Rampion 2 WIND FARM

Rampion 2 Wind Farm
Category 7:
Other Documents
Draft UXO Clearance Marine Mammal Mitigation Protocol (clean)

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Executive Summary

The aim of this Draft unexploded ordnance (UXO) clearance Marine Mammal Mitigation Plan (the Draft UXO clearance MMMP) (Document Reference: 7.15) is to detail the contingency measures which could be proposed to reduce the risk of permanent threshold shift (PTS) auditory injury to any marine mammal species in the close proximity to UXO clearance. **Section 1** provides an introduction. **Section 2** provides a summary of the Proposed Development. **Section 3** provides an overview of potential impacts. **Section 4** outlines the proposed embedded mitigation measures to reduce the potential impacts from UXO clearance, and **Section 5** sets out the potential mitigation measures.

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1. Introduction

1.1 Purpose of this document

1.1.1 The aim of this Draft unexploded ordnance (UXO) clearance Marine Mammal Mitigation Plan (the Draft UXO clearance MMMP) (Document Reference: 7.15) is to detail the contingency measures which could be proposed to reduce the risk of permanent threshold shift (PTS) auditory injury to any marine mammal species in the close proximity to UXO clearance to negligible (as defined in **Table 11.17** in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11)). This Draft UXO clearance MMMP draws on the guidance provided by the Joint Nature Conservation Committee (JNCC, 2010) and Statutory Nature Conservation Bodies (SNCBs) recommendations with regards to use of Acoustic Deterrent Devices (ADD) (JNCC, 2022), alongside current industry best-practise measures.

1.1.2 During pre-construction separate MMMPs for UXO clearance and piling will be developed for Rampion 2. The Final MMMPs will be updated to take account of the most suitable mitigation measures available. These measures will be consulted upon with the Natural England and other stakeholders as appropriate, including The Wildlife Trusts (TWT).

1.2 Implementation of the Draft UXO clearance MMMP

1.2.1 Following the granting of the Development Consent Order (DCO), and once the final project design has been confirmed, a Final UXO Clearance Marine Mammal Mitigation Plan (the Final UXO Clearance MMMP) will be prepared following the principles established in this Draft UXO clearance MMMP (as required under DCO Condition 11 of Schedule 11 and 12 of the deemed marine licences for generation and transmission assets). Details regarding proposed mitigation can be found in embedded mitigation (**Table 4-1**).

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2. Description of the Proposed Development

2.1 Key relevant project characteristics and maximum design scenario (MDS)

2.1.1 Rampion Extension Development Limited (hereafter referred to as 'RED') (the Applicant) is developing the Rampion 2 Offshore Wind Farm Project (Rampion 2) located adjacent to the existing Rampion Offshore Wind Farm Project ('Rampion 1') in the English Channel.

2.1.2 Rampion 2 will be located between 13km and 26km from the Sussex Coast in the English Channel and the offshore array area will occupy an area of approximately 160km^2.

2.1.3 The key offshore elements of the Proposed Development will be as follows:

- up to 90 offshore wind turbine generators (WTGs) and associated foundations;
- blade tip of the WTGs will be up to 325m above Lowest Astronomical Tide (LAT) and will have a 22m minimum air gap above Mean High Water Springs (MHWS);
- inter-array cables connecting the WTGs to up to three offshore substations;
- up to two offshore interconnector export cables between the offshore substations;
- up to four offshore export cables each in its own trench, will be buried under the seabed within the final cable corridor; and
- the export cable circuits will be High Voltage Alternating Current (HVAC), with a voltage of up to 275kV.

2.1.4 The key onshore elements of the Proposed Development will be as follows:

- a single landfall site near Climping, Arun District, connecting offshore and onshore cables using Horizontal Directional Drilling (HDD) installation techniques;
- buried onshore cables in a single corridor for the maximum route length of up to 38.8km using:
  - trenching and backfilling installation techniques; and
  - trenchless and open cut crossings.
- a new onshore substation, proposed near Cowfold, Horsham District, which will connect to an extension to the existing National Grid Bolney substation, Mid Sussex, via buried onshore cables; and

- extension to and additional infrastructure at the existing National Grid Bolney substation, Mid Sussex District to connect Rampion 2 to the national grid electrical network.

