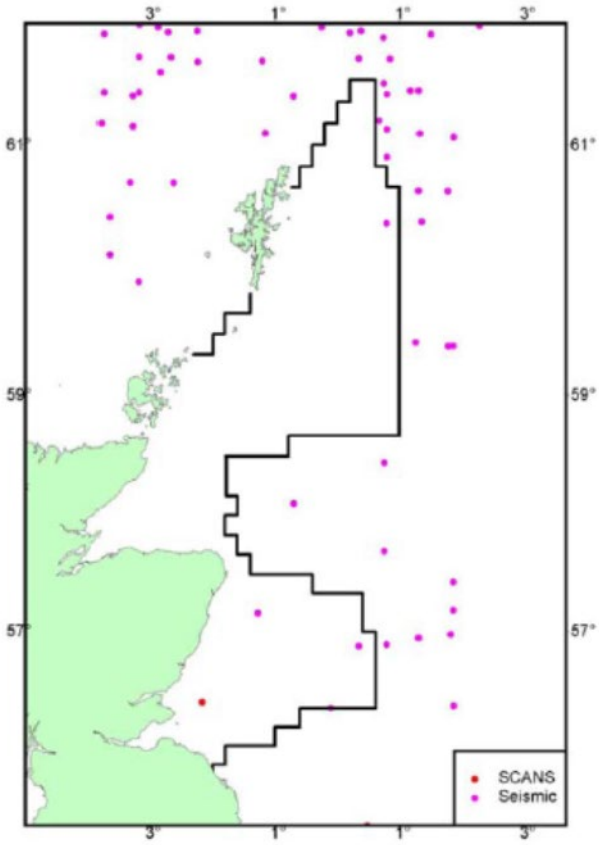

Figure 3-7 White-sided Dolphin sightings made from various surveys, AOWFL, 2012

Common Dolphin (*Delphinus delphis*)

Short-beaked Common Dolphins are generally found in oceanic and shelf-edge waters but do occasionally use coastal areas. Around the British Isles, the species is most often reported from the west coast, especially the Celtic Sea (Hammond *et al.,* 2004; Reid *et al*., 2003), but there have been infrequent sightings during surveys in the North Sea (Figure 3-6), generally during summer months (Hammond *et al*., 2001).

Nine groups of Common Dolphins, ranging in size from 1 to 25 animals, were recorded during the NORCET surveys from June to August in coastal waters near Shetland and north-east Scotland

(MacLeod *et al.*, 2007). One solitary common dolphin was recorded during the EOWDC 2007-2008 surveys and none were recorded in the KOWL HiDef surveys. Common Dolphins appear to be an occasional and seasonal, member of the cetacean assemblage of the northern North Sea (MacLeod *et al.,* 2007).

Long-finned Pilot Whale (*Globicephala melas*)

Long-finned Pilot Whales in UK waters occur mainly off the continental shelf. Most records are from waters with depths greater than 200 m, with relatively few occurrences in the shallower waters of the North Sea (Figure 3-6) (Hammond *et al.,* 2001).

Incidental sightings of Pilot Whales in the North Sea appear to be more numerous between November and January (Reid *et al*., 2003). There are a few sightings in the northern North Sea and there are also records from the south western North Sea during June, July, August, and December (Reid *et al*., 2003). Pilot Whales are seen in Shetland waters in most months of the year.

No long-finned pilot whales were recorded in any of the EOWDC boat surveys or in the KOWL HiDef aerial surveys.

5. RISK ASSESSMENT

5.1. Likelihood of Potential Impact

When a UXO is detonated on the seabed, several impacts to the surrounding area occur, including crater formation and the movement of sediment, both of which are localised impacts. Immediately following detonation, a rapid expansion of gaseous products is formed as a direct result of the detonation. This is known as the “bubble pulse”, and once it reaches the surface it will rapidly dissipate. Fragmentation of the UXO will also occur (the ejection of shrapnel from the UXO casing) but is also a localised impact and does not pose a significant risk past 10m from the UXO detonation location.

