

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

J18: Outline marine mammal mitigation protocol



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Contents

1	OUTLINE MARINE MAMMAL MITIGATION PROTOCOL (MMMP)	1
1.1	Background	1
1.1.1	Introduction	1
1.1.2	Project overview	1
1.1.3	Purpose of the Outline Marine Mammal Mitigation Protocol	4
1.1.4	Structure of this document	4
1.2	Legislation and guidance	4
1.3	Implementation	6
1.4	Measures adopted as part of the Transmission Assets (commitments)	6
1.5	Key species and potential impacts	8
1.6	UXO clearance	11
1.6.2	Mitigation zone	12
1.6.3	Marine Mammal Observers (MMOb)	12
1.6.4	Passive Acoustic Monitoring (PAM)	13
1.6.5	Acoustic Deterrent Devices (ADD)	14
1.6.6	Post clearance search	17
1.7	Reporting	20
1.8	Next steps	22
1.9	References	23
	APPENDIX A SECONDARY MITIGATION MEASURES FOR HIGH ORDER UXO CLEARANCE	26

Tables

Table 1.1:	Measures (commitments) adopted as part of the Transmission Assets	7
Table 1.2:	Maximum Design Scenario for UXO clearance.	8
Table 1.3:	Potential impact (PTS) ranges for low order and low yield UXO clearance activities. Maximum ranges for each donor charge across all species are shown in bold.	9
Table 1.4:	Minimum ADD duration for low order UXO clearance and associated displacement distance, showing whether the individual can move away from the injury range during ADD activation.	15

Figures

Figure 1.1:	Project overview	3
Figure 1.2:	Example UXO clearance mitigation.	19

Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd. (Morecambe OWL).
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Ensonified	Filled with sound.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Impact	Change that is caused by an action/proposed development, e.g. land clearing (action) during construction which results in habitat loss (impact).
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Marine Licence	The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for to apply for 'deemed marine licences' in English waters as part of the development consent process.
Maximum Design Scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morecambe Offshore Windfarm: Transmission Assets	The offshore export cables, landfall, and onshore infrastructure required to connect the Morecambe Offshore Windfarm to the National Grid.

Term	Meaning
Morecambe OWL	Morecambe Offshore Wind Limited is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	<p>The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.</p> <p>Also referred to in this report as the Transmission Assets, for ease of reading.</p>
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy Investments Ltd. And Energie Baden-Württemberg AG (EnBW).
National Grid Penwortham substation	The existing National Grid substation at Penwortham, Lancashire.
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023 and adopted in 2024.
Offshore Elements	The offshore export cables of the Transmission Assets which are seaward of Mean Low Water Springs.
Offshore export cables	The cables which would bring electricity from the Generation Assets to the landfall.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Permanent Threshold Shift	Refers to a total or partial loss of hearing at a particular frequency, or frequency range, caused by acoustic trauma.
Pre-construction	The phases of the Project before construction takes place.
Sound Exposure Levels	The representation of a noise event if all the energy were compressed into a one second period. This provides a uniform way to make comparisons between sound events of different durations.
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to section 42 of the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees (see non-statutory consultee definition).
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits: Offshore	<p>The area within which all components of the Transmission Assets seaward of Mean Low Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning.</p> <p>Also referred to in this report as the Offshore Order Limits, for ease of reading</p>
Underwater sound	Sound waves made underwater.

Acronyms

Acronym	Meaning
ADD	Acoustic Deterrent Devices
ASV	Automated Surface Vehicle
DCO	Development Consent Order
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EOD	Explosive Ordnance Disposal
HF	High Frequency
IUCN	International Union for Conservation of Nature
IEMA	Institute of Environmental Management and Assessment
JNCC	Joint Nature Conservation Committee
LF	Low Frequency
MBES	Multi-Beam Echo-sounder
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMOb	Marine Mammal Observer
MMO	Marine Management Organisation
NAS	Noise Abatement System
NEQ	Net Explosive Quantity
PAM	Passive Acoustic Monitoring
PCW	Phocid Carnivores in Water
PEIR	Preliminary Environmental Information Report
PTS	Permanent Threshold Shift
SBES	Single Beam Echosounder
SBP	Sub-Bottom Profiler
SEL _{cum}	Cumulative Sound Exposure Level
SNCB	Statutory Nature Conservation Body
SPL _{pk}	Peak Sound Pressure Level
SSS	Sidescan Sonar

Acronym	Meaning
UHRs	Ultra-High Resolution Seismic
UK	United Kingdom
UXO	Unexploded Ordnance
VHF	Very High Frequency

Units

Unit	Description
%	Percentage
μPa	Micropascal (10 ⁻⁶)
dB	Decibel
g	Gram
kg	Kilogram
kHz	Kilohertz
km	Kilometre
km ²	Kilometre squared
m	Metre
m/s	Metres per second
min	Minute
MW	Megawatt
nm	Nautical mile
rms	Root mean square

1 Outline Marine Mammal Mitigation Protocol (MMMP)

1.1 Background

1.1.1 Introduction

1.1.1.1 This document forms the Outline Marine Mammal Mitigation Protocol (MMMP) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as ‘the Transmission Assets’). ~~Joint Subsequently, mitigation for high order detonation is now only dealt with under section 1.5.7, secondary mitigation measures,~~

1.1.1.2 ~~-The Applicants updated the draft Development Consent Order (DCO) (REP1-008) at Examination Deadline 1 to authorise the use of low order Unexploded Ordnance (UXO) clearance only. High order UXO clearance will not be authorised under the draft DCO. Removal of high order UXO clearance from the DCO is reflected in the updated drafting of the deemed marine licences in Schedules 14 & 15, Condition 20(1)(b) in the draft DCO.~~

1.1.1.3 ~~Additionally, no clearance of UXO will be undertaken within Liverpool Bay/Bae Lerpwl SPA between November and March (inclusive). The Commitments Register (F 1.5.3/F03) was updated at Deadline 2 to reflect these changes (see CoT64 and CoT130).~~

1.1.1.4 ~~High order UXO clearance is considered within **Appendix A**, (secondary mitigation measures for high order UXO clearance), to adopt a holistic approach in the event these activities are authorised under a separate marine licence but are not considered further in this Outline MMMP.~~

1.1.1.5 ~~The Applicants have also aligned this Outline MMMP with the new Defra policy on reducing underwater noise (Defra, 2025a), the updated Joint UXO position statement (Defra *et al.*, 2025) and the latest Joint Nature Conservation Committee (JNCC) guidelines for mitigating the risk of injury to marine mammals from UXO clearance (JNCC, 2025). Updates include removal of the use of scare charges as a mitigation option for high order UXO clearance in **Appendix A**.~~

4.1.1.11.1.1.6 ~~The detailed MMMP(s) for UXO clearance will be developed in line with the most recent Joint UXO Position Statement (Defra *et al.*, 2025) and up to date mitigation guidance (JNCC, 2025), and will be issued to the MMO for approval in consultation with Natural England.~~

1.1.2 Project overview

1.1.2.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp Alternative Energy Investments Ltd. (bp) and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project. The Morgan Offshore Wind Project is a proposed wind farm in the east Irish Sea.