2.1.5 A full description of the Proposed Development is provided in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

2.1.6 The detailed design of Rampion 2 (for example: numbers of wind turbines, layout configuration, foundation type and requirement for scour protection) will not be fully determined until post-consent. Therefore, realistic worst-case scenarios (WCS) in terms of potential impacts/effects are adopted to undertake a precautionary and robust impact assessment (see **Section 11.9** of **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11).

2.1.7 There is the likely requirement for UXO clearance prior to construction of Rampion 2 based on the data from Rampion 1 UXO clearance (MLA/2015/00140)[1], Fécamp Offshore Wind Farm[2], Courseulles-sur-Mer Offshore Wind Farm[3], OSPAR munition encounters[4]. Whilst any underwater UXO that are identified would preferentially be avoided, it is necessary to consider the potential for underwater UXO detonation where retrieval is deemed to be unsafe and avoidance is not possible. UXO clearance will be controlled through a separate Marine Licence (ML).

2.1.8 The exact number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. It has been estimated, based on the UXO ML which were granted for the currently operational Rampion 1 offshore wind farm, that there could be up to 20 UXO[5] within the array and export cable corridor area. A geophysical survey will be completed prior to construction and the results of which will identify potential UXO and UXO hazards. A visual assessment of potential UXO will be carried out using a remotely operated vehicle to confirm if they are confirmed UXO.

2.1.9 It is not currently known the size or type of the UXO that could be present in the area, therefore a range of charge sizes have been considered (**Appendix 11.3: Underwater noise assessment technical report, Volume 4** of the ES (Document Reference: 6.4.11.3)), with a maximum charge weight of up to 525kg.

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[1] Two UXO were identified in the offshore cable route and disposed of in 2016

[2] 205 potential UXO targets investigated, one was identified in the export cable route and disposed of in 2021. Available at: [redacted] (Date accessed: 6 June 2023)

[3] Three UXO were identified and disposed of in 2021. Available at [redacted] (Date accessed: 6 June 2023)

[4] Available at: [redacted] (Date accessed: 6 June 2023)

[5] Number licenced to detonate at Rampion 1 offshore wind farm, Licence number: MLA/2015/00326/1, Case ref: MLA/2015/00140. Total UXO detonated was two.

2.1.10 The maximum charge weight assumed is considered to provide a good baseline for predicting and measuring the worst-case effects of any UXO that could be encountered within the offshore development area.

2.2 Key relevant project characteristic and worst-case scenario (WCS)

2.2.1 **Table 2-1** details the project characteristics and estimation of number and size of UXO at Rampion 2. For full details see **Appendix 11.3: Underwater noise assessment technical report, Volume 4** of the ES (Document Reference: 6.4.11.3).

Table 2-1 Key relevant project characteristics

Characteristic	UXO clearance
Rampion 2 wind farm site area	196km^2
Maximum offshore cable corridor area	59km^2
Rampion 2 wind farm site water depth range	15m to 65m below LAT
Closest distance to shore of wind farm array area	13km
Estimated number of UXO	Up to 20*
Estimated size of UXO	Up to 525kg**
*Indicative only – based on best available information from Rampion 1 UXO ML (Licence number: L/2015/00326/1, Case ref: MLA/2015/00140). **a 2,000 lb (907.2 kg) German air dropped bomb would have a net explosive quantity of 525 kg	

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3. Overview of potential impacts

3.1.1 RED has made the assessment of potential impacts to marine mammals as part of the EIA and this has been reported in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11).

3.1.2 The potential impacts from underwater noise from UXO clearance at Rampion 2 have been assessed for PTS on harbour porpoise, bottlenose dolphin, common dolphin, minke whale, grey seal and harbour seal (**Table 3-1**). Additional detail on the UXO assessment on marine mammals can be found in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11) and **Appendix 11.3: Underwater noise assessment technical report, Volume 4** of the ES (Document Reference: 6.4.11.3).

3.1.3 Whilst any identified UXO would preferentially be avoided, it is necessary to consider the requirement for underwater UXO detonation where it is deemed unsafe to retrieve the UXO from the seafloor.