The impacts from a UXO detonation that have impacts further afield are the high amplitude shock and the attendant sound wave produced. These impacts have the potential to cause injury or death to cetaceans (e.g. Richardson et al., 1995; von Benda-Beckmann et al., 2015). The highest risk to cetaceans is;

• Trauma (direct or indirect blast wave effect injury) such as crushing, fracturing, haemorrhages, and rupture of body tissues caused by the blast wave, resulting in immediate or eventual mortality;

• Auditory impairment (from exposure to the acoustic wave), resulting in a temporary or permanent hearing loss such as temporary threshold shift (TTS) and permanent threshold shift (PTS); or

• Behavioural change, such as disturbance to feeding, mating, breeding, and resting.

Physical injury, or trauma, can result from either direct or indirect effects of the blast wave, potentially causing injury to body tissues; this usually occurs near the source. Yelverton et al., (1973) identified that the threshold at which physical injury and/or trauma has the potential to occur on all cetaceans is at a peak to peak SPL of 240 dB re 1µPa (Yelverton et al., 1973).

Smaller species, such as harbour porpoise, are at greater risk of injury from both the shock wave and blast injuries (Ketten 2004; von Benda-Beckmann et al., 2015). After detonation, the shock wave will expand spherically outwards and in a straight line, unless the wave is reflected, channels or meets an intervening obstruction. The charge size needed to detonate the UXO, the water depth at the UXO location, bathymetry of the area and seabed sediments all have an impact on how far the noise associated with the UXO detonation will travel. High levels of exposure of underwater noise associated with the attendant sound wave of a UXO detonation can cause instantaneous auditory injury in cetacean species; or PTS. This effect will continue to persist even after the noise has ceased. PTS also has the potential to be occur from lower sound levels if a cetacean is exposed to the sound for a

prolonged period. TTS can be brought on in cetaceans if they are exposed to lower sound levels. An individual would ordinarily be able to fully recover from this effect.

Further details are provided in Figure 4.1 and 4.2.

Physical Disturbance

There is potential of physical disturbance to cetaceans during the UXO removal. These activities include:

- Neutralisation of UXO
- Use of Acoustic Device Deterrent

5.2. Magnitude of Impact

Sound

The way in which a species reacts to underwater noise relates to the way in which it hears. This can be attributed to variation in the anatomy and physiology of the ears and associated structures. The ability of an individual to hear a certain sound in the ocean is a complex task involving at least six abilities and processes:

- Absolute hearing threshold;
- Individual variation in sensitivity;
- Individual motivation;
- Ability to overcome the masking (i.e., obscuring/interference) effect of background sound;
- Sound source localisation; and
- Frequency and intensity discrimination (Richardson *et al.,* 1995).

Thereafter behavioural responses to a sound, once detected, are known to be strongly influenced by the context of the event and individual factors such as the animal's experience, motivation, conditioning and activity (Nowacek *et al.,* 2007; Southall *et al.,* 2007; Wartzok *et al*., 2004). Identical sounds may be experienced in very different ways by individual marine mammals of different species. In addition, as in humans and other mammals, variation in hearing ability between individual animals is common.

In order to judge the potential of a noise to cause avoidance, it is necessary to understand the perception of the sound by the species, i.e. how loud the sound appears to individuals of that species. Individuals of species having poor hearing may perceive the level as low, and hence not react to the noise, whereas a species that is sensitive may find the level unbearably loud and react by swimming away. It is therefore key to understand the hearing ability of the species that may be affected.

Most marine mammals have hearing capabilities across similar frequencies to where their vocalisations occur, although perception may be slightly broader than the frequency range of vocalisations (Luther and Wiley, 2009). The large whales (mysticete cetaceans) generally produce low-frequency sounds in the tens of Hz to the several kHz band, with a few signals extending above 10 kHz. These sounds appear to serve predominantly social functions, including reproduction and maintaining contact, but they may also play some role in spatial orientation. The dolphins and porpoises (odontocete cetaceans) produce sounds across some of the widest frequency bands that have been observed in animals. Their social sounds are generally in the range audible to humans, from a few hundreds of Hz to several tens of kHz, but specialised clicks used in biosonar (echolocation) systems for prey detection and navigation extend well above 100 kHz (Southall *et al*., 2007).