- 1.1.2.2 Morecambe Offshore Windfarm Ltd (Morecambe OWL), a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea.
- 1.1.2.3 Morgan OWL and Morecambe OWL (the Applicants), being in agreement with the output from the Holistic Network Design Review, are jointly seeking a single consent for their electrically separate Transmission Assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate onshore substation(s), and onward connections to the National Grid at Penwortham, Lancashire.
- 1.1.2.4 The purpose of the Transmission Assets is to connect the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to collectively as the 'Generation Assets') to the National Grid. The key components of the Transmission Assets include offshore element, landfall and onshore elements. Details of the activities and infrastructure associated with the Transmission Assets are set out in Volume 1, Chapter 3: Project description of the Environmental Statement (ES) (document reference: F1.3/~~APP-024~~).
- 1.1.2.5 This Outline MMMP has been developed for the offshore elements of the Transmission Assets (i.e. the offshore export cables), seaward of Mean High Water Springs (MHWS).
- ~~1.1.2.5~~1.1.2.6 The Transmission Assets will be located within the Transmission Assets Order Limits as shown on **Figure 1.1**.

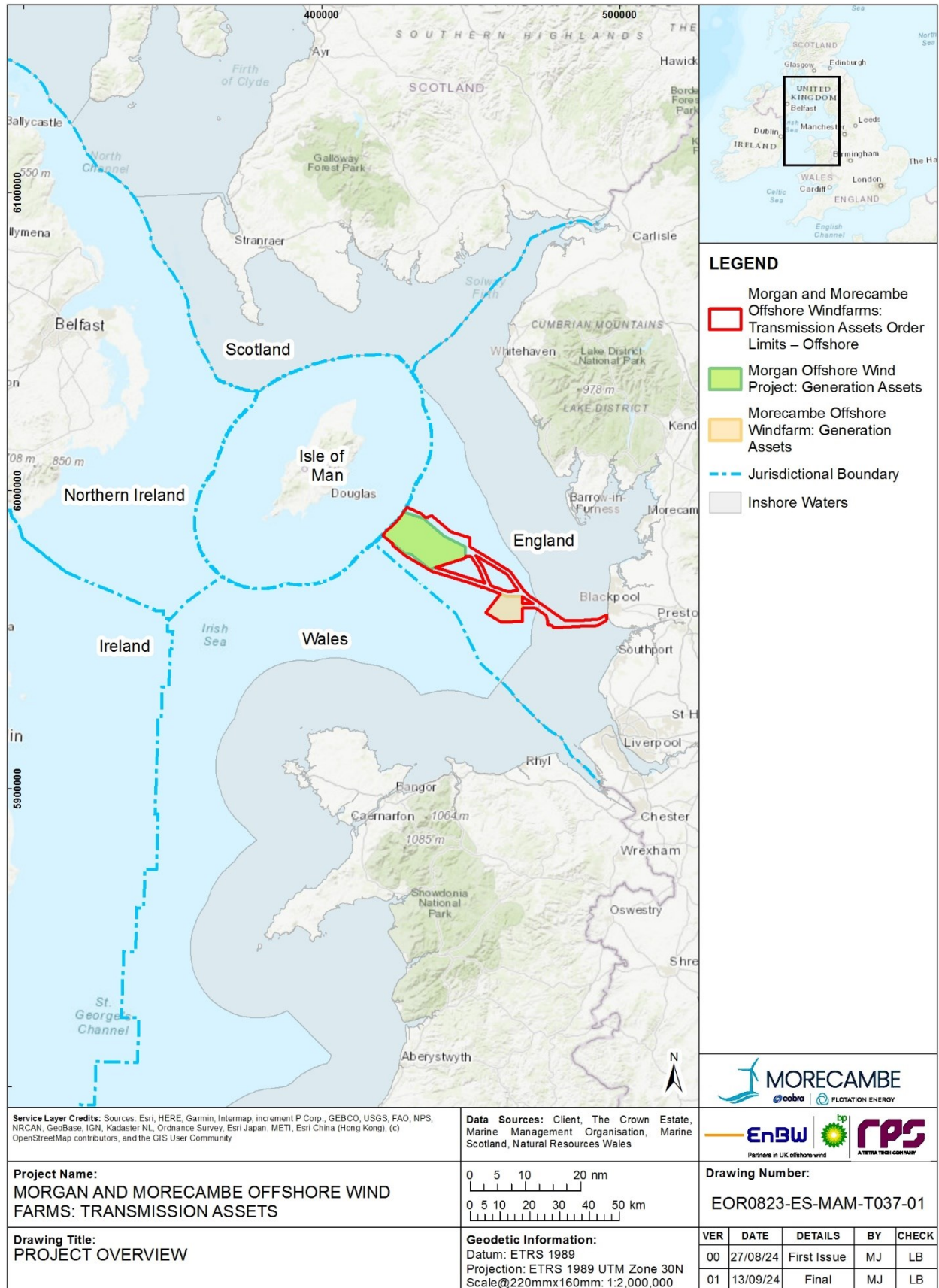


Figure 1.1: Project overview

1.1.3 Purpose of the Outline Marine Mammal Mitigation Protocol

- 1.1.3.1 The primary aim of this Outline MMMP is to propose planned measures for low order UXO clearance to reduce the risk of Permanent Threshold Shift (PTS) auditory injury to any marine mammal to negligible levels. ~~f~~
- 1.1.3.2 The Outline MMMP sets out a review of primary measures and potential secondary measures for injurious effects as a result of underwater sound due to UXO clearance to reduce the magnitude of any residual effects (that cannot be fully mitigated by embedded mitigation measures) to a non-significant level.
- 1.1.3.3 Information presented in this Outline MMMP is based on Volume 2, Chapter 4: Marine mammals of the ES (document reference: F2.4/~~APP-050~~). An assessment of the potential for injury from elevated underwater sound during UXO clearance has been set out in section 4.11.2 of Volume 2, Chapter 4: Marine mammals of the Environmental Statement (F2.4APP-050). This Outline MMMP) and focuses on the measures adopted as a part of the Transmission Assets in line with recently (January 2025) (Defra, 2025a; JNCC, 2025) and existing policy and guidance (JNCC, 201). ~~guidance (Joint Nature Conservation Committee (JNCC), 2010).~~ In developing the detailed MMMP(s) the Applicants will have due regard to the recently published requirements (January 2025) and to the latest existing guidance at the time and will engage with SNCBs in respect of this.

