



## APPENDIX 5-6

### MARINE MAMMAL MITIGATION PROTOCOL

APPENDIX 5-6

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## GLOSSARY

## ACRONYMS AND ABBREVIATIONS

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## GLOSSARY

Term	Definition
Sceirde Rocks Offshore Wind Farm ("The Project")	<p>Sceirde Rocks Offshore Wind Farm (The Project) is comprised of an Offshore Site and an Onshore Site. The transition between the Offshore and Onshore Sites (referred to as the Landfall) is the location at which the offshore export cable and communication cables emerge from the trenchless landfall duct and enter the transition joint bay (TJB). The Offshore Site refers to the Offshore Array Area (OAA) and Offshore Export Cable Corridor (OECC) and the infrastructure within the OAA and the OECC.</p> <p>The OAA infrastructure will include 30 wind turbine generators (WTG), an offshore substation (OSS), 31 Gravity Base Structure (GBS) foundations which support the WTGs and OSS, and Inter-array Cables (IACs) and cable protection. The OECC infrastructure will include Offshore Export Cable (OEC) and cable protection</p>
The Applicant	In reference to planning – Fuinneamh Sceirde Teoranta (FST)
Offshore Export Cable Corridor	The Offshore Export Cable Corridor (OECC) is approximately 62 km in length, approximately 1 km wide along the majority of its length and has a total area of approximately 73 km <sup>2</sup> .
Landfall	The transition between the Offshore and Onshore Developments (referred to as the Landfall) is the location at which the offshore export cable and communication cables emerge from the trenchless landfall duct.
Environmental Impact Assessment (EIA)	EIA is a process used to evaluate the potential environmental effects of a proposed project ensures that environmental considerations are integrated into the planning and decision-making stages, helping to minimize negative impacts on the environment and promote sustainable development

## ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ADD	Acoustic Deterrent Device
BOWL	Beatrice Offshore Windfarm Ltd
EIAR	Environmental Impact Assessment Report
EPS	European Protected Species
EU	European Union
FLA	Foreshore Licence Application
GBS	Gravity Base Structure
HF	High frequency
IAC	Inter-array Cables (
JNCC	Joint Nature Conservation Committee
LF	Low Frequency
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Mammal Observer
NEQ	Net Explosive Quantity
NM	Nautical Miles
NPWS	National Parks and Wildlife Services
OEC	Offshore Export Cable
OECC	Offshore Export Cable Corridor
OEMP	Offshore Environmental Management Plan
OSS	Offshore Substation
PAM	Passive Acoustic Monitoring
PCW	Phocid carnivores in water
PTS	Permanent Threshold Shift
SEL	Sound Exposure Level
SEL <sub>ss</sub>	Sound Exposure Level Single Strike

Acronym	Definition
SOLAS	International Regulations for the Safety of Life at Sea
SPL <sub>peak</sub>	Peak Sound Pressure Level
TJB	Transition Joint Bay
TTS	Temporary Threshold Shift
UK	United Kingdom
USBL	Ultrashort Baseline
UXO	Unexploded Ordnance
VHF	Very High Frequency
WTG	Wind Turbine Generators

# 1. **MARINE MAMMAL MITIGATION PROTOCOL**

## 1.1 **Introduction**

### 1.1.1 **Background**

This Marine Mammal Mitigation Protocol (MMMP) forms part of the Offshore Environmental Management Plan (OEMP) and has been prepared by Xodus on behalf of Fuinneamh Sceirde Teoranta (hereafter referred to as the Applicant), for the construction, operation and maintenance, and decommissioning of the Sceirde Rocks Offshore Wind Farm, and all its offshore component parts within the Offshore Site. The Offshore Site refers to the Offshore Array Area (OAA) and Offshore Export Cable Corridor (OECC) and the infrastructure within the OAA and the OECC.

The MMMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement which will accompany the application for development permission of the Project to be submitted to An Bord Pleanála.

Should Sceirde Rocks Offshore Wind Farm secure development permission, the MMMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The MMMP should be read in conjunction with the EIAR and the planning drawings. The MMMP will also require updating by the appointed contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. Due to its structure and nature, this MMMP will require constant updating and revision throughout the various phases of the project from construction to operation and maintenance and decommissioning.

The appointed contractor will be required to implement all of the requirements set out in this MMMP. The MMMP may be updated and revised throughout the construction, operation and maintenance a decommissioning phases, but all future iterations must meet or exceed the standards and requirements set out in this document and the Applicant must be satisfied that all requirements set out in this document can and will be implemented in full by the appointed contractor.

### 1.1.2 **Project Description**

Sceirde Rocks Offshore Wind Farm ('the Project') is comprised of an Offshore Site and an Onshore Site. The transition between the Offshore and Onshore Sites (referred to as the Landfall) is the location at which the offshore export cable and communication cables emerge from the trenchless landfall duct and enter the transition joint bay (TJB). This MMMP only considers the Offshore Site.

Sceirde Rocks Offshore Wind Farm Environmental Impact Assessment Report (EIAR), Chapter 5: Project Description describes the design details of the Offshore Site and all its component parts, situated off the South coast of Ireland, close to Connemara, Co. Galway.

The Offshore Site comprises the OAA and OECC infrastructure.

The OAA infrastructure includes 30 wind turbine generators (WTG), an offshore substation (OSS), 31 Gravity Base Structure (GBS) foundations which support the WTGs and OSS, and Inter-array Cables (IACs) and cable protection. The OECC infrastructure includes the Offshore Export Cable (OEC) and cable protection. Figure 1-1 shows the layout of the Offshore Site.