- Cetacean species can be classified into three functional hearing groups based on auditory sensitivity (Southall *et al*., 2007):
    - Low Frequency (7 Hz – 22 kHz), all baleen whales e.g. humpback whales, minke whales;
    - Medium Frequency (150 Hz – 160 kHz), e.g. dolphins and killer whales; and

- High Frequency (200 Hz – 180 kHz), e.g. harbour porpoises.

The marine mammal species identified in as being regularly, seasonally or occasionally present in the vicinity of the UXO are shown in Table 4-1 grouped into their functional hearing groups.

Table 4-1 Functional hearing groups of marine mammals identified as regularly, seasonally or occasionally present in Aberdeen Bay

Functional hearing group	Species	Occurrence
High Frequency	Harbour Porpoise	Regular
Medium Frequency	Bottlenose Dolphin	Regular
	White-beaked Dolphin	Regular/seasonal
	White-sided Dolphin	Occasional
	Common Dolphin	Occasional
	Risso's Dolphin	Occasional/regular
	Long finned pilot Whale	Occasional
Low Frequency	Minke Whale	Regular

During the removal of the UXO it is anticipated that only noise arising from the detonation could have a potential adverse impact on cetaceans. The post lay survey involves the use of a 'Work Class' Remotely Operated Vehicle (WROV) to identify the mine, The exact details of the WROV and associated equipment used during construction are yet to be determined therefore the following frequency ranges have been used to cover the worst case:

- TSS pipe tracker – no acoustic emissions;
- USBL positioning systems and positioning transponder – 10kHz-40kHz;
- Doppler Velocity Log (DVL) – 300kHz -1200kHz;
- Object Avoidance Sonar (OAS) –500kHz-900kHz; and
- Profiling sonar (PS) - 600kHz-1200kHz.

When the worst-case frequency ranges are compared to the functional hearing groups for marine mammals (Figure 4-1) only the noise frequency emitted by the USBL positioning systems and positioning transponder falls within the hearing range of marine mammals. This is therefore the only equipment that has been further assessed within this risk assessment.

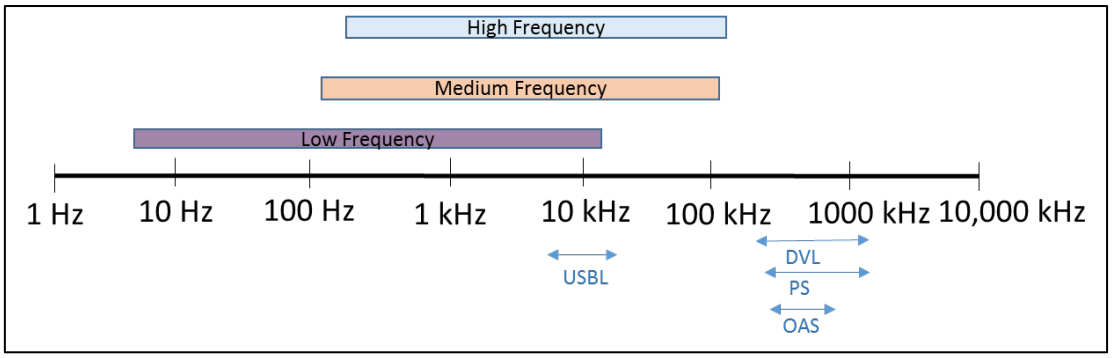

Figure 4-1 Frequency relationship between marine mammal functional hearing groups and equipment (USBL - USBL positioning systems and positioning transponder, DVL -Doppler Velocity Log, PS – Profiling Sonar, OAS - Object Avoidance Sonar)

The frequency range of the USBL positioning system and positioning transponders are within the functional hearing range of low, medium and high frequency hearing marine mammals meaning that all species identified in Table 4-1 could potentially be impacted by its use. However, as a general statement, animals do not hear equally well at all frequencies within their functional hearing ranges. Frequency weighting is a method of quantitatively compensating for the differential frequency responses of sensory systems by considering both the frequency bandwidth of hearing and volume perception. The M-weighting function (M for marine mammals) assumes a logarithmic reduction in auditory sensitivity outside of the range of best hearing sensitivity and represent the bandwidth where acoustic exposure can have auditory effects. The M-weighting functions de-emphasise frequencies that are near the lower and upper frequency ends of the estimated hearing range.