3.1.4 UXO clearance has the potential to produce underwater noise capable of causing injury and disturbance to marine mammals. This Draft UXO Clearance MMMP details how RED would reduce the risk of underwater noise of UXO clearance causing auditory injury to marine mammals that could be present in and around the Rampion 2 site.

3.1.5 The Final UXO Clearance MMMP will be developed in the pre-construction period, where more information is available on the sizes and locations of any UXO devices present and mitigation available. The implementation of mitigation measures, such as bubble curtains, would further reduce the impacts of high order UXO clearances for all species.

Summary of potential impacts

3.1.6 For different UXO charge sizes, the predicted PTS onset impact ranges from Southall et al., (2019) are presented in **Table 3-1**. Both the maximum instantaneous (peak Sound Pressure Level - SPL_{peak}) and cumulative (single strike Sound Exposure Level – SEL_{ss}) PTS-onset impact ranges are shown.

Table 3-1 Summary of PTS impact ranges for UXO detonations using impulsive noise criteria from Southall at al., (2019)

		25kg	55kg	120kg	240kg	525kg
Southall et al., (2019) Unweighted SPL_{peak}						
PTS	219dB re 1µPa (LF)	810m	1.0km	1.3km	1.7km	2.2km
	230dB re 1µPa (HF)	260m	340m	450m	560m	730m
	202dB re 1µPa (VHF)	4.6km	6.0km	7.7km	9.8km	2.5km
	218dB re 1µPa (PCW)	900m	1.1km	1.5km	1.9km	2.5km
Southall et al., (2019) Weighted SEL_{ss}						
PTS	183dB re 1µPa²s (LF)	2.1km	3.2km	4.6km	6.5km	9.5km
	185dB re 1µPa²s (HF)	< 50m	< 50m	< 50m	< 50m	< 50m
	155dB re 1µPa²s (VHF)	560m	740m	950m	1.1km	1.4km
	185dB re 1µPa²s (PCW)	380m	560m	830m	1.1km	1.6km

3.1.7 **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11) presents the assessment of the impacts of PTS onset from UXO clearance on marine mammals. The assessment concluded that with the application of a European Protected Species (EPS) licence and the requirement imposed through the deemed Marine Licence for the preparation and approval of the Final UXO Clearance MMMP, and its implementation in the event UXO are required to be cleared, it is expected that the risk of PTS will be negligible. Therefore, it is considered to not have a significant effect on any marine mammal species considered in the assessment.

4. Rampion 2 Embedded environmental measures

4.1 Embedded environmental measures

4.1.1 As part of the Rampion 2 design process, a number of embedded environmental measures have been adopted to reduce the potential for impacts on marine mammals. These embedded environmental measures have evolved over the development process as the EIA has progressed and in response to consultation.

4.1.2 These measures typically include those that have been identified as good or standard practice and include actions that would be undertaken to meet existing legislation requirements. As there is a commitment to implementing these embedded environmental measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of Rampion 2 and are set out in the ES.

4.1.3 All embedded mitigation measures are detailed within **Commitments Register** (Document Reference: 7.22).

4.1.4 **Table 4-1** sets out the relevant embedded environmental measures within the design and these affect the marine mammals assessment. Of primary relevance to this Draft UXO clearance MMMP, the Commitments Register includes a Commitment (**C-102**) to develop and implement a UXO clearance MMMP. The Final UXO Clearance MMMP must be in accordance with this outline document.

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Table 4-1 Relevant marine mammal embedded environmental measures