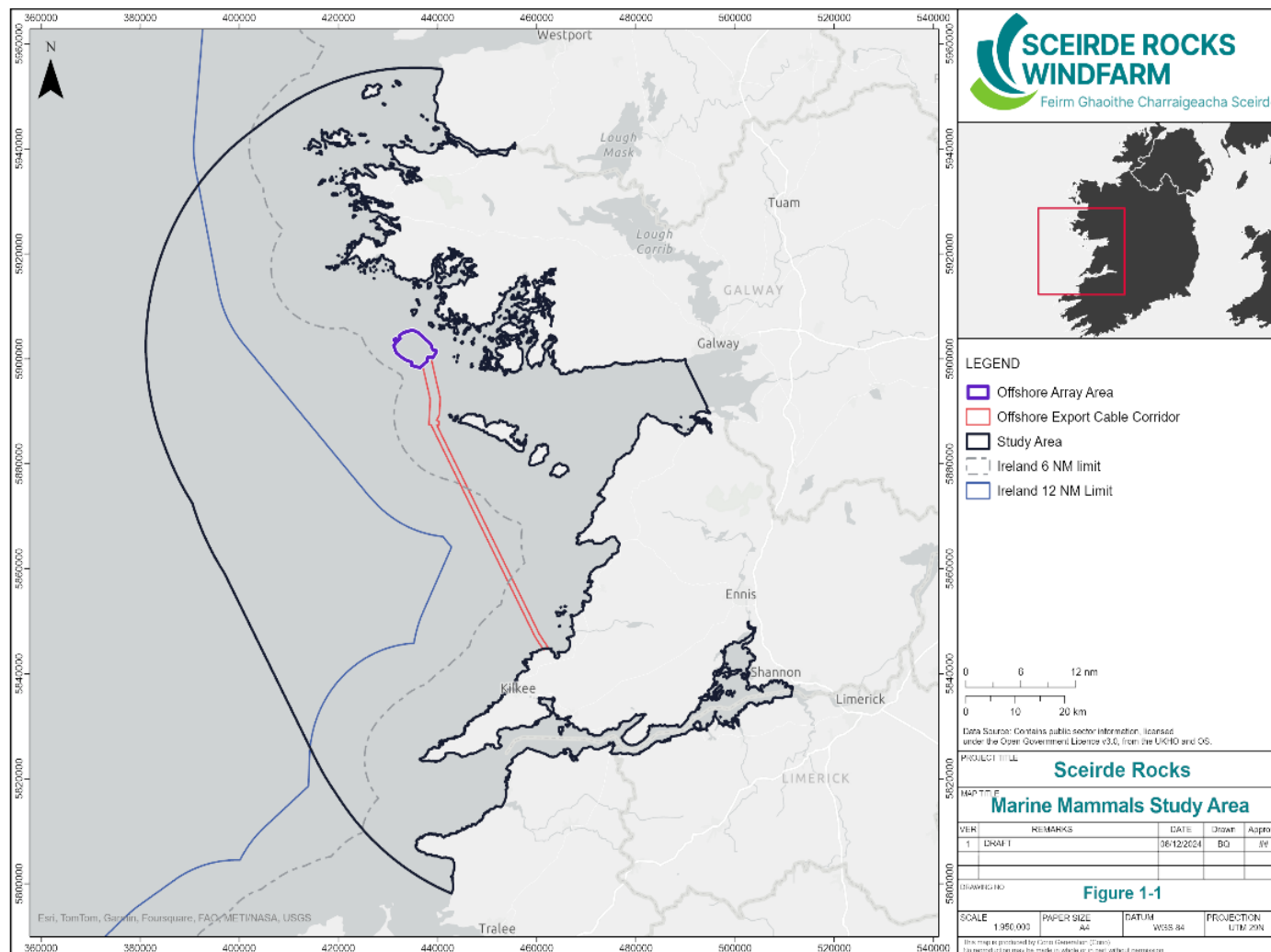


Figure 1-1 Marine Mammals Study Area



### 1.1.3 Purpose of Document

The MMMP sets out the overarching principles of the project surveys and potential unexploded ordnance (UXO) clearance activities during the pre-construction phase of the Project. This MMMP has been drafted in line with industry and best practice guidance, specifically the National Parks and Wildlife Services (NPWS) 'Guidance to Manage the Risk to Marine Mammals from Manmade Sound Sources in Irish Waters' (NPWS, 2014). The MMMP will also draw on further guidance to support best practice, this is detailed in Section 1.2.2.

The MMMP has been drafted as detailed within the Environmental Impact Assessment Report (EIAR) Chapter 12: Marine Mammals there are potential impacts to marine mammal species due to the nature of activities associated with the Project. The activities which have been assessed for mitigation include:

- Project surveys (geotechnical investigations and ultrashort baseline (USBL) operation) (Section 1.4.1); and
- UXO clearance activities (Section 1.4.2)

As detailed within the EIAR, piling<sup>1</sup> is not part of the Project Design, and therefore piling has not been considered within this MMMP.

In addition, the requirement for UXO clearance is highly unlikely, as informed by the UXO risk assessment undertaken by the Project. UXO clearance is included here to cover the eventuality that further pre-construction surveys may discover unavoidable UXO

The MMMP will be further updated to support the construction programme.

### 1.1.4 Construction Programme

A summary of the phases of the Offshore Site construction programme is shown in Table 1-1. The construction programme and durations of the campaigns are subject to change depending on factors such as contractor/ vessel availability, ground and weather conditions and any supply chain or logistical issue that may arise. Furthermore, specific details on installation will vary depending on the technologies adopted and may change due to improvements in both the technology and supply chain.

Ports to be used during the construction phase are not yet confirmed. Shannon Foynes Port, Rossaveel, Cork and Belfast harbours, along with ports in the UK and continental Europe, are all being considered as ports which will support construction activities for the Project. This is subject to project-specific requirements and the availability of ports and other local facilities during construction, a multi-port approach may also be considered prior to commencement of construction. Ports to be used during the O&M phase are not yet determined. However, it is assumed that Rossaveel Harbour will be the primary O&M base. The O&M port will be confirmed post consent.

*Table 1-1 Offshore Site activities from pre-installation to commissioning*

Activity	Description
Pre-construction surveys and site investigations	Additional pre-construction surveys may be undertaken, including geophysical, geotechnical, benthic, unexploded ordnance (UXO) and metocean investigations. Other surveys, e.g. for birds, may also be undertaken as required.

<sup>1</sup> Piling refers to the process of installing foundations, known as piles, into the seabed to support the wind turbine generators. These piles are driven into the seabed to provide stability against the forces of wind, waves, and currents.

Activity	Description
Site preparation	Seabed preparations will be required prior to the installation of GBS foundations and offshore cable infrastructure. This may include dredging, boulder clearance and UXO clearance. Site preparation works also include placement of rock to form a stonebed for GBS foundations and for WTIV operations.
GBS foundation and sub-structure installation	Prior to installation at the OAA, the GBS foundations are proposed to be temporarily anchored, at a temporary anchor facility which is subject to a separate application and assessment process. Foundations will be towed to site and installed ahead of the WTG and OSS topside structure.
OSS installation/ commissioning	OSS topside structure is installed after the installation of the GBS foundation. Following installation of the OSS and connection to the inter-array and export cabling, a process of testing and commissioning will be undertaken.
Offshore export cable (OEC) – landfall and offshore installation	<p>Following the completion of the necessary onshore works (including the necessary landfall preparations) and the offshore site preparations, the OEC will be laid from the landfall out to the OSS, with the potential for pre-trenching works to be undertaken ahead of cable installation.</p> <p>The export cable will be buried wherever possible and may be installed using a variety of techniques detailed further in section 5.8.4. Following cable lay and burial (which may occur simultaneously or sequentially) external cable protection will be installed, as necessary. Further details on cable protection are provided in the chapter ‘Project Description’ of the EIAR.</p>
Inter-array cable installation	<p>The inter-array cables will be installed between the WTGs and between WTGs and the OSS.</p> <p>The installation techniques for the inter-array cables will be similar to that of the OEC.</p>
WTG installation/commissioning	The WTG components will be fabricated onshore and transported to the OAA for installation. Following installation of the WTG and connection to the inter-array cabling, a process of testing and commissioning will be undertaken.