The M-weighting functions are precautionary in that regions of best hearing sensitivity for most species are likely to be considerably narrower than the M-weighting functions (designed for the overall marine mammal group) would suggest. This is because, to have a given auditory effect, sound at these frequencies must have higher absolute amplitude than sound in the region of best hearing sensitivity.

Use of such M-frequency-weighting functions is superior to flat weighting across all frequencies as it accounts for known or estimated differences in the frequency response characteristics for each functional hearing group. None of the species included within each functional hearing group has been shown or is expected to have any portion of its best hearing sensitivity outside the flat portion of the relevant frequency-weighting function, thus, the functions are precautionary (Southall *et al*., 2007).

The M-weighting function in Figure 4-2 suggests that the noise generate from a USBL positioning system and positioning transponder with a frequency range of 15kHz-27kHz would be in the range of best hearing for mid and high frequency hearing cetaceans and towards the edge of the range of best hearing for low frequency cetaceans. This suggests that low frequency hearing cetaceans are less likely to be impacted by the noise, especially given the precautionary nature of this metric. It is therefore concluded that Minke Whale, which are low frequency hearing range cetaceans, are unlikely to be impacted by the noise from the removal of the UXO.

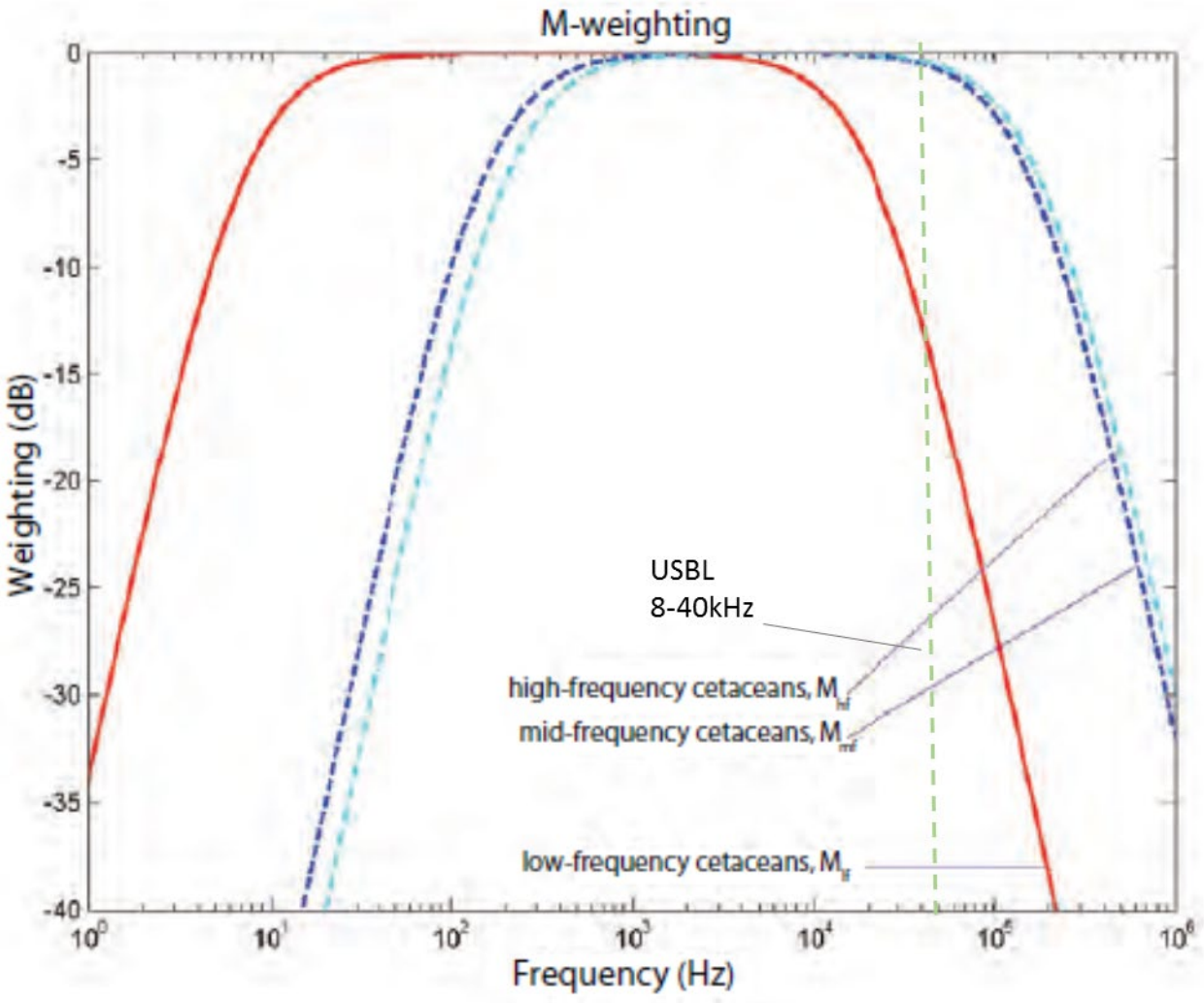

Figure 4-2 The M-weighting functions for low, mid and high frequency cetaceans (adapted from Southall et al., 2007)

Physical Disturbance

The majority of the sediment that is displaced during trenching operations will be replaced during the burial process. However, there will be some increase in suspended sediment concentrations (SSC) during UXO detonation. The potential for increased SSC is high during detonation, however, as the process occurs very gradually sediment displacement will occur. Many marine mammals inhabit turbid environments and many use sonar systems to sense the environment around them (Au *et al.,* 2000). Sediment plumes are generally localised, and many marine mammals often reside in turbid waters, so significant impacts from turbidity are improbable. In addition, there is no evidence to suggest that turbidity affects cetaceans. Disturbance from removing the UXO during construction will be very short term and increased suspended sediments in the area will settle out quickly and over a limited area.