1.1.4 Structure of this document

- 1.1.4.1 This document is set out as follows.
- **Section 1.1:** presents a background to the Outline MMMP.
 - **Section 1.3:** presents the legislation and guidance for the Outline MMMP;
 - **Section 1.3 and 1.4:** presents how the MMMP will be implemented and measures adopted, respectively.
 - **Section 1.5:** presents the key species and potential impacts.
 - **Section 1.6:** presents outline mitigation that may be employed for low order UXO clearance.
 - **Section 1.7:** presents detail on the mitigation compliance report.
 - **Section 1.8:** presents an outline of the next steps following the confirmation of relevant parameters.
 - **Section 1.9:** presents the references used.

1.2 Legislation and guidance

- 1.2.1.1 The Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (the Generation Assets) are both located in the east Irish Sea. The Transmission Assets will be

located within the Transmission Assets Order Limits as shown on **Figure 1.1**. The offshore elements of the Transmission Assets are located in the east Irish Sea within English offshore waters (beyond 12 nm from the English coast) and inshore waters (within 12 nm from the English coast).

- 1.2.1.2 As set out in Volume 1, Chapter 1: Introduction of the Environmental Statement (APP-021), the Generation Assets fall within the definition of an NSIP, as they exceed the threshold for an offshore generating station with a capacity of more than 100 megawatts (MW), set under the Planning Act 2008. These are the subject of separate applications for development consent. Following a request from the Applicants, on 4 October 2022 the Secretary of State issued a direction under section 35 of the Planning Act 2008 that the Transmission Assets should be treated as a ‘development for which development consent is required’.
- 1.2.1.3 As such, there is a requirement to submit an application for a DCO to the Planning Inspectorate to be decided by the Secretary of State for the Department for Energy Security and Net Zero for Transmission Assets. Consideration of the National Policy Statements (NPS), the North West Inshore and North West Offshore Coast Marine Plans, The National Planning Policy Framework 2023 (NPPF) and The Marine Strategy Framework Directive (MSFD) relevant to marine mammals and the Transmission Assets is provided in full detail in Volume 2, Chapter 4: Marine mammals of the Environmental Statement (APP-050).
- 1.2.1.4 The UK has a responsibility to protect all whales, dolphins and porpoises, derived from legal requirements under the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the Habitats Directive), as well as various obligations under international law. The Habitats Directive is transposed into UK law by the Habitats Regulations, which includes The Conservation of Habitats and Species Regulations 2017 (covering England, Wales and Scotland for reserved matters), the Conservation of Offshore Marine Habitats and Species Regulations 2017, ‘The Conservation (Natural Habitats, &c.) (Scotland) Regulations and The Conservation (Natural Habitats, etc.) (Northern Ireland) Regulations 1995. For the Isle of Man, the Wildlife Act 1990 is the primary wildlife protection legislation and sets out schedules of Manx species of animal and plant that are protected by law from injury or disturbance.
- 1.2.1.5 Cetaceans in waters more than 12 nautical miles from land are protected under the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2017 (which consolidate and update the Offshore Marine Conservation (Natural Habitats &c) Regulations 2007).
- 1.2.1.6 Additionally, recent policy and guidance which has been considered for this Outline MMMP includes the following:
- Defra (2025a) Policy: ‘Reducing marine noise’.
 - Defra (2025b) Guidance: ‘Supporting minimising environmental impacts from unexploded ordnance clearance’.

- Defra, MMO, JNCC, Natural England, Scottish Government, Natural Resources Wales, Ireland), D. N., BEIS, OPRED and DESNZ (2025) 'Marine environment: unexploded ordnance clearance Joint Position Statement'.
- JNCC (2025) 'Guidelines for minimising the risk of injury to marine mammals from UXO clearance in the marine environment'.

1.21.3 Implementation

1.2.1.11.3.1.1 Following the granting of consent for the Transmission Assets, detailed MMMP(s) will be prepared on behalf of Morgan OWL and -Morecambe OWL, prior to commencement of the relevant stage of works. The detailed MMMP(s) will require approval by the Marine Management Organisation (MMO) following consultation with relevant stakeholders.

1.2.1.21.3.1.2 The Applicants have committed to implementation of the detailed MMMP(s) via the following commitment, CoT64 (in ~~Table 1.1~~ **Table 1.1**), which ~~and~~ is secured for low order unexploded ordnance UXO clearance by inclusion of condition 20(1)(b) of the draft ~~Development Consent Order (DCO)~~ Schedules 14 and 15 (document reference C1). Below sets out the condition wording for condition 20(1):

1.2.1.31.3.1.3 20.—(1) No low order removal or detonation of unexploded ordnance clearance can take place until the following have been submitted to and approved in writing by the MMO in consultation with the relevant statutory nature conservation body and, in respect of the method statement, the MCA—

(b) *a marine mammal mitigation protocol in accordance with the outline marine mammal mitigation protocol, the intention of which is to prevent injury to marine mammals, following current best practice as advised by the relevant statutory nature conservation body.*

1.2.1.41.3.1.4 The Transmission Assets may adopt a staged approach to the approval of DCO requirements. This will enable requirements to be approved in part or in whole, prior to the commencement of the relevant stage of works in accordance with whether staged approach is to be taken to the delivery of the each of the offshore wind farms.

1.2.1.51.3.1.5 For offshore elements seaward of MHWS, this approach will be governed by the inclusion of condition 12 of Schedules 14 and 15 of the draft DCO, which requires a written scheme detailing the stages of construction for Project A or Project B to be submitted for approval by the MMO prior to the commencement of the licensed activities.

1.31.4 Measures adopted as part of the Transmission Assets (commitments)

1.3.1.11.4.1.1 The measures adopted as a part of the Transmission Assets which are relevant to potential injurious effects of underwater sound due to UXO clearance are described in **Table 1.1**.

