

# Glyn Rhonwy Pumped Storage Development Consent Order

## Deadline 4 – Outline Ordnance Management Strategy

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<b>Authors</b>	Zetica/SPH	
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# Contents

<b>SECTION 1</b>	<b>INTRODUCTION</b>
<b>SECTION 2</b>	<b>METHOD</b>
<b>SECTION 3</b>	<b>KEY STAFF &amp; COMPETENCIES</b>

# 1 Introduction

- 1.1.1 The objective of this Ordnance Management Plan (OMS) is to set-out the basic framework of processes and plans for the mitigation of risk from potential Unexploded Ordnance (UXO) hazards to the construction of the Glyn Rhonwy Pumped Storage (“the Development”) near Llanberis, North Wales.
- 1.1.2 The OMS is designed to ensure that the requirements of legislation, the requirements of the Development Consent Order (DCO), the Environmental Statement (ES) and Snowdonia Pumped Hydro (“the Applicant”) Environmental Policies are complied with. It shall be the policy of the Applicant to ensure the project is executed in a manner that demonstrates its commitment to the care and protection of the environment.
- 1.1.3 The draft OMS has been developed by the Applicant and will be adopted and updated/refined by the Principal Contractor (PC) upon their appointment. All personnel and sub-contractors working on the Development shall perform their duties in accordance with the requirements of the OMS.
- 1.1.4 The OMS will be in accordance with Requirement 7 of the DCO and sets of the strategy and typical techniques and approaches that could be implemented by the Ordnance Management contractor to ensure the operations are undertaken safely, with minimal disruption to the local community and impacts to the environment.
- 1.1.5 The detailed Ordnance Management Strategy (OMS) will be produced once the final construction design and proposed methods are devised and all other related risk assessments have been developed.
- 1.1.6 The OMS is the definitive management plan for the management of UXO but must also be read in conjunction with the following other management plans:

- Land Discovery Strategy (LDS) – in relation to any UXO which may pose a risk to controlled waters and/or human health in relation to contamination;
- Water Management Plan (WTMP) – in relation to any amendment to the testing suite for the dewatering of Q6; and
- Material Management Plan (MMP) – in relation to the movement of material from Q6 to Q1 or waste material offsite. The OMS will outline specific methods of screening excavated material prior to any storage, use or movement within the Order Limits or removal of scrap material offsite which is not included within the MMP due to its specialised requirements .

1.1.7 The timing of the ordnance related works will therefore depend on the detailed construction design and programme but the anticipation is for all risk mitigation works to be completed prior to construction where possible to ensure site safety.

## 1.2 Requirement

- 1.2.1 A detailed UXO desk study and risk assessment (Report ref: P3300-12-R1-C) identified the potential for various types of ordnance to be present within Quarry 6 (Q6) of the Development, which was used during and immediately after World War Two (WWII) for extensive ordnance disposal operations.
- 1.2.2 Q6 is planned to be the location of a storage reservoir for the Development and a dam is to be constructed at the surface of the quarry.
- 1.2.3 It is understood that this will require the removal of a significant amount of slate waste from Q6, the draining of water currently present and potentially the lining of the base of the proposed reservoir. During all these activities there is the potential to encounter UXO.
- 1.2.4 It is therefore important to put in place an OMS to ensure that the UXO hazard is appropriately addressed.
- 1.2.5 The main focus of this strategy will be to protect personnel involved in construction, the public, property, environment and those directly involved in the Explosive Ordnance Clearance (EOC) and Disposal (EOD) operations.

## 2 Method

2.1.1 Although no detailed construction plans are yet available, the OMS will comprise of several phases of work as typically used for other similar projects in the UK, focusing on ensuring the development goes ahead safely and, where appropriate, that the UXO hazard is removed.

2.1.2 Typically these phases comprise:-

- Detailed UXO hazard identification – To provide further input into the risk assessment and method of EOD ensuring that any EOD operation is appropriately prepared for.
- UXO mapping – Where appropriate, the location of individual items and groups of UXO will be mapped through visual/detection techniques as appropriate.
- Explosive Ordnance Clearance – Investigation and identification of UXO in order to determine the hazard and whether they are required to be made safe.
- Explosive Ordnance Disposal – Making safe of any hazardous UXO.

2.1.3 Where safe to do so, any UXO risk mitigation works can be undertaken in conjunction with the main construction works. This not only reduces costs and programme but also the requirement to mobilise additional plant or materials.

2.1.4 It should be noted that at every stage of the mitigation works, task specific risk assessment method statements (RAMS) will be produced by the Ordnance Management Contractor that provide details of the work practices and approach, alongside contingencies relevant to the types of work being conducted. This will be carried out in conjunction with intermittent testing of

water quality at the site to ensure that no significant contaminants are present.

## **2.2 UXO Hazard Identification**

2.2.1 As detailed in the desk study and risk assessment, there is the potential for a wide variety of UXO types to be present in Q6. These range in size from small detonators, fuzes and bullets up to large High Explosive (HE) bombs. There is also likely to be quantities of ordnance scrap in Q6 which, whilst inert, will need positive identification prior to removal.