An increase in vessel activity may result in a temporary barrier effect to cetaceans due to marine mammal avoidance of vessel traffic, potentially preventing marine mammals from moving through the waters within the UXO neutralisation area. This may cause physical disturbance to marine mammals,

especially those which may be transiting or foraging in waters local to the Development Area. Marine mammal behaviour in response to vessels is variable and may depend on the type and speed of the vessel, as well as other factors such as habituation to specific vessels. However, marine mammals in the Project Site are already subject to considerable activity by a range of vessels from commercial ships to fishing boats as well as a range of smaller non-commercial craft. Marine mammals in the area thus seem likely to display some degree of habituation to vessel traffic. Consequently, the impact of vessels associated with the detonation of the UXO may not be as great as in an undisturbed area. There is the potential for all species identified in figure 4.2 to be present within the UXO neutralisation area, however these numbers are likely to be limited and the increase in vessel traffic compared to background levels is very small. In addition, this was fully explored within the Environmental Statement (ES), and it was concluded that this would have a negligible/minor impact.

5.3. Timing and Duration of Impact

Table 4-2 below summarises the presence, seasonal occurrence and seasonal sensitivity of the main species of concern and shows that generally, most of the species are likely to be present over the spring and summer months, however Bottlenose Dolphins are present year-round. Table 4-2 suggests that less species of cetacean would potentially be disturbed if the survey was undertaken over the winter months, however Bottlenose Dolphins would be at their peak abundance during this time and are likely to be present in greater numbers than most of the other species. Table 4-2 shows that the most prevalent and regularly occurring high and mid frequency hearing species are Bottlenose Dolphin, Harbour Porpoise and White-beaked Dolphin. These species have an identified sensitivity period (due to calving) which cumulatively falls between April and September.

The Explosives Ordnance Disposal (EOD) operation will be carried from a designated construction vessel, to be called the principle vessel. The principle vessel will have a crane and include a work class ROV. The EOD operation site will be 1200m radius centred on the position of the UXO. This site will be controlled by the EOD superintendent from the principle vessel. It is anticipated that the Works will last between 3 to 6 days.