## 1.2

## Summary of Relevant Species

### 1.2.1

## Overview of Main Species Occurring in the Offshore Site

The MMMP has built on the data detailed within the EIAR, Chapter 12: Marine Mammals. This chapter highlighted the species likely to be present in the Project Area and Wider Study Area (Figure 1-1) which could be impacted from Project activities (Section 1.4) have been listed in Table 1-2 below, in addition to the hearing group they are associated with. These species have also been acknowledged

within the Project Foreshore Licence Application (FLA). All marine mammal species are protected under Annex IV of the EU Habitats Directive and are European Protected Species (EPS).

*Table 1-2 Relevant marine mammal species to the Project and hearing thresholds*

Species	Generalised hearing range	Hearing Group
Harbour porpoise ( <i>Phocoena phocoena</i> )	275 Hz - 160 kHz	VHF
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	150 Hz - 160 kHz	HF
Risso’s dolphin ( <i>Grampus griseus</i> )		
Common dolphin ( <i>Delphinus delphis</i> )		
Minke whale ( <i>Balaenoptera acutorostrata</i> )	7 Hz - 35 kHz	LF
Harbour seal ( <i>Phoca vitulina</i> )	50 Hz - 86 kHz	PCW
Grey seal ( <i>Halichoerus grypus</i> )		
*VHF – Very high frequency, HF – High frequency, LF – Low frequency, PCW - Phocid carnivores in water		

## 1.2.2

## Other Species Which Could Occur

In addition to the species highlighted in Section 1.2.1 there are five further species which could occur within the Project Area. Whilst there is potential for these species to occur they have not been considered as the main species predicted to be present; this is based on information gathered from a desk-based review which included data from the Irish Whale and Dolphin Group *Celtic Mist* survey report (IWDG, 2023) and ObSERVE surveys (DECC, 2024), marine mammal observations, Project specific site-surveys to date, and the Project eDNA report. The species include:

- White beaked dolphin (*Lagenorhynchus albirostris*) (HF)
- Humpback whale (*Megaptera novaeangliae*) (LF)
- Fin whale (*Balaenoptera physalus*) (LF)
- Killer whale (*Orcinus orca*) (HF)
- Striped dolphin (*Stenella coerulealba*) (HF)

## 1.3

## Legislation, Policy and Guidelines

Over and above the legislation presented in the EIAR Chapter 1: Introduction and Chapter 2: Background and Policy, and Chapter 12: Marine mammals and Other Megafauna, the Irish legislation, policy and guidance relevant to the MMMP is outlined below:

- Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters (NPWS, 2014)

In addition to the Irish guidance, consideration has also been given to the United Kingdom guidance to ensure that best available techniques are used. These guidelines are outlined below:

- Guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC, 2017)

- Draft guidelines for minimising the risk of injury to marine mammals from unexploded ordnance clearance in the marine environment (JNCC, 2023)
- Marine mammals and noise mitigation (JNCC, 2024)

## 1.4

## Overview of Impacts

Chapter 5: Project Description of the EIAR details the activities which will be undertaken by the Project. This details two activities which have the potential to result in impacts from underwater sound to relevant marine mammal species (Section 1.2.1), these activities are Project surveys (Section 1.4.1) and UXO clearance activities (Section 1.4.2).

## 1.4.1

### Project Surveys

## 1.4.1.1

#### Geotechnical Investigations

The NPWS (2014) guidance does not make specific reference to several activities that may be undertaken during additional pre-construction geotechnical investigations for the Project. These include the geotechnical methods known as vibro-coring and cone penetrometer testing (CPT), and the use of USBL underwater acoustic positioning. Although these activities were not specifically referenced in the guidance, they were nevertheless subject to a comprehensive assessment in the environmental reports comprising the Foreshore Licence applications (FS007161/ FS007543) which cover site investigations in the OAA and OECC.

While these geotechnical survey techniques and activities may introduce sound to the marine environment, they do not operate at relevant frequency ranges or generate sufficient levels of sound to be considered as potential sources of acoustic injury or disturbance to marine mammal species, and were screened out of further consideration within this MMMP.

## 1.4.1.2

#### Ultrashort Baseline

In the environmental assessments supporting the Foreshore Licence Applications, it was concluded that while USBL positioning equipment generated sound of an amplitude that could cause behavioural changes in marine mammals (including cetaceans, which are listed in Annex IV of the EU Habitats Directive) there would be no significant disturbance of these species, and that the risk of auditory injury was implausible as attenuation of the sound would mean the sound pressure level would fall below the injury threshold for any marine mammal within a few metres of the source. As a result, it was concluded that no marine mammal mitigation was required for USBL operations alone.

With respect to disturbance risk, the assessment concluded that as the survey vessel (with USBL operating) would be stationary for short periods while undertaking geotechnical investigations at a station, very few animals would experience incidental disturbance, i.e. at levels below what could be considered to be 'significant', and it is highly unlikely that any disturbance would have prolonged negative effects on any marine mammal.

As detailed in Section 1.4.1.1 the NPWS (2014) guidance highlights the requirement for MMOs during surveys. Following a comprehensive assessment of the risk, the Project will undertake to (where possible) implement mitigation measures prior to USBL activation during geotechnical investigations where USBL is required (such as those carried out under Foreshore Licences FS007161/ FS007543).

This is undertaken as a voluntary, 'belt and braces' approach by the Project, to ensure that any residual risk to marine mammals is minimised. As stated in the environmental appraisal documents submitted alongside the FLAs for FS007161 and FS007543, MMO watches would only be implemented during daylight hours, and at no point was marine mammal mitigation specifically identified as a requirement

for vibro-coring and USBL operations. The USBL poses no significant risk to marine mammal populations

MMOs are not likely to offer any additional protection to cetaceans relating to the use of USBL. As the NPWS (2014) guidance makes no specific provision for USBL or vibro-coring, this is entirely in line with the guidance, and the voluntary MMO watches (during daylight hours) go above and beyond the requirements under that guidance. The Project will adhere to the NPWS (2014) guidelines and ensure that an MMO is present during the operations. The MMO will have undergone formal marine mammal observation and distance estimation training e.g. a Joint Nature Conservation Committee (JNCC) MMO training course or equivalent<sup>2</sup>.