2.2.2 As part of the detailed risk assessment prior to any ordnance operations, a full assessment of both whole and component parts of ordnance likely to be present will be undertaken in order to further assess the nature, likely hazard and appropriate disposal action on encounter. This will consider:-

- Identifying marks/details;
- Size;
- Nature of filling;
- Quantity of filling;
- Nature of fusing;
- Possible variations;
- Age and condition;
- Probability of operating intended; and
- Incompatibility with other ordnance.

2.2.3 Alongside the UXO mapping results, this will inform the EOD operation planning.

2.2.4 The risk assessment will be finalised on confirmation of the construction methods and updated and revised throughout the EOC operations based on the types/quantities/locations of any UXO discoveries.

## **2.3 UXO Mapping**

- 2.3.1 Depending on practicality, a combination of UXO detection and observational mapping will be undertaken in order to provide location and potential quantity verification of UXO prior to any investigation works.
- 2.3.2 Some characterisation of either location and/or concentration of metallic targets will enable detailed planning for preparation on a daily basis, ensuring that appropriate resource is in place at each stage of any EOD operation.
- 2.3.3 A targeted non-intrusive magnetometer survey could be undertaken to detect the potential extents of any UXO within the slate waste and therefore inform the subsequent investigation phase. This would be undertaken by an experienced EOC team (see below).
- 2.3.4 UXO detection equipment is most likely to comprise of caesium vapour magnetometers that offer high sensitivity for the detection of ferrous metallic objects, alongside time domain electromagnetic instruments (such as the EM61) which provide high sensitivity for the detection of ferrous and non-ferrous metallic objects. This will be augmented with handheld instruments such as fluxgate magnetometers that also provide high sensitivity search capabilities where access is restricted.
- 2.3.5 The aim is to provide initial mapping of metal targets to assist in subsequent planning for the following phases of more detailed detection and removal works.

## **2.4 Explosive Ordnance Clearance**

- 2.4.1 As part of the construction phase of works, potential UXO will be investigated and assessed by the EOC Engineer to determine whether they are live, inert or non-UXO. Anything inert or non-UXO will be removed as 'scrap'.
- 2.4.2 Live/hazardous UXO will be subject to an EOD operation either in-situ or relocated to a purpose-built EOD facility for disposal.



- 2.4.3 The EOC Engineer will be fully briefed on the EOD tasking protocol for this project. All tasks will be reported and a record of the time and detailed maintained.
- 2.4.4 Subject to the methods proposed, this clearance phase is planned to be an integrated activity during construction, reducing any impact and utilising common resources where required.
- 2.4.5 A range of other protective measures will be put in place which may be required to include:-
- Active detection during material movement;
  - Enforced man limits in working areas of UXO risk;
  - Protective materials for plant; and
  - PPE for staff.

## **2.5 Explosive Ordnance Disposal**

- 2.5.1 EOD operations will be undertaken by trained and experienced staff that have appropriate competencies in conjunction with recognised UK best practice endorsed by HSE, MoD, MCA and Crown Estates.
- 2.5.2 Liaison with authorities such as the MoD and Police will be maintained to keep them informed of the operation and to allow them to reassure the local community in the event of any enquiries.
- 2.5.3 An EOD facility will be established on site prior to any investigation works. This would remain in place throughout the development.
- 2.5.4 The exact design of the EOD facility will be governed by the anticipated types of ordnance and site location. Typically EOD facilities are of tried and tested designs comprising of a surrounding blast mitigation structure with sand or water suppression barriers with an airgap. This means that any blast is not only contained, but also any significant noise.
- 2.5.5 Such facilities mean that there is no disruption to the local community.



**Figure 1: Typical EOD Facility**

- 2.5.6 The proposed location of an EOD facility will be determined once a contractor has been appointed and the programme for construction has been developed. The location of the facility will be selected taking into consideration distance from properties and construction activities in accordance with the Works Plans within the Development Consent Order.
- 2.5.7 In the unlikely event that an item is deemed unsafe to move and requires disposal in-situ the same mitigation principle will be adopted as for the fixed disposal facility outlined above. This will involve placing a sufficient quantity of blast mitigation over the item to suitably mitigate the effects of the blast, fragmentation and noise from the UXO detonation. Again an evacuation of nearby properties would not be anticipated.
- 2.5.8 Provisions will also be made for the unlikely scenario in which Mustard Gas or other suspected chemical-filled munitions are found. In such a situation, the suspect item will be segregated, a safety cordon put in place and the

Defence Science and Technology Laboratory (DSTL) at Porton Down will be contacted to arrange for its disposal, as per standard UK protocols.

2.5.9 As a precaution, appropriate Personal Protective Equipment (PPE) will be used to protect staff against such hazards if they are deemed to be potentially present.