Table 4-2 Presence and seasonal occurrence of cetacean species

Species	Presence	Seasonal Occurrence											
		J	F	M	A	M	J	J	A	S	O	N	D
Bottlenose Dolphin	Regular				*		*	*	*	*			
Harbour Porpoise	Regular				*	*	*	*	*	*			
White-beaked Dolphin	Regular / Seasonal						*	*	*				
White-sided Dolphin	Occasional												
Common Dolphin	Occasional												
Risso's Dolphin	Occasional / Regular												
Long finned Pilot Whale	Occasional												
Key	Present in area (sighting and / or stranding)												
	Peak abundance												
	Potential to be present in the area												
	Seasonal sensitivities (e.g. calving period)	*											

5.4. Location and Spatial Extent of Impact

The location of the British Buoyant mine

WGS84	
Lat	**Long**
56° 59' 47.5823"N	1° 52' 13.4622"W

All of the species identified in Table 4-2 have the potential be present within the area of detonation and surrounding area and therefore have the potential to be disturbed by the proposed construction works.

5.5. Cumulative

The Kincardine Floating Offshore Windfarm Environmental Statement identifies the following projects that could have a cumulative impact on marine mammals:

- Beatrice Offshore Windfarm;
- Moray Firth R3 Zone 1 offshore wind farm;
- Seagreen Alpha offshore wind farm;
- Seagreen Bravo offshore wind farm;
- Inch Cape offshore wind farm;

- Neart na Gaoithe offshore Wind farm;
- European Offshore Wind Deployment Centre (EOWDC); and
- Aberdeen Harbour Expansion Project (AHEP), Nigg Bay.

Potential cumulative impacts could arise between the Project during the neutralisation of the UXO and if the construction timeframes overlap. With regards to the offshore windfarms that have been identified, Inch Cape, Seagreen Alpha, Seagreen Bravo and Neart na Gaoith have all recently had their consents overturned and have applied for an extension to the commencement for development. Inch Cape have had their extension granted to no later October 2021 and the Seagreen Alpha and Bravo and Neart na Gaoith to no later than October 2022.This means that they would not be constructed at the same time as the Kincardine UXO removal (Feb- June 2021) and will therefore not have cumulative impacts. Of the remaining windfarms that have been identified, noise from piling is likely to be the greatest impact. Figure 4-3 shows the location of these projects in relation to the Kincardine Project Site. Beatrice and Moray Firth are located a considerable distance from the Kincardine Project Site and are therefore not anticipated to have cumulative impacts on cetaceans due to underwater noise.

Considering non-windfarm projects, it is possible that there could be cumulative impacts from the Kincardine survey and Aberdeen Harbour Expansion (AHEP) at Nigg Bay. The construction programme for this development (Q4 2016 to Q4 2019) indicates that dredging (including drilling and blasting) and the installation of large breakwaters could occur at the same time but details of the exact timing of these activities is unknown. However, it is unlikely that there would be a significant cumulative impact with the AHEP due to the small range of the USBL/Transponder to be used for the KOWL construction works.