ID	Environmental measure proposed	Project phase measure introduced	How the environmental measures will be secured	Relevance to marine mammals assessment
C-51	A Vessel Management Plan will be developed pre-construction which will determine vessel routeing to and from construction areas and ports to minimise, as far as reasonably practicable, encounters with marine mammals. It will also consider vessel codes of conduct provided by WiSe Scheme, Scottish Marine Wildlife Watching Code (MWWC) and the Nature Scott "Guide to best practice for watching marine wildlife".	Scoping, updated at ES	DCO requirements or DML conditions	The Vessel Management Plan (VMP) will reduce the risk of vessel disturbance and collision risk. The assessment of vessel disturbance and collision risk are assessed in **Section 11.9 – 11.11** in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11).
C-54	A Decommissioning Marine Mammal Mitigation Protocol (MMMP) will be implemented during decommissioning. The Decommissioning MMMP will be in line with the latest relevant available guidance	Scoping	DCO requirements or DML conditions	The decommissioning MMMP will set out measures and their implementation will secure a reduction in the impact from underwater noise generated from decommissioning activities, lowering the risk of injury, including PTS.
C-102	A UXO Clearance Marine Mammal Mitigation Protocol (MMMP) will be developed in consultation with Natural England to appropriately manage the risk to marine mammals during UXO clearance. A **Draft UXO Clearance**	Scoping, updated at ES	DML conditions	The measures set out in the UXO Clearance MMMP (this Plan) will reduce the impact from underwater noise generated from the removal of UXOs, lowering the risk of injury, including PTS.

ID	Environmental measure proposed	Project phase measure introduced	How the environmental measures will be secured	Relevance to marine mammals assessment
	MMMP (Document Reference 7.15) has been submitted with this Application.			
C-275	The use of low order detonations using the 'deflagration method' will be the prioritised method of disposal for Offshore UXOs and will be implemented, where practicable.	ES	DML conditions	The use of low order detonations will secure a reductio in the impact from underwear noise generated from UXO clearance, lowering the risk of injury, including PTS.

4.1.5 In addition to the mitigation measures detailed in this Draft UXO Clearance MMMP (mitigation zone, and activation of ADDs, see **Section 5.2**), RED has also committed to the use of low order detonations where possible using the 'deflagration method' (C-275). This method involves Remotely Operated Vehicle (ROV) placing a chemical device against the UXO which triggers a burn of the explosive material, without triggering detonation. Where other less impactful methods exist at the point of applying for a Marine Licence for the works, those alternative methods may be proposed instead, where evidence support their efficacy.

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5. Draft protocols for UXO clearance

5.1 UXO clearance

5.1.1 The Final UXO Clearance MMMP will ensure there are mitigation measures to prevent the risk of any physical or permanent auditory injury to marine mammals from the clearance of UXO. This will be developed in the pre-construction period, when there is more detailed information on the level of UXO clearance required and hence, it will incorporate the most appropriate mitigation measures based upon best available information and proven methodologies at that time to mitigate the impacts of Rampion 2.

5.1.2 The possible mitigation measures outlined below are in line with current best practice. The UXO Clearance MMMP will be updated prior to construction.

5.2 Possible mitigation measures for UXO clearance

5.2.1 In order to minimise the risk of any auditory injury to marine mammals from underwater noise during UXO clearance, there is a suite of mitigation measures that RED could implement for Rampion 2 UXO clearance. These mitigation measures may include (but are not limited to) the following:

- all detonations taking place in daylight;
- the controlled explosions of UXO, undertaken by specialist contractors, using the minimum amount of explosives required to achieve safe disposal;
- consideration of any commercially available alternative and implementation where appropriate (for example: low order deflagration);
- establishment of suitable mitigation zone around the UXO before any detonation;
- monitoring of the mitigation zone (1 km) by marine mammal observation (MMOb) during daylight hours and when conditions allow suitable visibility for at least one hour pre-detonation and at least 15 minutes post-detonation after last detonation;
- deployment of passive acoustic monitoring (PAM) systems, if required, and if equipment can be safely deployed and retrieved;
- activation of acoustic deterrent devices (ADDs);
- the sequencing of detonations if there are multiple UXO in close proximity to be disposed of near simultaneously, where practicable, will start with the smallest detonation and end with the larger detonations; and
- establishing a protocol in line with JNCC guidelines in the event marine mammals are observed within the mitigation zone (JNCC, 2010).

5.2.2 The specific mitigation measures (or suite of measures) that will be implemented during the pre-construction of Rampion 2 will be determined in consultation with

the relevant Natural England, following confirmation of charge weights, collection of additional survey data (noise or geophysical) and/ or acquisition of noise monitoring data, and/ or information on maturation of emerging technologies. This additional data and information will allow the noise modelling to be updated to feed into discussions on appropriate mitigation measure(s) and the Final UXO Clearance MMMP.