## 1.4.2 UXO Clearance Activities

Due to the location of the Project, and given the UXO risk based on surveys to date, it is highly unlikely that any UXO clearance activities will be required. However, a protocol for UXO clearance has been considered within this MMMP as a contingency measure in the event that any UXO are located. UXO clearance may be required prior to the construction and operations of the Project, but the clearance activities may not require detonation. The potential UXO clearance activities will follow a hierarchal strategy and this has four options;

- Avoidance – spatially avoiding any UXO finds during construction works;
- Relocation (sometimes called ‘lift and shift’) – moving UXO to a safe location;
- Low-noise methods of *in situ* clearance – the use of techniques such as low-order deflagration, which causes a rapid burn of the explosive content to make safe the UXO without detonating it; and
- As a last resort, detonation – initiating a high-order detonation of the UXO through the ignition of an explosive donor charge adjacent to the UXO:

*As highlighted in the underwater noise modelling and assessment report (Subacoustech Environmental, 2024) the noise levels generated by UXO clearance activities may be affected by multiple factors. The methodology from Soloway and Dahl (2014) has been used to determine the peak sound pressure level (SPL<sub>peak</sub>), sound exposure level (SEL), and sound exposure level single strike (SEL<sub>ss</sub>). This information has been used in addition to Southall et al. (2019) to produce the injury levels and ranges of the relevant marine mammal species (Section 1.2.1) and hearing ranges (Table 1-2). Table 1-3 to*

Table 1-5 details the sound levels and ranges the relevant marine mammal species are likely to be impacted at.

*Table 1-3 Summary of the unweighted SPL<sub>peak</sub> and SEL source levels used for UXO clearance modelling.*

Charge Weight (kg)	SPL <sub>peak</sub> source level (dB re 1 μPa at 1 m)	SEL source level (dB re 1 μPa <sup>2</sup> s at 1 m)
0.5 (low-order deflagration)	272.1	217.1
25 (+ donor)	284.9	228.0
55 (+ donor)	287.5	230.1
120 (+ donor)	290.0	232.3
240 (+ donor)	292.3	234.2
525 (+ donor)	294.8	236.4
700 (+ donor)	295.8	237.2

<sup>2</sup> These UK JNCC-recognised courses train MMOs to undertake marine mammal watches to reduce the risk of injury to marine mammals from marine activities e.g. geophysical surveys.

Charge Weight (kg)	SPL <sub>peak</sub> source level (dB re 1 $\mu$ Pa at 1 m)	SEL source level (dB re 1 $\mu$ Pa <sub>2s</sub> at 1 m)
800 (+ donor)	296.2	237.5

Table 1-4 Summary of the PTS and TTS impact ranges for UXO detonation using the impulsive, unweighted SPL<sub>peak</sub> noise criteria from Southall et al. (2019) for marine mammals.

Charge Weight (kg)	Estimated Impact Range (m)							
	PTS (impulsive)				TTS (impulsive)			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
0.5 (low order)	220	80	1200	240	410	130	2300	450
25 (+ donor)	820	260	4600	910	1500	490	8500	1600
55 (+ donor)	1000	340	6000	1100	1900	640	11000	2100
120 (+ donor)	1300	450	7800	1500	2500	830	14000	2800
240 (+ donor)	1700	560	9800	1900	3200	1000	18000	3500
525 (+ donor)	2200	730	12000	2500	4100	1300	23000	4600
700 (+ donor)	2400	810	14000	2700	4500	1400	25000	5000
800 (+ donor)	2600	840	14000	2800	4700	1500	26000	5300

Table 1-5 Summary of the PTS and TTS impact ranges for UXO detonation using the impulsive, weighted LE, *p* noise criteria from Southall et al. (2019) for marine mammals.

Charge Weight (kg)	Estimated Impact Range (m)							
	PTS (impulsive)				TTS (impulsive)			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
0.5 (low order)	320	< 50	110	60	4500	< 50	930	800
25 (+ donor)	2200	< 50	570	390	29000	150	2400	5200
55 (+ donor)	3200	< 50	740	570	41000	210	2800	7500
120 (+ donor)	4700	< 50	950	830	57000	300	3200	10000
240 (+ donor)	6500	< 50	1100	1100	76000	390	3500	14000

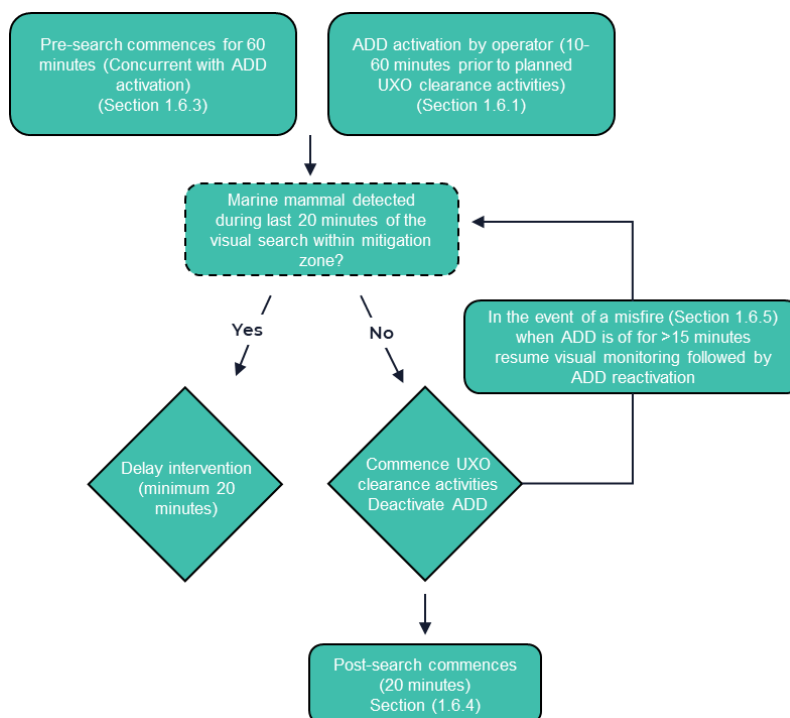
Charge Weight (kg)	Estimated Impact Range (m)							
	PTS (impulsive)				TTS (impulsive)			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
525 (+ donor)	9500	60	1400	1500	100000	530	4100	22000
700 (+ donor)	10000	60	1500	1900	110000	590	4100	22000
800 (+ donor)	11000	70	1600	2000	120000	620	4200	23000

### 1.4.3

## Overview of Approaches

This section of the MMMP details the operational steps to be taken during the period of potential impact. The section details the mitigation measures which will be employed during the UXO clearance activities to reduce the potential for injury to marine mammals from the Project surveys and the UXO clearance activities.