Table 1.1: Measures (commitments) adopted as part of the Transmission Assets

Commitment number	Measure adopted	How the measure will be secured
Embedded measures		
CoT64	<p>Detailed Marine Mammal Mitigation Protocols (MMMPs) will be developed and implemented in accordance with the Outline MMMP, to reduce the risk of injury to marine mammals.</p> <p>The Detailed MMMP(s) will include measures to apply in advance of UXO clearance. The Detailed MMMP(s) will include for the use of low order techniques, where possible, as the primary mitigation measure alongside other measures.</p> <p>The detailed MMMP(s) will be approved by Marine Management Organisation, in consultation with Natural England.</p> <p>The detailed MMMP(s) will require implementation of mitigation hierarchy with regard to Unexploded Ordnance (UXO) clearance as follows:</p> <ul style="list-style-type: none"> - Avoid UXO; and - Clear UXO with low order techniques. <p>Low order techniques or avoidance of confirmed UXO is not always possible and is dependent upon the individual circumstances surrounding each UXO. Should high order UXO techniques be required, a separate marine licence will be applied for and will include consideration of secondary mitigation measures such as Noise Abatement Systems (NAS).</p>	<p>DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition 18(1)(g) Condition 20 (1)(b) (Pre-construction plans and documentation) Low order unexploded ordnance clearance and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(g) (Pre-construction plans and documentation) Condition 20 (1) (b) (Low order unexploded ordnance clearance).</p>
<u>CoT130</u>	<p><u>No clearance of unexploded ordnance (UXO) will be undertaken within Liverpool Bay/Bae Lerpwl SPA between November and March (inclusive).</u></p>	<p>DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – <u>Condition 18(1)(f) (Pre-construction plans and documentation)</u> and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 – <u>18(1)(f) (Pre-construction plans and documentation)</u></p>

1.41.5 Key species and potential impacts

1.4.1.11.5.1.1 Seven key marine mammal species were identified within the regional marine mammal study area encompassing the Irish Sea and the Celtic Sea (for more information see Volume 2, Annex 4.1: Marine mammal technical report of the ES, document reference F2.4.1):

- harbour porpoise,
- bottlenose dolphin,
- minke whale,
- short-beaked common dolphin,
- Risso's dolphin,
- grey seal, and
- harbour seal.

1.4.1.21.5.1.2 These marine mammals may experience auditory injury from elevated underwater sound as a result of:

- Low order UXO clearance during the pre-construction phase of the Transmission Assets (**Section 1.6**).

1.4.1.31.5.1.3 It is anticipated that up to 25 UXOs within the Transmission Assets Order Limits: Offshore, may require clearance (i.e. 22 at the Morgan Offshore Wind Project: Transmission Assets; three at the Morecambe Offshore Windfarm: Transmission Assets) as detailed in **Table 1.2**.

Table 1.2: Maximum Design Scenario for UXO clearance.

Parameter	UXO MDS		
	Morgan Offshore Wind Project: Transmission Assets	Morecambe Offshore Windfarm: Transmission Assets	Transmission Assets Total
Number of UXOs expected to be cleared within the Transmission Assets	22	3	25
High order			
High order clearance UXO	From 25 kg to 907 kg (absolute maximum), with 130 kg the most likely (common) maximum		
High order donor charges			
High order clearance detonation donor charges	1.2 kg (most common) and 3.5 kg (single barracuda blast charge)		
NEQ clearance shot	0.5 kg		
Low order			
Low order donor charge	0.08 kg		

Parameter	UXO MDS		
	Morgan Offshore Wind Project: Transmission Assets	Morecambe Offshore Windfarm: Transmission Assets	Transmission Assets Total
<u>Low order clearing shot</u>	<u>0.5 kg</u>		
Low yield clearance configurations	Up to four charges of 0.75 kg		

~~1.4.1.4~~1.5.1.4 UXO clearance injury ranges are presented in **Table 1.3** for low order and low yield UXO), ~~Table 1.4 (high order donor charges) and Table 1.5 (high order UXO detonation)~~ (for more information see Volume 2, Chapter 4: Marine mammals of the ES, document reference: F2.4). Please note that injury ranges presented in the tables do not include application of tertiary (embedded) mitigation which is discussed in more detail in ~~s~~**Sections 1.6**.

Table 1.3: Potential impact (PTS) ranges for low order and low yield UXO clearance activities. Maximum ranges for each donor charge across all species are shown in bold.

Charge Size	PTS range (m)				
	Threshold	VHF	HF	LF	PCW
0.08 kg low order donor charge	SPL _{pk}	685	40	122	135
	SEL _{cum}	190	2	47	9
0.5 kg <u>low order</u> clearing shot	SPL _{pk}	1,265	73	223	247
	SEL _{cum}	421	4	115	22
2 x 0.75 kg low-yield charge	SPL _{pk}	1,820	105	322	357
	SEL _{cum}	650	7	196	38
4 x 0.75 kg low-yield charge	SPL _{pk}	2,290	133	406	449
	SEL _{cum}	840	10	275	53

Table 1.4: Potential impact (PTS) ranges for donor charges used in high order UXO clearance activities.

Charge Size	PTS range (m)				
	Threshold	VHF	HF	LF	PCW
1.2 kg	SPL _{pk}	1,690	98	299	331
	SEL _{cum}	596	6	176	34
3.5 kg	SPL _{pk}	2,415	140	427	473
	SEL _{cum}	885	10	297	57

Table 1.5: Potential impact (PTS) ranges for high order UXO detonation.

Charge Size	PTS range (m)				
	Threshold	VHF	HF	LF	PCW
25 kg UXO	SPL _{pk}	4,645	268	825	910
	SEL _{cum}	1,645	27	775	147
130 kg UXO	SPL _{pk}	8,045	464	1,425	1,580
	SEL _{cum}	2,520	61	1,705	323
907 kg UXO	SPL _{pk}	15,370	890	2,720	3,015
	SEL _{cum}	3,820	151	4,215	800

1.51.6 UXO clearance

1.6.1.1 The clearance of UXO prior to commencement of construction has the potential to generate high peak sound pressures and is considered a high energy, impulsive sound source with a potential to cause injury to marine mammals. The Applicants have committed to the implementation of a mitigation hierarchy with regard to UXO that follows:

- Avoid UXO
- Clear UXO with low order techniques
- Clear UXO with high order techniques (for which a separate marine licence would be sought, if required). See **Appendix A** for details on potential secondary mitigation measures which would be considered should high order techniques be required.