5.2.3 The following sections provide a high-level methodology for each of these measures. A Final UXO Clearance MMMP will be produced prior to the relevant stage of construction for approval by the Marine Management Organisation (MMO).

Mitigation zone

5.2.4 The mitigation zone is defined as the maximum potential instantaneous PTS-onset impact range. RED will update the noise modelling prior to construction once the final project details are known. The JNCC (2010) recommends a mitigation zone with 1 km radius for UXO detonation. The actual mitigation zone for Rampion 2 UXO detonation will be confirmed in the Final UXO Clearance MMMP and will be determined based on the final confirmed charge sizes and detonation methods etc. If the final noise modelling estimates result in a PTS-onset impact range larger than the 1 km suggested in the JNCC explosives guidance, the mitigation zone will be increased to cover the PTS-onset impact.

5.2.5 The methods for achieving the mitigation zone would be agreed in consultation with the MMO, SNCBs and any other relevant stakeholders and secured as commitments within the final UXO Clearance MMMP.

Marine mammal observers (MMOb)

5.2.6 JNCC recommends a pre-detonation search of a minimum period of 60 minutes (JNCC 2010) for UXO detonation. The MMOb would undertake visual monitoring for marine mammals within the defined mitigation zone around the location from a suitable elevated platform. The MMOb would record all periods of marine mammal monitoring, including start and end times. Details of environmental conditions (sea state, weather, visibility, etc.) and any sightings of marine mammals around the vessel would also be recorded as per JNCC marine mammal recording forms and guidelines. In addition, any obvious responses of animals to the ADD activation would be recorded (e.g., a change in behaviour from milling or bottling to directed travel away from the ADD at the onset of ADD activation).

5.2.7 If, during the MMOb pre-detonation search, a marine mammal is detected within the mitigation zone, the operation will be delayed until it is assessed by the MMOb that the marine mammal has vacated the mitigation zone and a further 20 minutes have elapsed since the last detection within the mitigation zone. If there are no sightings in that 20 minute period, it can be assumed the marine mammal has left the mitigation area and detonation can commence.

5.2.8 Full details on the role and responsibilities of the MMOb with respect to explosives are described in JNCC guidelines for minimising the risk of injury to marine mammals from using explosives (JNCC, 2010).

5.2.9 The specific details regarding MMObs and methods employed will be updated in the Final UXO Clearance MMMP with respect to any updated and available guidance at the time.

Passive acoustic monitoring (PAM)

5.2.10 A PAM system may be used to allow a trained PAM operator to conduct acoustic monitoring. This would be utilised in conjunction with visual monitoring during daylight operations and/ or as an alternative method of monitoring the mitigation zone during periods of reduced visibility (for example: night[6], fog, high sea state as per JNCC, 2010). If an animal has been detected acoustically, the PAM operative should use a range indication and their judgement to determine whether the marine mammal is within the mitigation zone. If an MMOb or PAM operative is uncertain whether marine mammals are present within the mitigation zone, they should advise that the activity should be delayed as a precaution until they are certain that no animals are present. If a PAM is not available for monitoring, then UXO detonation would be unable to commence during such periods of restricted visibility that are not conducive to visual monitoring as there is a greater risk of failing to detect the presence of marine mammals.

Pre-UXO clearance deployment of ADDs

ADD choice and specification

5.2.11 If an ADD is chosen as part of the suite of mitigation measures set out in the Final UXO Clearance MMMP, the ADD that is likely to be used is the Lofitech AS seal scarer, although this will be confirmed within the Final UXO Clearance MMMP. This ADD has been shown to have the most consistent effective deterrent ranges for harbour seals, grey seals, harbour porpoise and minke whales in environments similar to the offshore wind farm (OWF) construction site (Sparling et al., 2015, McGarry et al., 2017). The Lofitech AS seal scarer has been successfully used for marine mammal mitigation purposes at a number of OWF construction projects in Europe, including the C-Power Thornton Bank OWF in Belgium (Haelters et al., 2012), the Horns Rev II, Nysted and Dan Tysk OWFs in Denmark (Carstensen et al., 2006; Brandt et al., 2009; Brandt et al., 2011; Brandt et al., 2013; Brandt et al., 2016). Additionally, Lofitech AS seal scarer has been used as mitigation for UK projects such as Dudgeon Offshore Wind Farm, Beatrice Offshore Wind Farm and Race Bank Offshore Wind Farm.