As highlighted in Section 1.4.2, due to the location of the Project it is highly unlikely for UXOs to be present, in addition the Project will follow the hierarchy for UXO clearance (Figure 1-2). Whilst it is highlighted that high order clearance is an option, the likelihood of this occurring is so low that it would not represent the realistic worst-case scenario. However, should it be required, the mitigations below would be likely to be adequate enough to ensure any potential effects would not be 'significant'.



*Figure 1-2 Hierarchical flowchart for decision making of UXO clearance activities*



#### 1.4.4 Acoustic Deterrent Devices (ADD)

Due to the extremely high amplitude of the sound pressure resulting from UXO detonation (Table 1-3) an ADD<sup>3</sup> will be used to mitigate the risk of injury to marine mammals during UXO clearance (Section 1.4.2). Following the hierarchy in Section 1.4.2, the use of ADD will be applied during tier 3: the low-noise (e.g. low-order deflagration) and tier 4: the high-order detonation of UXO. ADDs are not required for tier 1: avoidance and tier 2: relocation (lift and shift) of UXO. The Project will ensure a trained ADD operator is used during the low-order and high-order disposal of any potential UXOs.

ADDs emit a loud, mid-frequency (ca. 12 kHz) sound signal with the intention of deterring marine mammals from the area close to where they are deployed. The guidance from NPWS (2014) highlights a reduction impacts to marine mammals in the form of disturbance and injury. Whilst the use of ADDs will result in a potential disturbance to the marine mammal species in the area it will reduce the impacts of greater disturbance and injury from the UXO clearance activities. This is supported the JNCC guidelines which notes that ADDs have the potential to reduce the risk of injury to marine mammals by causing them to flee from locations where even louder sounds might be expected, for example close to any UXO clearance activities. Within the UK there have been previous projects including Hornsea One, Two, and Three, and East Anglia One which have used ADDs<sup>4</sup> during UXO clearance activities and have reported this form of mitigation as being successful in reducing potential impacts to EPS.

Prior to any ADD being used at the Project Area, the ADD will be calibrated by the manufacturer and an additional calibration check carried out by the ADD operator/ MMOs prior to being brought on the vessel for departure. An additional sound test will be undertaken on the vessel prior to deploying the ADD. The guidelines provided by NPWS (2014) and the JNCC (2023) will be adhered to, ensuring the maximum effectiveness of the device and minimum additional adverse impacts. This includes deploying the ADD as near as is reasonably practicable to the UXO that is undergoing clearance activities. The ADD will be deployed in midwater, a minimum of 2 m below the keel of the vessel from which it is deployed and will be switched off immediately after the UXO clearance activities have commenced.

##### 1.4.4.1 Previous Project Use of ADD efficiency

The use of ADDs as a mitigation measure for reducing the risk of disturbance and injury to marine mammals has been increasingly used and previous projects and studies have highlighted the benefits to using this as a mitigation measure. Graham *et al.* (2019) used wind farm construction operations at Beatrice Offshore Windfarm Ltd (BOWL) in the Moray Firth as an *in-situ* experiment to evaluate the effectiveness of ADDs. The Graham *et al.* (2019) study assessed the response behaviours of harbour porpoise to ADDs and pile driving, and the response to pile driving only<sup>5</sup>. It was determined that the short-term response to the cumulative impact on harbour porpoise was greater with the addition of ADDs than pile driving alone. However, the study also referenced an increase in probability of response due to increase vessel activity. Additionally, within the Moray Firth, Thompson *et al.* (2020) noted a strong behavioural response from harbour porpoise following a 15-minute experimental exposure to an ADD.

Information within a recent JNCC report (McGarry *et al.* 2022) has also been considered to determine the optimal mitigation measures using ADDs. The report considered the risk of hearing damage on marine mammals, i.e. PTS and TTS. It was concluded that whilst TTS could occur at short ranges for some ADDs, the risk of auditory injury from ADDs was low. Furthermore, Boisseau *et al.* (2021) reported that the ADDs (specifically Lofitech AS Seal Scarer) is effective at evoking a deterrence response in minke whales, suggesting that this device could be effective at reducing any potential for auditory injury from exposure to sound generated during UXO intervention for low frequency cetaceans (Table 1-2).

<sup>3</sup> The exact model will be discussed and agreed with the Relevant Regulator

<sup>4</sup> The model of ADD used by these projects was the Lofitech AS Seal Scarer

<sup>5</sup> Whilst the Project will not use any piling techniques, this study provides a relevant comparison between a noise impact source (e.g. UXO clearance) with and without the use of an ADD mitigation measure and therefore has been considered to evaluate efficiency.



#### 1.4.4.2 Summary

The Project will use ADDs in combination with MMOs and a PAM operator. Additionally, the use of ADDs will only occur during potential UXO clearance activities. This will adhere to the guidelines and ensure the use of ADDs do not result in unnecessary risks of disturbance to marine mammal species whilst still reducing the potential risk of injury from TTS and/ or PTS on individuals. The duration of ADD operation has been proposed based on the predicted range of PTS onset for a VHF cetacean (harbour porpoise (

Table 1-2)), assuming an animal flees at  $1.5 \text{ m s}^{-1}$ , with a minimum ADD activation duration of 10 minutes. The maximum duration of ADD operation is proposed to be 60 minutes, concurrent with visual MMOs (

Table 1-6). ADD will be deactivated as soon as the detonation is complete.

There is no evidence of ADD efficacy for activation periods of >60 minutes. In addition, Thompson *et al.* (2020) reported that far-field responses to ADD playback were evident in a controlled, scientific study in the Moray Firth from only a 15 minute ADD activation, where there was a 50 % probability of a harbour porpoise response within 21.7 km of the ADD. For this reason, the maximum proposed ADD activation is 60 minutes (for charge sizes 700 (+donor charge) NEQ kg).