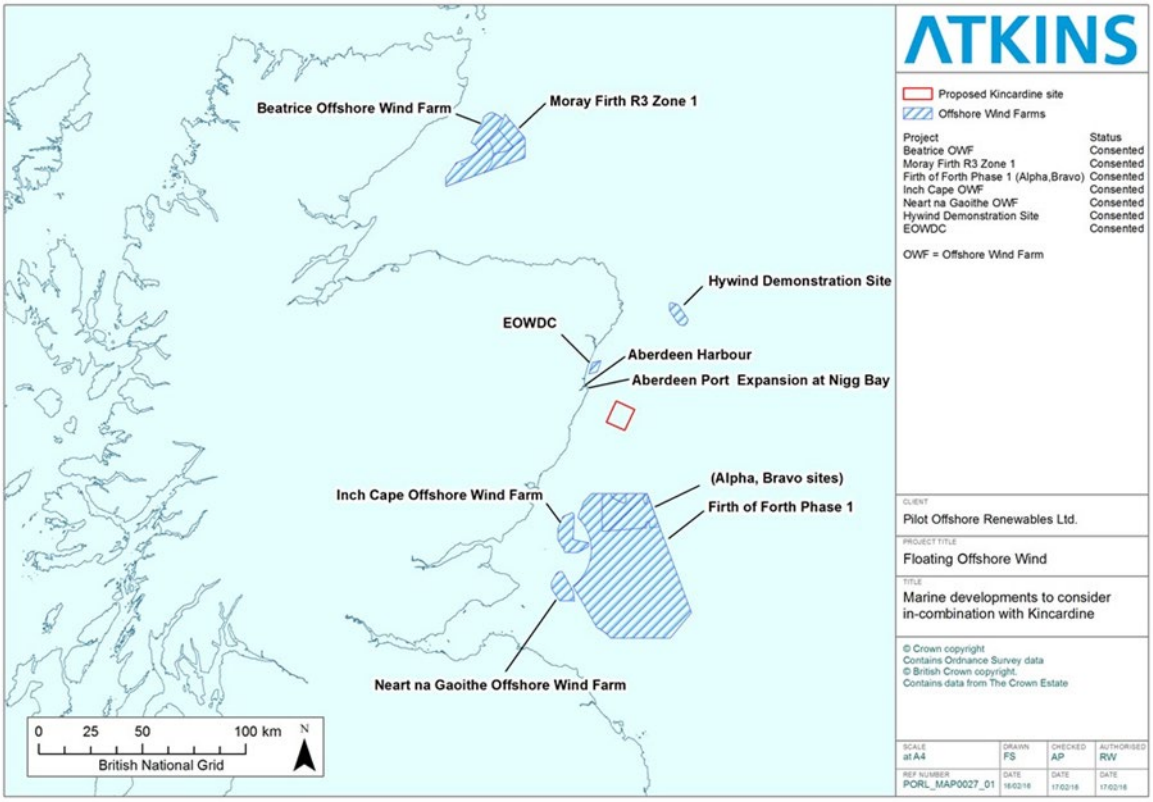

Figure 4-3 Location of projects that could have cumulative impacts

5.6. Alternatives

The alternative is to leave the UXO in place. However, this places people and equipment at an unacceptable risk. In the unlikely event that a mooring line fails the remaining mooring lines may come into contact with the UXO and cause a further failure because of its presence putting people and the floating wind turbine at risk.

5.7. Mitigation

Cetaceans may be present within the survey area year-round. The most prevalent and regularly occurring cetacean species are Bottlenose Dolphin, Harbour Porpoise, and White-beaked Dolphin. These species have an identified sensitive period (due to calving) which cumulatively falls between April and September. Due to restrictions on the Construction Programme, it is not possible to avoid this period; however, the work will be undertaken to comply with the JNCC seismic guidelines (2010), including:

- Having a trained Marine Mammal Observer (MMO) undertake a visual search for 30 minutes prior to commencement of operations;
- Undertaking soft-start procedures (if necessary); and
- Use the lowest practicable power levels to achieve the objectives of the UXO removal works.

It is considered that compliance with the recommendations in the JNCC guidelines will reduce the risk of injury and disturbance to EPS to negligible levels.

5.8. Summary of Potential Impacts

It is considered that through mitigation including compliance with the recommendations in the JNCC seismic survey guidelines, the risk of fatal effects or permanent injury (PTS) and disturbance to EPS is negligible. However, there is a low risk of temporary threshold shift if an animal is located in very close proximity to the source of the noise, and a negligible risk of disturbance and other behavioural effects over a wider area. These potential impacts would be temporary (due to the relatively short timeframe of the UXO removal) and localised. The species identified as likely to be present within the survey site and surrounding area, with a functional hearing range that could be disturbed by the survey are:

i. Bottlenose Dolphin
ii. Harbour Porpoise
iii. White-beaked Dolphin
iv. White-sided Dolphin
v. Common Dolphin
vi. Risso's Dolphin
vii. Long finned Pilot Whale

Cetaceans could potentially be present within the Project Site all year round. Most of the species are likely to be present over the spring and summer months, however Bottlenose Dolphins are present year-round and are at their peak abundance over the winter months. The most prevalent and regularly occurring species are Bottlenose dolphin, Harbour Porpoise, and White-beaked Dolphin. These species have an identified sensitive period (due to calving) which cumulatively falls between April and September.

There is potential for cumulative underwater noise impacts from the construction of EOWDC and AHEP at Nigg Bay as the construction timeframe of these two projects may overlap with construction activities. The construction period for both projects covers a large amount of time and it is unknown exactly when within this the 'noisy' activities (such as drilling and blasting) would be undertaken. The proposed Kincardine construction activities are short term and temporary and it is likely that the noisy activities from these three projects will not overlap. KOWL will continue to communicate with AHEP

and EOWDC on construction timings. However, it is unlikely that there would be a significant cumulative impact with the AHEP or EOWDC due to the small range of the USBL/Transponder to be used for the KOWL construction works.