5.2.12 An Offshore Renewables Joint Industry Programme (ORJIP) study undertook trials of ADD efficacy on minke whale (McGarry et al., 2017). The results presented in the ORJIP study demonstrate that the Lofitech ADD modifies the behaviour of free-ranging minke whales at both 500m and 1000m. Minke whales demonstrated a significant increase in swim speed, and an increase in the directness of their movement away from the site of the ADD playback. This indicates clear avoidance

[6] Detonations are not proposed for Rampion 2 and will only take place during daylight hours therefore PAM is only suggested in practice for days with reduced visibility.

behaviour, which indicates utility as a mitigation tool for the deterrence of minke whales from a standard mitigation zone.

5.2.13 There is currently no published evidence of the effectiveness of ADDs on bottlenose dolphins, but deterrents only have to be effective over a small range for white-beaked and bottlenose dolphins in order to ensure these species are not at risk of instantaneous auditory injury. Further to this, it is also noted that this species is also less likely to be encountered at the site compared to harbour porpoise due to the lower densities of these species recorded in the area. As such, the likelihood of bottlenose dolphins being exposed to the risk of auditory injury is considered to be low.

5.2.14 It is important to note that there may be additional ADD models identified in the pre-construction phase for Rampion 2 that are available and suitable for use. As such, if an ADD is identified as part of the suite of mitigation measures set out in the Final UXO Clearance MMMP, the final ADD choice and specification would be confirmed within the final document.

Duration of deployment

5.2.15 The duration of ADD deployment would be calculated using swimming speed assumptions to ensure that marine mammals are beyond the mitigation zone when UXO clearance commences.

5.2.16 A swim speed of 1.5m/s (Otani et al., 2000; Lepper et al., 2012) is assumed for all marine mammals with the exception of minke whales. A swim speed of 3.25m/s is assumed for minke whales (Blix and Folkow, 1995). There is evidence to suggest that these selected swim speeds are precautionary and that animals are likely to flee at much higher speeds, at least initially. For example, Minke whales have been shown to flee from ADDs at a mean swimming speed of 4.2 m/s (McGarry et al., 2017). A recent study by Kastelein et al., (2018) showed that a captive harbour porpoise responded to playbacks of pile driving sounds by swimming at speeds significantly higher than baseline mean swimming speeds, with greatest speeds of up to 1.97m/s which were sustained for the 30-minute test period. In another study, van Beest et al., (2018) showed that a harbour porpoise responded to an airgun noise exposure with a fleeing speed of 2m/s.

5.2.17 In addition, the presence of novel vessel activity on-site is also predicted to result in animals moving away from the detonation location and out of the mitigation zone prior to the commencement of UXO detonation (Brandt et al., 2018; Graham et al., 2019).

ADD deployment procedure

5.2.18 It is expected that during UXO detonation, one ADD would be deployed from the deck of the detonation platform/ vessel, with the control unit and power supply on board the platform/ vessel in suitable, with safe positions on deck. The ADD would need to be verified for operation prior to pre-detonation activation. The exact deployment procedure will be agreed once the UXO contractor is in place and will follow safe, standard working practices using experienced/ trained staff to ensure the ADD equipment is used and deployed correctly within the confines of different vessel layouts.

ADD operator training and responsibilities

5.2.19 A trained and dedicated ADD operator will be responsible for ADD maintenance, operation and reporting. The ADD duties involved would be to deploy the ADD from the installation platform or vessel, to verify the operation of the ADD before deployment, to operate the ADD throughout the pre-detonation period, ensure batteries are fully charged and that spare equipment is available in case of any problems, and record and report on all ADD and detonation activity. Prior to the start of the marine mammal observer pre-detonation watch period, the ADD operator will test the equipment to ensure the ADD is working and ensure they are deployed appropriately from the UXO to an agreed depth and appropriate distance. Following the deployment and testing of the ADD equipment, the ADD operator will activate the ADD and the marine mammal observer will commence the pre-detonation watch to ensure all marine mammals have moved out of the zone of impact. The ADD will be stopped prior to detonation of the UXO.