*Table 1-6 Sound pressure levels associated with UXO high-order detonation, for a range of potential UXO charge sizes (SPL<sub>peak</sub> dB re 1  $\mu\text{Pa}$  @ 1 m) and associated ranges for the onset of PTS (in metres) for marine mammals calculated for the Project (Subacoustech, 2024)*

Charge size (NEQ kg)	0.5 (low order)	25 (+donor)	55 (+donor)	120 (+donor)	240 (+donor)	525 (+donor)	700 (+donor)	800 (+donor)
Source sound pressure level (SPL <sub>pk</sub> )	272.1	284.9	287.5	290.0	292.3	294.8	295.8	296.2
Range of PTS onset (worst case detonation; VHF cetacean) (m)	2,300	8,500	11,000	14,000	18,000	23,000	25,000	26,000
ADD playback duration (minutes)	10	10	15	25	35	40	60	60

#### 1.4.5 Marine Mammal Observers (MMO)

The MMO protocol will apply to the UXO clearance activities which includes both low-noise (e.g. low-order deflagration) and high-order hierarchy tiers. It does not apply to relocation (lift and shift) of UXO. As detailed in Section 1.4.1 the surveys do not pose a significant impact to marine mammals and therefore MMOs are not likely to offer any additional protection to cetaceans relating to the use of Project survey methods. The Project will ensure that at least two trained MMOs will be present during

the UXO clearance activities (Low noise and high order) will undertake a pre-intervention watch (Section 1.4.6).

The MMO will have undergone formal marine mammal observation and distance estimation training e.g. a UK JNCC MMO training course or equivalent, have knowledge and experience in identifying Irish marine mammal species and at least one of the MMOs will be experienced<sup>6</sup>. This follows best practice in line from the NPWS (2014) and JNCC (2023) guidelines.

Prior to the monitoring and intervention, there will be consideration of the environmental (e.g. meteorological) conditions and other mitigation measures which will contribute to the decision on whether to proceed with UXO clearance activities. The Project will commit to only commencing with the UXO clearance activities during hours of daylight with good visibility using MMOs and a PAM operator. Monitoring will be undertaken only when environmental conditions allow effective observation of the mitigation zone<sup>7</sup> which are:

- Daylight hours – between sunrise and sunset
- Good visibility (> 5 NM)
- Sea state no greater than Beaufort 3

#### 1.4.6 Pre-search

During the UXO clearance activities there will be MMOs positioned in an elevated area on the vessel with unobstructed vision of the entire mitigation zone, as far as possible. The MMOs will follow the NPWS and JNCC guidelines and observe a minimum mitigation zone of 1 km from the source of explosion with a clear view of the search area for the duration of the clearance operations.

The MMOs will commence a pre-search over the mitigation zone for **60 minutes**, and this pre-search will continue throughout the UXO clearance activities in line with NPWS (2014) and draft JNCC guidelines (2023). Depending on the ADD activation time the pre-intervention search may occur concurrently with ADD activation (for example if the ADD is activated for 60 minutes this would occur concurrently with the 60-minute search). Should any marine mammals be recorded within the mitigation zone then a delay will occur: no UXO clearance activities will take place for either the remainder of the 60-minute pre-watch or 20 minutes, whichever is greater. This will allow the marine mammals to relocate from the mitigation zone. The MMOs will monitor and track the marine mammal(s) until all individuals have vacated the mitigation zone. The clearance will only occur after no marine mammals have been detected within the mitigation zone for a **minimum of 20 minutes**. Once there has been no detection of any individuals within the mitigation zone for at least 20 minutes then the UXO clearance activities can commence

#### 1.4.7 Post-search

Upon completion of the UXO clearance the MMOs will conduct a post-intervention search recording any notable information. This search will be conducted for a minimum of 20 minutes and will record any instances of injury or death of marine life, including fish. Any notable observations made by the MMOs will also be recorded and provided with the results in a post-intervention report for submission to the relevant regulator.

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<sup>6</sup> Will have a minimum of 20 weeks' experience of implementing JNCC noise mitigation guidelines in UK waters, ideally within last 5 years, but no later than within the last 10 years

<sup>7</sup> The Project will ensure the vessels provide adequate height to allow for the MMOs to conduct the visual scans to the required distances (Section 1.4.6)

#### 1.4.8 Misfires

In the event of a misfire, visual monitoring should continue and the ADD activation should be resumed as soon as practicable. If, during the misfire, the ADD is inactive for  $\leq 15$  minutes, there is no minimum ADD duration prior to intervention, as animals are not likely to have returned to the vicinity of the UXO clearance activities within this time period. If the ADD is inactive for  $> 15$  minutes, it must be active for a minimum of 20 minutes (max 60 minutes) for low order and 60 minutes for any high order intervention prior to the subsequent clearance attempt.

#### 1.4.9 Unexpected Delays

If there is an operational delay to UXO clearance activities following the commencement of the marine mammal mitigation measures, the UXO manager (Section 1.5.1) will confirm the expected delay to the UXO clearance activities. This will dictate the subsequent sequence of events:

- If the delay is likely to be  $< 20$  minutes, then the ADD playback and MMOs and PAM will continue until the UXO clearance activities takes place;
- If the delay is likely to be  $> 20$  minutes, then the ADD should be deactivated and mitigation measures (including full pre-search (Section 1.4.6) shall re-commence once operations can be restarted.

### 1.5 Key Personnel

#### 1.5.1 UXO Manager

The UXO manager will be offshore during the works and is responsible for compliance to this MMMP throughout the UXO clearance activities and is responsible for all other personnel implementing this MMMP. This will include confirming and agreeing this protocol with the MMOs and ADD operator. The UXO manager will be responsible for communicating with the MMOs and ADD operator during works and notifying them in good time ahead of UXO intervention such that the protocol can be followed.

#### 1.5.2 ADD Operator

The ADD operator (will also be a trained MMO) will be responsible for the appropriate use and deployment of the ADD, including testing, deploying, monitoring and retrieving the ADD at the appropriate time. This will require communication with the lead MMO and the UXO manager to ensure watches and ADD deployments are coordinated.

#### 1.5.3 Lead MMO

The lead MMO will be an experienced observer, and is responsible for all MMO watches, data collection and reporting (Section 1.7). The lead MMO is responsible for communication with the UXO manager to enable disposal activities to commence and will be required to notify the UXO manager when a cessation in operations is required e.g. in the event that a marine mammal is observed with the mitigation zone (Figure 1-2). They will be supported by a second MMO, in line with the NPWS guidelines (2014) and draft JNCC guidelines (2023).