~~1.5.1.1~~ 1.6.1.2 Therefore, where clearance of UXO is required (i.e. avoidance is not possible) the use of low order clearance will be adopted where feasible and therefore clearance of UXO using low order techniques has been considered as a potential embedded measure (**Table 1.1**~~Table 11~~). However, low order techniques or avoidance of confirmed UXO are not always possible and are dependent upon the individual situations surrounding each UXO.

~~1.5.1.2~~ Given that it is possible that high order detonation may be used where low order is not possible, this document includes mitigation to reduce the risk of injury from high order UXO clearance as the MDS (modelling a range of UXO sizes from 25 kg to 907 kg as the absolute maximum, with 130 kg as the most likely “common” maximum).

~~1.5.1.3~~ 1.6.1.3 ~~If the measures in the Final MMMP~~ In this event it may be necessary to apply high order detonation, but only in the following circumstances (as per the Joint UXO Position Statement (Defra *et al.*, 2025)):

- The most appropriate low noise method has failed after a minimum of three attempts;
- All best practice has been demonstrably applied; and
- There is prior agreement with the appropriate licensing authority.

1.6.1.4 Where high order UXO clearance is subsequently determined to be the only option available, ~~do not fully mitigate clearance of UXOs~~, additional secondary mitigation measures ~~may~~ are likely to be required in the form of Noise Abatement Systems (NAS) (see **Appendix A**. This will be considered post consent and will be presented as an appendix in each of the detailed MMMP(s), to support any application for a separate marine licence to authorised high order UXO clearance.

1.6.1.5 Post consent more information on the size, type and condition of potential UXOs will be available (e.g. following detailed pre-construction site investigation surveys) and a more detailed assessment of mitigation will be undertaken post-consent to inform the each of the detailed MMMP(s). The detailed MMMP(s) for UXO clearance will be developed in line with

the most recent Joint UXO Position Statement (Defra *et al.*, 2025) and up to date mitigation guidance (JNCC, 2025).

1.5.21.6.2 Mitigation zone

Where clearance of UXO is required (i.e. avoidance is not possible), the Applicants have committed to the prioritisation of low order clearance methods where possible, as per As set out in the mitigation hierarchy (see paragraph 1.6.1.1) (CoT64, see Table 1.1), where clearance of UXO is required, i.e. where the first step, avoidance, is not possible, the Applicants will seek to clear UXO by low order clearance methods.

1.6.2.1

1.5.2.11.6.2.2 The mitigation zone is defined as the area over which pre-start monitoring will be undertaken to record the presence of marine mammals. If marine mammals are recorded within the mitigation zone during the pre-start search, the operations will be delayed until such a time as there have been no sightings of marine mammals and/or acoustic recordings of marine mammals within the mitigation zone for a minimum of 20 minutes (regardless of the type of UXO clearance), in line with the JNCC guidelines for minimising the risk of injury to marine mammals from UXO clearance (JNCC, 2025).

1.5.2.21.6.2.3 As per the mitigation hierarchy (see paragraph 1.6.1.11.5.1.1) Whilst the Applicants have committed to the prioritisation of low order clearance methods, where possible (CoT64, see Table 1.1), the mitigation zone will be determined considering the largest injury zone across all species as per **Table 1.4.**

1.5.31.6.3 Marine Mammal Observers (MMOb)

1.5.3.11.6.3.1 Dedicated¹ and trained MMObS will be used to survey the mitigation zone at any one time and conduct the pre-start searches and post detonation searches in the case of low order UXO clearance. The MMObS will be JNCC certified and have an appropriate level of field experience (i.e. a minimum of one year's MMObS experience on offshore projects).

1.5.3.21.6.3.2 A minimum number of MMObS will be agreed with the MMO (as the licensing authority) post-consent. MMObS should be present in sufficient numbers to ensure that monitoring is not compromised by fatigue. MMObS will carry out pre-start monitoring from an appropriate elevated platform that allows 360° visualisation (full coverage of the mitigation zone) and record all relevant information, including the start and end times of monitoring. Environmental conditions such as sea state, weather, and visibility, as well as any marine mammal sightings, will also be documented according to JNCC marine mammal recording forms and guidelines. If relevant, any noticeable behavioural changes in

¹ A dedicated MMOb is defined as an observer with sole role on board of conducting visual watches for marine mammals.

animals in response to ADD activation, such as change in direction of travel, will be recorded.

1.5.3.31.6.3.3 The MMObs will be equipped with reticule binoculars and marine mammal reporting forms and will be capable of determining the extent of the search zone in relation to their viewing platform. A range stick may be used to aid the estimation of distance of the sighting from the survey vessel. The lead MMObs should also be equipped with a two-way radio to ensure communication with both the vessel crew and the PAM Operator. This is to allow any visual or acoustic detections of marine mammals in the mitigation zone and any subsequent delay required to the commencement of surveying to be communicated quickly and effectively between all parties. MMObs will communicate any detections of marine mammals with the PAM Operator as part of the procedures set out in this Outline MMMP.

1.5.3.41.6.3.4 The precise information pertaining to MMObs and the methods they employ will be revised and specified in the detailed MMMP(s), taking into consideration any updated guidance and available resources at the time.

1.5.41.6.4 Passive Acoustic Monitoring (PAM)

1.5.4.11.6.4.1 The requirement for PAM will be agreed with the MMO post-consent once relevant activity parameters are known and will be set out in the detailed MMMP(s).

1.5.4.21.6.4.2 Where PAM monitoring is required, the PAM Operator will be suitably trained in passive acoustic monitoring and the use of PAMGuard software, with training having been provided by an appropriate organisation. As per the JNCC PAM guidance ([JNCC, 2023](#)), all PAM operatives undertaking marine mammal mitigation will be trained on how to implement the JNCC mitigation guidelines (having undertaken formal training on a JNCC approved course).

1.5.4.31.6.4.3 A PAM Operator will acoustically track vocalising marine mammals using a hydrophone, deployed to a suitable depth from the operation vessel. The PAM system chosen will be able to detect the required species (JNCC, 2023). The hydrophone data will be monitored by the PAM Operator via a computer interface using the software PAMGuard. This allows the PAM Operator to detect vocalisations, and signal strengths give an indication of the position of the animal relative to the hydrophone (i.e. the signal becomes weaker as the animal moves further away).