Noise abatement

5.2.20 The currently suggested noise abatement system for use during UXO clearance is a bubble curtain when high order detonation is required. The purpose of this is to reduce the noise propagated through the water column from the detonation, and thus reduce the impact of UXO clearance noise on marine life. For low order detonation bubble curtains are not proposed.

5.2.21 At this stage it is considered that a combination of MMOb, PAM, short duration ADD for both low and high order detonations, with additional noise abatement of bubble curtains for high order detonations, will be sufficient to ensure animals are out of the impact zone prior to UXO clearance.

Breaks in UXO detonations

5.2.22 Breaks in the UXO detonations could provide the potential for marine mammals to re-enter the mitigation zone. The guidance provided in JNCC (2010) states that *"After any break in detonation the end of the detonation sequence, a post-detonation search is carried out"*. The final procedure for breaks in detonations will be agreed with input from the UXO contractor (once contracted) and Natural England and set out within the Final UXO Clearance MMMP.

Delays in commencement of UXO detonation

5.2.23 Should there be a delay in the commencement of UXO detonation, there is a risk of animals moving back into the mitigation zone when ADDs are switched off. However, there is also a risk of habituation as a result of no aversive detonation noise commencing after ADD activation. ADDs would therefore be turned off as soon as the delay in the commencement is realised. The ADD is not switched on again until there is confirmation that detonation is ready to commence. The ADD is then reactivated, as above, for the minimum duration required for animals to move out of the mitigation zone, alongside the continuance of visual and/or acoustic monitoring. The MMOb should continue to undertake visual searches during this period.

Communications

5.2.24 The Final UXO Clearance MMMP will detail a communications protocol to ensure that all marine mammal mitigation measures, including any delays in commencing UXO detonations due to marine mammals being present in the area, are undertaken for all UXO activities.

5.2.25 The Final UXO Clearance MMMP will also detail all key personnel and their responsibilities to ensure that all marine mammal mitigation measures are successfully undertaken for all UXO activities. This will be developed based on the mitigation measures and personnel required with the titles and responsibilities being refined depending on the contractual agreement.

Reporting

5.2.26 Reports detailing the UXO clearance activity and mitigation measures will be prepared. Where appropriate these will include, but not necessarily be limited to:

- where relevant, the reference number for the activity provided by the regulatory authority;
- date and location of the activity;
- details of the operation, including information on the size of charges used; the start times of explosive detonations; the start and end times of watches by MMObs; the start and end times of any acoustic monitoring using PAM; and details of all explosive activity during the relevant watches;
- any marine mammal sightings summarised in completed “Marine Mammal Recording Forms". Although these have been developed for the seismic industry they can be used for other applications, such as explosive use;
- details of any Acoustic Deterrent Devices used, and any relevant observations on their efficacy; and
- details of any problems encountered during the activity, including instances of non-compliance with the JNCC guidelines and any variations from the agreed procedure.

5.2.27 The final report will include, but not be limited to: date; time and location of detonation events; mitigation methods used; details of any problems or non-compliance; sightings and marine mammal behavioural observations and if necessary, recommendations of how the protocol could be improved in the future. This will be sent to the regulator within 6 weeks of the completion of works.

6. Glossary of terms and abbreviations

Table 6-1 Glossary of terms and abbreviations

Term (acronym)	Definition
ADD	Acoustic Deterrent Device
DCO	Development Consent Order
DML	Deemed Marine Licence
EIA	Environmental Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
HF	High Frequency
JNCC	Joint Nature Conservation Committee
LF	Low Frequency
MDS	Maximum Design Scenario
ML	Marine Licence
MLA	Marine Licence Application
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MMOb	Marine Mammal Observer
ORJIP	Offshore Renewable Joint Industry Programme
OWF	Offshore Wind Farm
PAM	Passive Acoustic Monitoring
PCW	Phocine Carnivore in Water
PTS	Permanent Threshold Shift
RED	Rampion Extension Development
ROV	Remotely Operated Vehicle
SNCB	Statutory Nature Conservation Body

Term (acronym)	Definition
TWT	The Wildlife Trust
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMP	Vessel Management Plan
WCS	Worst Case Scenario

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Rampion 2
WIND FARM