### 1.6 Communication

The following summary details the chain of communication and communication strategy that will be implemented during UXO clearance operations:

- The UXO manager will inform the MMO and ADD operator of the planned commencement of operations at least 90 minutes in advance;
- The lead MMO, will communicate to the ADD operator when the MMO watch may be conducted and when the ADD may be activated;
- The ADD operator must, following agreement with the lead MMO activate the ADD for the required duration, and confirm to the UXO manager when it is safe to commence disposal activities;
- The UXO manager must assist the ADD operator/s in recording accurate timings of the interventions and the charge weights to be used.

The UXO Manager will be responsible for implementing the MMMP and providing the survey data and report following completion of the UXO clearance campaign to the lead MMO.

## 1.7

# Data Collection and Reporting

In line with the NPWS (2014) guidance the Project will be required to collect data and report to the relevant authorities. The guidance highlights the difference in recording and operating for ‘Geophysical Acoustic Surveys’ and ‘Other Coastal/ Marine Works’. The data collection and reporting is detailed respectively in Section 1.7.1.1 and 1.7.1.2 below.

## 1.7.1

# Project Statement to Requirements

The Applicant and MMOs tasked with monitoring the Project activities in relation to the technical guidance and with conducting survey effort for marine mammals in accordance with the NPWS (2014) guidance, will submit a report to the relevant Regulatory Authority within 30 days of completion of the relevant geophysical acoustic surveys as detailed in Section 1.4.1 and UXO clearance activities as detailed in Section 1.4.2. This will include a daily log detailing the testing and operation of all relevant sound-producing equipment/activities and a record of all marine mammal detections as detailed in the operations report (Section 1.7.1.3) and MMO Report (Section 1.7.1.4).

## 1.7.1.1

# Geophysical Acoustic Surveys

The data collection and reporting under the geophysical acoustic surveys will apply to the geotechnical investigations (Section 1.4.1.1) and USBL operations (Section 1.4.1.2) to be undertaken by the Project. The Project will follow the guidelines as detailed below. The Project will adhere to the reporting of the data requirements using the standard data forms and will include the following data from the following, operations report (Section 1.7.1.3) and MMO Report (Section 1.7.1.4). The standard data forms which will be used during the Project surveys to inform the operations report and MMO report are provided in Appendix A.

## 1.7.1.2

# Other Coastal/Marine Works

The data collection and reporting under the Other Coastal/Marine Works will apply to the UXO clearance activities (Section 1.4.2) to be undertaken by the Project. The Project will follow the guidelines as detailed in Section. The Project will adhere to the reporting of the data requirements using the standard data forms and will include the following data from the following, operations report (Section 1.7.1.3) and MMO Report (Section 1.7.1.4). The standard data forms which will be used during the Project surveys to inform the operations report and MMO report are provided in Appendix B.

### 1.7.1.3 Operations Report

The Project survey 'operations report' will follow the NPWS (2014) guidance and provide the relevant required information as detailed below:

- Details of both the Applicant and the contractor used to complete the relevant survey activities;
- Details of the platform/ vessel type(s) participating in the plan/project
- The survey reference number supplied by the Regulatory Authority or other statutory body.
- Date and location of the Project.
- Latitudes, longitudes or grid references for the Project survey area

### 1.7.1.4 MMO Report

The Project survey 'MMO report' will follow the NPWS (2014) guidance and provide an MMO report with the following information and structure as detailed below:

- Executive Summary
  - Concise text at the beginning of the report which highlights the MMO work undertaken
- Introduction
  - Overview of the date and location of Project
  - Details of the MMOs including address, and qualifications
  - Details of any relevant equipment
  - Details of any further platform and/ or vessels used during the survey
- Marine mammal observations
  - All detections of marine mammals which occurred during the survey
  - All detections made prior to the commencement of the survey
  - All responses from the vessels/ operations as a result of the presence of individuals in the area and the associated outcomes;
  - All occurrences of night-time surveys, continuation into poor weather and stoppages, this will include details on the rationale and how it was ensured monitoring was still being effectively carried out (e.g. PAM);
  - Details of monitoring watches conducted for marine mammals.
  - Details of all marine mammal sightings recorded during monitoring watches.
  - Details of all marine mammal sightings recorded outside monitoring watches (e.g., incidental observations), including records from additional personnel on board.
- Details of observation platform used for marine mammal monitoring
  - Details of the observation platform used for marine mammal monitoring, including its height above sea level.
- Details of all sound-producing operations undertaken during period of works
- Details of monitoring watches conducted for marine mammals
  - Including environmental data (e.g. visibility, wind, sun glare, sea state etc.)
- Details of any problems encountered during marine mammal monitoring, start-up procedures, ramp-up (soft start) procedures or during full scale operation/activity.
- Concluding statement
  - This will include details regarding the operational efficacy of the mitigation measures performed (detailed in Section 1.4.3).

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## APPENDIX A STANDARD DATA FORMS FOR GEOPHYSICAL ACOUSTIC SURVEYS

### MARINE MAMMAL RECORDING FORM - COVER PAGE

<b>Regulatory reference number</b> (e.g. DECC no., MMS permit no., OCS lease no., etc.)	<b>Country</b>	<b>Ship/ platform name</b>
<b>Client</b>	<b>Contractor</b>	<b>Survey type</b> <input type="checkbox"/> site <input type="checkbox"/> 4C <input type="checkbox"/> 2D <input type="checkbox"/> VSP <input type="checkbox"/> 3D <input type="checkbox"/> WAZ <input type="checkbox"/> 4D <input type="checkbox"/> other <input type="checkbox"/> OBC
<b>Start date</b>	<b>End date</b>	

<b>Number of source vessels</b>	<b>Type of source (e.g. airguns)</b>	<b>Number of airguns (only if airguns used)</b>	<b>Source volume (cu. in.)</b>
<b>Source depth (metres)</b>	<b>Frequency (Hz)</b>	<b>Intensity (dB re. 1 µPa or bar metres)</b>	<b>Shot point interval (seconds)</b>
<b>Method of soft start</b> <input type="checkbox"/> increase number of guns <input type="checkbox"/> increase pressure (where permitted) <input type="checkbox"/> increase frequency (where permitted) <input type="checkbox"/> other			

<b>Visual monitoring equipment used (e.g. binoculars, big eyes, etc.)</b>	<b>Magnification of optical equipment (e.g. binoculars)</b>	<b>Height of eye (metres)</b>	<b>How was distance of animals estimated?</b> <input type="checkbox"/> by eye <input type="checkbox"/> with laser rangefinder <input type="checkbox"/> with rangefinder stick/ calipers <input type="checkbox"/> with reticle binoculars <input type="checkbox"/> by relating to object at known distance <input type="checkbox"/> other
<b>Number of dedicated MMOs</b>	<b>Training of MMOs</b> <input type="checkbox"/> INCC approved MMO induction course for UK waters <input type="checkbox"/> PSO training course for the Gulf of Mexico <input type="checkbox"/> MMO training course for Irish waters <input type="checkbox"/> other <input type="checkbox"/> none		

<b>Was PAM used?</b> <input type="checkbox"/> yes <input type="checkbox"/> no	<b>Number of PAM operators</b>	
<b>Description of PAM equipment</b>		
<b>Range of PAM hydrophones from airguns (metres)</b>	<b>Bearing of PAM hydrophones from airguns (relative to direction of travel)</b>	<b>Depth of PAM hydrophones (metres)</b>

Regulatory reference number ..... Ship/ platform name .....