1.5.4.41.6.4.4 The extent to which the PAM will be able to acoustically record marine mammals will depend on the equipment used, weather and the species present. PAM Operators will be responsible for compiling all the data on marine mammal observations, mitigation activities (including ADDs ~~and soft start~~) and instances of noncompliance, for reporting to the MMO and the Marine Noise Registry.

1.5.4.51.6.4.5 The PAM Operator will communicate with the MMObs to 'ground truth' any detection of marine mammals to validate species

identification and determine approximate position. The PAM Operator, together with the MMObs, will provide a detailed introduction during the pre-works introduction session/s to advise the offshore team on the implementation of the procedures set out in this Outline MMMP.

1.5.5.1.6.5 Acoustic Deterrent Devices (ADD)

1.5.5.1.6.5.1 The requirement for ADDs will be agreed with the MMO post-consent once relevant activity parameters are known and will be set out in the detailed MMMP(s).

1.5.5.2.6.5.2 Devices with the capability to deter animals from entering the mitigation zone, such as ADDs, may be employed in combination with visual and/or acoustic monitoring, for low order UXO clearance.

1.5.5.3.6.5.3 Where ADD is required, a trained and dedicated ADD Operators will be responsible for ADD maintenance, operation and reporting. The ADD Operator will be responsible for deploying the ADD, verifying the operation of the ADD before deployment, operating the ADD, ensuring that batteries are fully charged, and that spare equipment is available.

1.5.5.4.6.5.4 The ADD selected will be suitable for the target species and will be placed in the water in proximity to the UXO. ADD activation will commence at the start of pre-detonation search for a specified period (see **Table 1.4**) which depends on the UXO size, to minimise the introduction of additional sound.

Table 1.4: Minimum ADD duration for low order UXO clearance and associated displacement distance, showing whether the individual can move away from the injury range during ADD activation.

Hearing group	Maximum PTS Range (m)	Swim speed (m/s)	ADD duration (min)	Swim distance (m)	Move away?	ADD duration (min)	Swim distance (m)	Move away?
UXO size: 0.08 kg low order donor chargeup to 3.5 kg								
VHF (harbour porpoise)	6852,415	1.5	15	1,350	No	2730	2,7002,430	Yes
HF (bottlenose dolphin, short-beaked common dolphin, Risso's dolphin)	40140	1.52		1,368	Yes		2,7362,462	Yes
MW	122427	2.3		2,070	Yes		4,1403,726	Yes
PCW	135473	1.8		1,620	Yes		3,2402,916	Yes
UXO size: 0.5 kg low order clearing shot3.6 kg to 25 kg								
VHF (harbour porpoise)	1,2654,645	1.5	15	1,350	No	5230	2,7004,680	Yes
HF (bottlenose dolphin, short-beaked common dolphin, Risso's dolphin)	73268	1.52		1,368	Yes		2,7364,742	Yes
MW	223825	2.3		2,070	Yes		4,1407,176	Yes
PCW	247910	1.8		1,620	Yes		3,2405,616	Yes
UXO size: 2 x 0.75 kg low-yield charge: 26 kg to 130 kg								
VHF (harbour porpoise)	1,8208,045	1.5	15	1,350	No	3060	2,7005,400	YesNo
HF (bottlenose dolphin, short-beaked common dolphin, Risso's dolphin)	105464	1.52		1,368	Yes		2,7365,472	Yes
MW	3221,425	2.3		2,070	Yes		4,1408,280	Yes
PCW	3571,580	1.8		1,620	Yes		3,2406,480	Yes

Hearing group	Maximum PTS Range (m)	Swim speed (m/s)	ADD duration (min)	Swim distance (m)	Move away?	ADD duration (min)	Swim distance (m)	Move away?
<u>UXO size: 4 x 0.75 kg low-yield charge</u>								
<u>VHF (harbour porpoise)</u>	<u>2,290</u>	<u>1.5</u>	<u>15</u>	<u>1,350</u>	<u>No</u>	<u>30</u>	<u>2,700</u>	<u>Yes</u>
<u>HF (bottlenose dolphin, short-beaked common dolphin, Risso's dolphin)</u>	<u>133</u>	<u>1.52</u>		<u>1,368</u>	<u>Yes</u>		<u>2,736</u>	<u>Yes</u>
<u>MW</u>	<u>406</u>	<u>2.3</u>		<u>2,070</u>	<u>Yes</u>		<u>4,140</u>	<u>Yes</u>
<u>PCW</u>	<u>449</u>	<u>1.8</u>		<u>1,620</u>	<u>Yes</u>		<u>3,240</u>	<u>Yes</u>