6. EPS LICENCE ASSESSMENT

6.1. Test 1 'purpose' (Regulation 44 (2))

Only activities carried out for certain 'purposes' can be licensed so that regulations 39 (1) and (2) do not apply. The*se purposes include 'imperative reasons of over-riding public interest including those of a social or economic nature' and 'beneficial consequences for the environment' and 'scientific and educational purposes'.*

The removal of Unexploded Ordnance is an integral part of the Project and permitted under the Section 36 Consent and Marine Licence KOWL have been granted. The proposed construction activities are in the public interest as it is an integral part of the Project which fulfils societal needs at a local, regional, national and international level, by providing beneficial environmental consequences through replacing fossil fuel based electricity generation with renewable energy.

The Project is a commercial demonstrator project, which will utilise floating foundation technology, rather than conventional fixed substructure foundations used the majority of Scottish offshore windfarm developments. It will be one the world's first arrays of floating wind turbines utilising the semi-submersible foundation technology. This will establish a leading position for Scotland in the development and deployment of this novel technology within a global perspective and will contribute to Scottish, UK and European targets for Renewable Energy.

Floating foundations open the possibility for future offshore windfarms to be located further from shore in deeper waters, reducing impacts to sea bird populations and minimising visual impacts whilst accessing hitherto untapped wind resources that can be found in offshore locations. Floating structures also offer benefits over conventional fixed foundations in terms of reduced construction and installation costs, as extensive piling operations are not required and significant construction activities can be undertaken within the construction port. This minimises potential noise impacts upon marine mammals during construction and installation when compared to fixed installation approaches.

6.2. Test 2 'There must be no satisfactory alternatives' (Regulation 44 (3) (a))

The removal of the UXO is an integral part of the Project and permitted under the Section 36 Consent and Marine Licence KOWL have been granted.

Alternative Location

During the initial period of site selection for the Project, two potential sites were identified for the installation of the windfarm within Scottish Territorial waters:

- Forth Array (Firth of Forth, north of St Abbs Head) – a Round 2 development site; and
- NE3 – Aberdeen (To be renamed Offshore Wind North East OWNE1 within updated Regional Guidance Location (RGL) guidance).

A review of both sites was undertaken by KOWL and through this process it was identified that the Forth Array site had two key disadvantages:

- Due to the cumulative impact of other offshore windfarm developments in the Firth of Forth on bird movements (discussions with MS-LOT), the possible additional (very limited) impact that a floating offshore demonstrator development would have on key bird species was considered to be a potential issue. This was concluded following an initial aerial bird and sea mammal survey undertaken at this location in May 2013.

- Following discussions with the relevant grid connection company, it was apparent that there was limited grid capacity at the onshore substation location and any additional installation at this location would be cost prohibitive.

Due to the above disadvantages, OWNE1 was selected as the location for the Project.

Alternative Method

The construction works proposed are the most effective to remove an Unexploded Ordnance for the Project following best practice guidelines and have been assessed within the EPS Application 2020. All methods of UXO removal will produce an increase in SSC which will have a minimal level of disturbance, and therefore there are no alternative methods which can be assessed. The associated risk assessment concludes that there will be limited risk of disturbance and negligible risk of injury to cetaceans during construction works.

6.3. Test 3 'The action authorised must not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range' (Regulation 44 (3) (b))

This EPS risk assessment concludes that there would be a negligible risk of injury and a low-level risk of disturbance to cetaceans. Any disturbance that might occur would be temporary and localised. The JNCC seismic survey guidelines will be followed where possible, to minimise the impacts from the works which means that there will be no effect on the favourable conservation status of any of the marine mammal species considered.

6.4. Summary

This EPS licence assessment demonstrates that the removal satisfies all three EPS tests as the activities have a licensable purpose, there are no satisfactory alternatives and it will not be detrimental to Favourable Conservation Status for any of the species identified.

Due to the assessed risk identifying only a negligible risk and the projects utilisation of additional control procedures on the ADD and detonation lay vessel (use of MMO and utilising best practice guidelines). It is therefore assessed that an EPS licence is required for the project to neutralise the identified UXO- MC699.

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