Complete this form every time the airguns are used, including overnight, whether for shooting a line or for testing or for any purpose. Times should be in UTC, using the 24 hour clock.

[illegible]



Regulatory reference number ..... Ship/ platform name .....

**Start a new line on form if any one of these changes**

[illegible]

### MARINE MAMMAL RECORDING FORM - SIGHTINGS

<b>Regulatory reference number</b> (e.g. DECC no., MMS permit no., OCS lease no., etc.)	<b>Ship/ platform name</b>	<b>Sighting number</b> (start at 1 for first sighting of survey)	<b>Acoustic detection number</b> (start at 500 for first detection of survey)
<b>Date</b>		<b>Time at start of encounter</b> (UTC, 24hr clock)	<b>Time at end of encounter</b> (UTC, 24hr clock)
<b>Were animals detected visually and/ or acoustically?</b>  <input type="checkbox"/> visual <input type="checkbox"/> acoustic <input type="checkbox"/> both	<b>How were the animals first detected?</b> <input type="checkbox"/> visually detected by observer keeping a continuous watch <input type="checkbox"/> visually spotted incidentally by observer or someone else <input type="checkbox"/> acoustically detected by PAM <input type="checkbox"/> both visually and acoustically before operators/ observers informed each other		
<b>Observer's/ operator's name</b>	<b>Position</b> (latitude and longitude)	<b>Water depth</b> (metres)	
<b>Species/ species group</b>		<b>Description</b> (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)	
<b>Bearing to animal</b> (when first seen or heard)	<b>Range to animal</b> (when first seen or heard) (metres)		
<b>Total number</b>	<b>Number of adults</b> (visual sightings only)	<b>Number of calves</b> (visual sightings only)	
<b>Behaviour</b> (visual sightings only)			
<b>Direction of travel</b> (relative to ship) <input type="checkbox"/> towards ship <input type="checkbox"/> away from ship <input type="checkbox"/> parallel to ship in same direction as ship <input type="checkbox"/> travelling in opposite direction to ship		<b>Direction of travel</b> (compass points) <input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> NE <input type="checkbox"/> SW <input type="checkbox"/> E <input type="checkbox"/> W <input type="checkbox"/> SE <input type="checkbox"/> NW <input type="checkbox"/> variable	
<b>Airgun (or other source) activity when animals first detected</b>  <input type="checkbox"/> full power <input type="checkbox"/> not firing <input type="checkbox"/> soft start <input type="checkbox"/> reduced power (other than soft start)	<b>Airgun (or other source) activity when animals last detected</b>  <input type="checkbox"/> full power <input type="checkbox"/> not firing <input type="checkbox"/> soft start <input type="checkbox"/> reduced power (other than soft start)	<b>Closest distance of animals from airguns (or other source)</b> (metres)	<b>Time of closest approach</b> (UTC, 24hr clock)
		<b>If seen during soft start give:</b> <b>First distance    Closest distance    Last distance</b> during soft start (metres)	
<b>What action was taken?</b> (according to requirements of guidelines/ regulations in country concerned)  <input type="checkbox"/> none required <input type="checkbox"/> delay start of firing <input type="checkbox"/> shut-down of active source <input type="checkbox"/> power-down of active source <input type="checkbox"/> power-down then shut-down of active source		<b>Length of power-down and/ or shut-down</b> (if relevant) (length of time until subsequent soft start, in minutes)	<b>Estimated loss of production</b> (if relevant) <b>due to mitigating actions</b> (km)

## DATA FORM FOR COASTAL/MARINE WORKS - RECORD OF OPERATION/ACTIVITY

Complete this form every time the sound-producing operation or activity (e.g., drilling, pile driving, blasting) occurs including overnight, whether for testing, full operation or any other purpose.


[illegible]

Location:..... Platform name:..... Platform type:..... Client: ..... MMO(s): .....

[illegible]

### DATA FORM FOR COASTAL/MARINE WORKS - MARINE MAMMAL SIGHTING RECORDS

*Options in italics should be circled or underlined as appropriate. Complete 1 record per sheet.*

<b>Operation/Activity</b> (please tick)		<b>Dredging</b>	<b>Drilling</b>	<b>Pile Driving</b>	<b>Blasting</b>	<b>Other (specify)</b>
<b>Date</b> (dd/mm/yyyy)	<b>Time</b> (Local)		<b>Time</b> (GMT/UTC)		<b>Sighting Record no.</b>	
<b>How did this sighting occur?</b> (please tick) While you were keeping a continuous watch for marine mammals _____ Spotted incidentally by you or someone else _____ Other (please specify) _____ Details: .....						
<b>Platform type &amp; name</b> (e.g. ship, rig, headland)				<b>Observer's name</b>		
<b>Observer's position</b> (Latitude/Longitude or 8-figure Grid reference)					<b>Water depth</b> (metres) (if available)	
<b>Species recorded</b>			<b>Certainty of identification</b> (underline) <i>Definite / probable / possible</i>			
<b>Total number of animals</b> (best estimate)		<b>No. of adults</b>	<b>No. of juveniles</b>	<b>No. of calves</b>		
<b>Maximum number</b> (estimated total)		<b>Minimum number</b> (estimated total)				
<b>Description</b> (include features such as overall size; shape of head; position, shape and size of dorsal fin; colour and patterning; height, direction, shape of blow)				<b>Photograph or video taken</b> Yes / No		
				<b>Direction of travel of animals in relation to platform/vessel</b> (draw arrow) <div style="text-align: center;">  </div>		
<b>Behaviour</b>				<b>Direction of travel of animals</b> (compass points or degrees)		
<b>Activity of platform/vessel</b>	<b>Operation/activity under way</b> (when animals first seen)		<b>Closest distance of animals from platform/vessel</b> (metres) (Record even if not operating)			
	<i>Yes / No / Pre-Start watch</i>					