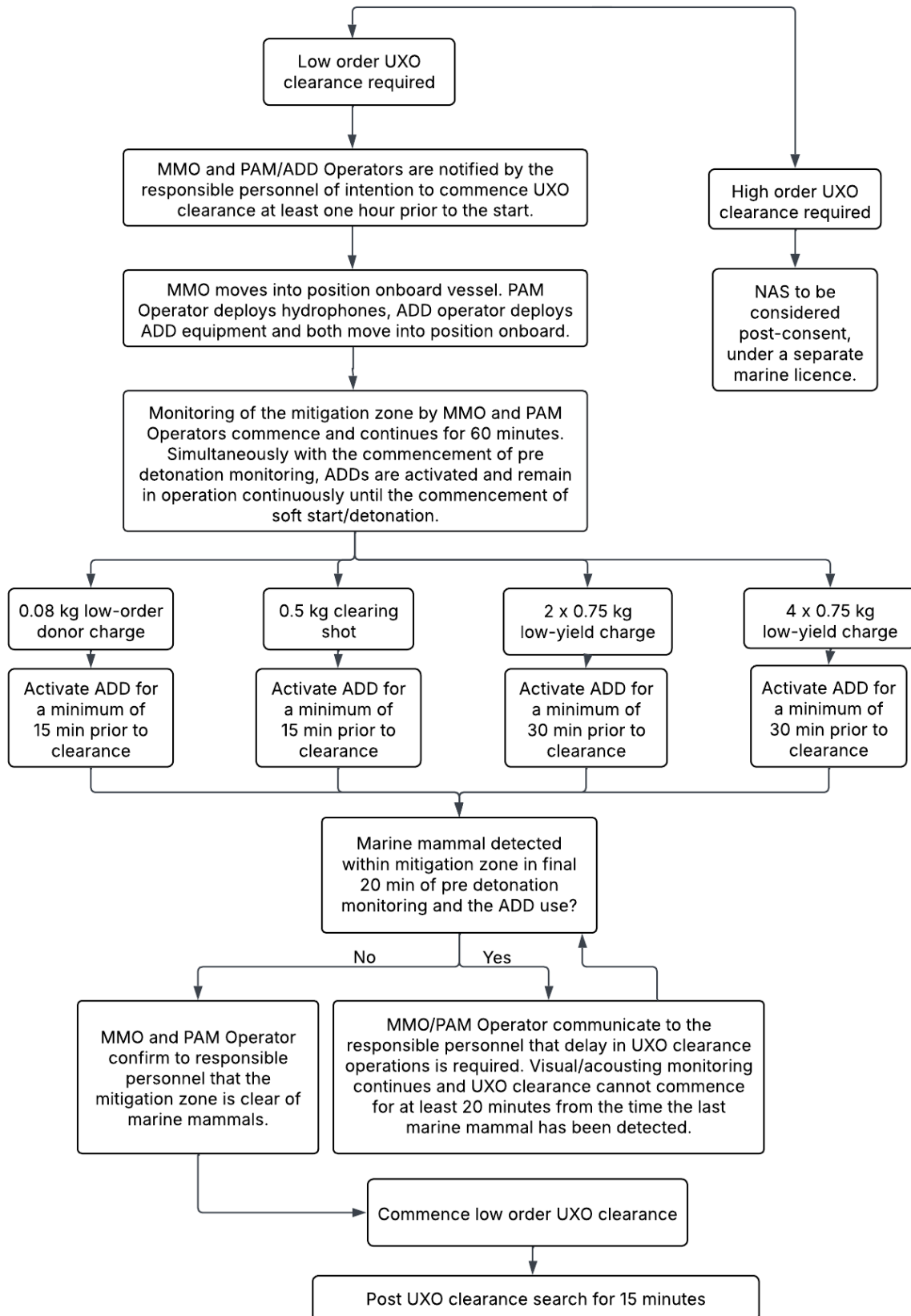
1.5.6 ~~Soft start procedure~~

- 1.5.6.1 ~~The requirement and application of soft start procedures will be agreed with the MMO post-consent, once UXO parameters are known, and will be set out in the detailed MMMP(s).~~
- 1.5.6.2 ~~If required, to mitigate risk of injury to harbour porpoise (based on VHF injury ranges, as set out in **Table 1.6**) for a UXO between 26 kg to 130 kg, pre-detonation monitoring will be carried out as per the JNCC (2010) guidance.~~
- 1.5.6.3 ~~For UXO sizes larger than 130 kg the use of NAS as an additional secondary mitigation technique will be considered as an option post-consent (see **section 1.5.7**).~~

1.5.7 ~~1.6.6~~ **Post clearancedetonation search**

~~1.5.7.1~~ 1.6.6.1 Following UXO ~~detonation~~clearance, the MMObs and PAM Operator (if present) will undertake a post ~~detonation~~clearance search of the mitigation zone for at least 15 minutes after the final ~~detonation~~clearance. The purpose of this search is to look for potential evidence of injury to marine life, including fish kills. Any other unusual observation will be noted.

~~1.5.7.2~~ 1.6.6.2 **Figure 1.2** below provides an example of a sequence of events and the necessary lines of communication for implementing this Outline MMMP for ~~high-order~~ UXO clearance. However, this may be varied and updated post-consent, in the detailed MMMP(s).



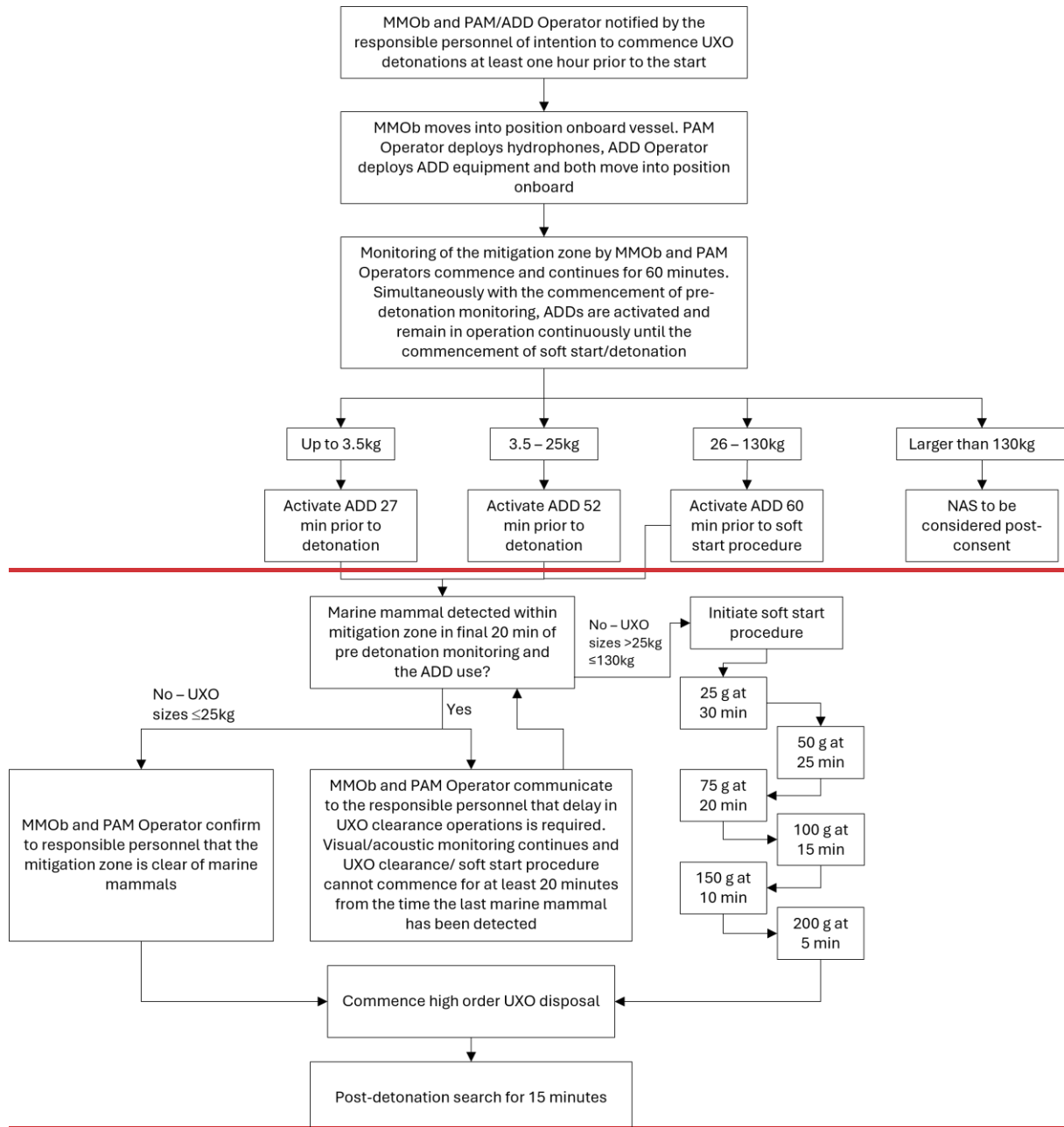


Figure 1.2: Example UXO clearance mitigation implementation for a high order clearance event.

1.5.7.31.6.6.3 The above UXO clearance mitigation plan has been developed in line with the latest Joint UXO Position Statement (Defra et al., 2025) and JNCC mitigation guidance (JNCC, 2025). The Joint UXO Position Statement states that high order UXO clearance should always be the last resort and that a minimum of three attempts should be made before high order UXO clearance is considered. Where high order UXO clearance is required a separate marine licence will be applied for (see paragraph 1.1.1.1) and therefore secondary mitigation measures will be considered post consent and will be presented in each of the detailed MMMP(s), to support the application for a separate marine licence. An overview of potential secondary mitigation measures for high order UXO clearance has been set out in **Appendix A**.

1.61.7 **Reporting**

1.6.1.11.7.1.1 The mitigation compliance report will be submitted to the MMO after UXO clearance activity is completed. It will be accompanied by completed JNCC marine mammal recording forms in the original format (i.e. the raw data in the excel spreadsheets) and a copy of the relevant survey consent or licence.

1.6.1.21.7.1.2 This report may encompass, but is not limited to, the following.

- Brief details of the company awarded the consent or licence, relevant contractor details if appropriate, and the survey consent or licence reference number.
- Identification of all confirmed UXO, including estimated size, type, location and depth.
- Approach taken for each UXO, including dates, times, disposal method attempted (based on size and type, and number of donor charge(s) used).
- Details of any UXOs relocated.
- Presence, location, and activity of vessels during low order UXO clearance.
- Outcome of each low order UXO clearance, including evidence of high order detonation, clearing charges required, and method of debris and residue recovery.
- The mitigation procedures followed for each low order UXO clearance, including details of MMOB activities, and where required, PAM equipment and operation (including expected detection performance for the various species expected to be encountered) and, ADD duration, and size and timing of soft start charges where required.
- All marine mammal sightings and completed JNCC marine mammal recording forms.
- Detailed descriptions of any technical problems encountered and what, if any, actions were taken as well as instances of non-

compliance with the JNCC mitigation-(2010)-guidelines (JNCC, 2025), detailed MMMP(s), and variations from agreed procedures.

- Protocols followed and any recommendations which could benefit future projects.

1.71.8 Next steps

1.7.1.11.8.1.1 The Applicants will produce the detailed MMMP(s) (one for Morgan OWL and one for Morecambe OWL) post-consent to include details on identified UXOs and programme. The detailed MMMP(s) will be agreed with the MMO prior to the commencement of pre-construction activities and will provide further information and confirmation of appropriate mitigation measures.

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Appendix A Secondary mitigation measures for high order UXO clearance

This section of the Outline MMMP provides a summary of measures currently available or likely to be available in the future, which could be applicable to further reducing residual effects from underwater sound from high order UXO clearance if required.

The detailed MMMP(s) will set out which mitigation measures may be required, if at all, based upon any reduction in effects, which in turn, will be based on any refinements due to the identified UXO charge sizes, and clearance methodology.

As per the mitigation hierarchy and CoT64 in **Table 1.1**, where clearance of UXO is required (i.e. avoidance is not possible) the use of low order UXO clearance will be adopted where feasible (see **Table 1.3**).

The mitigation approach adopted is dependent upon the individual situations surrounding each UXO. A detailed UXO survey will be completed post-consent. The exact number of possible detonations and duration of UXO clearance operations is therefore not known at this stage.

Mitigation for low order clearance of UXOs is secured in this Outline MMMP (see **section 1.6**), but for high order UXO clearance, secondary mitigation measures will be required (in accordance with the Joint UXO Position Statement (Defra *et al.*, 2025)). If high order UXO clearance techniques are required a separate marine licence will be applied for (see **paragraph 1.1.1.1**) and therefore secondary mitigation measures will be considered post consent within the MMMPs to support a separate marine licence for high order UXO clearance.

~~Given that it is possible that high order detonation may be required, embedded mitigation measures to reduce the risk of injury from UXO clearance for UXOs up to a size of 130 kg are provided in this Outline MMMP as set out in **Table 1.6**. If high order clearance techniques are required a separate marine licence will be applied for (see **paragraph 1.1.1.2**). For higher charge sizes, additional secondary mitigation measures may be required. Secondary mitigation measures will be considered post consent and will be presented in each of the detailed MMMP(s).~~

Secondary mitigation measures that may be considered include:

- Relocation of UXOs - the suitability of a UXO for relocation depends on its condition (sufficiently structurally sound to remain intact) and location (as greater distances represent a higher safety risk, and factors such as weather need to be considered).
- Clustering of UXO devices - in circumstances of multiple UXO located in proximity, UXO may be relocated such that they can be disposed of in a single controlled detonation and therefore limit the total potential area of disturbance and the potential cumulative underwater sound exposure that would otherwise result from successive detonations of UXO devices in discrete areas.
- Temporal and spatial phasing – following pre-site investigation surveys, temporal and/or spatial phasing could be used for UXO clearance. UXOs could be detonated outside of critical times for species at risk of a significant residual effect (such as seasonal

movements of bottlenose dolphin between Manx waters and Cardigan Bay (Howe, 2018)) or detonated sequentially, such that those furthest from key areas (such as SACs for harbour porpoise) are detonated first, and those closest to these areas detonated outside of key events.

- Sound reduction/NAS - sound reduction or NAS/noise mitigation systems are systems currently in use elsewhere or being developed and improved within the industry that enable a reduction of sound (dB) at source and could be considered for use following further investigation. It is likely that 'far field' systems such as Big Bubble Curtains) and Double Big Bubble Curtains could be applied if required.