2.5.10 Additionally, staff will be provided with Chemical Agent Monitors (CAMs) that will allow for the safe investigation of materials potentially contaminated with vesicant agents such as Mustard Gas. The instrument and approach have been established as a mainstay for such operations throughout the UK since the 1980s and involves the use of the CAM to monitor works such as excavation as they are progressed. In conjunction with appropriate personal protective equipment, it provides protection to those involved in works such as excavations as it indicates whether Mustard Gas may be present. If detected, then further more detailed sampling and analysis would be undertaken to confirm the presence of Mustard Gas. It is important to understand that the purpose and nature of vesicant agents such as Mustard Gas is area denial (i.e. they offer only a local hazard close to the source) and as such on discovery they do not offer a widespread hazard and certainly not a hazard to the local community. As part of the compilation of the detailed OMS, contact will be made with DSTL at Porton Down to request further input into the detailed OMS/RAMS to ensure that the approach with respect to Mustard Gas is both robust and appropriate, following industry good practice. This will provide the opportunity to improve on the normal industry standard approach through consultation with a world-leading authority in such matters.

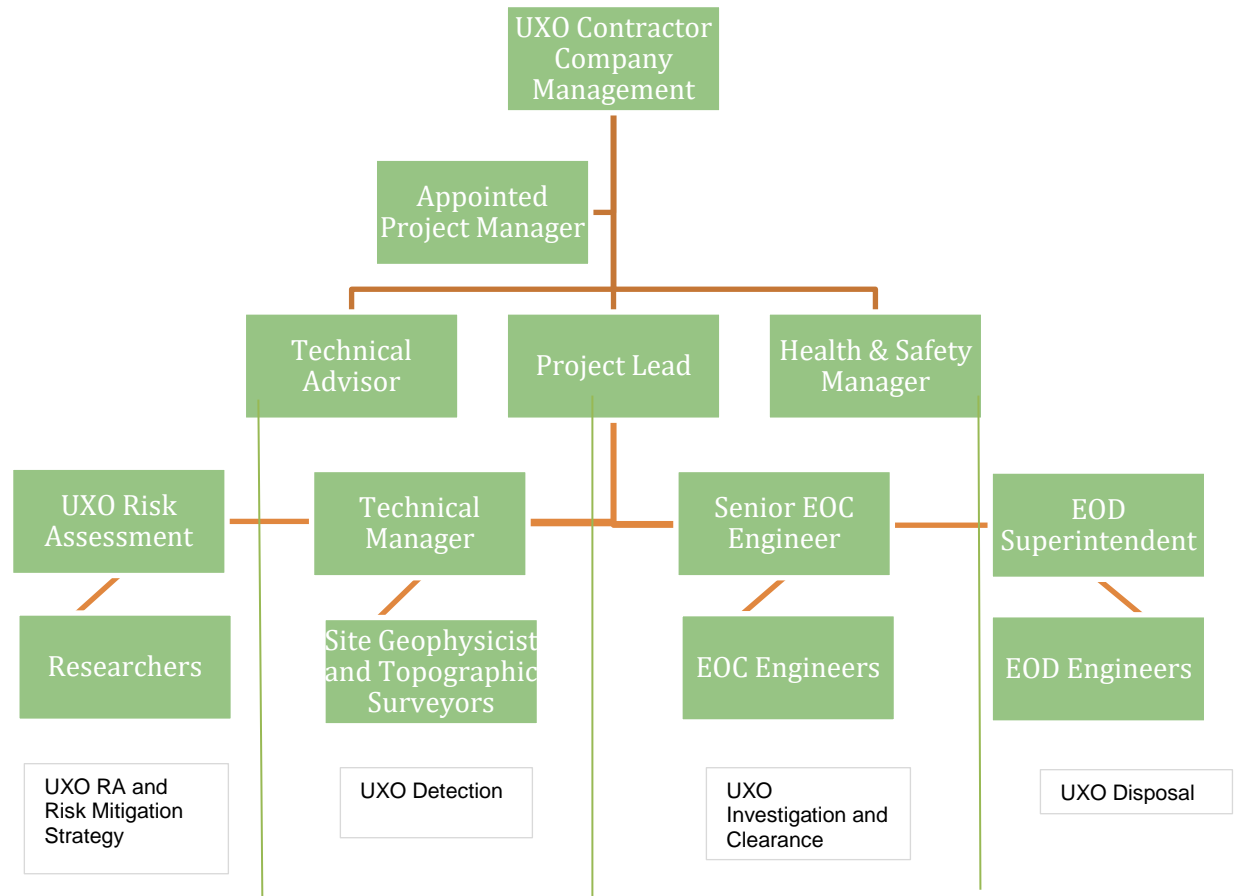
## **2.6 Slate Waste**

2.6.1 Given the potential for there to be UXO within the Q6 slate waste, screening of the removed slate and slate to be transferred to Q1 via conveyor will be required.

- 2.6.2 Effective measures for screening the slate for UXO are essential in order to maintain the safety of all site workers and to ensure that UXO is not inadvertently transported to Q1.
- 2.6.3 Effective screening will ensure that any UXO present can be dealt with in a controlled and safe way with the minimum of disruption.
- 2.6.4 To allow effective screening of slate waste, the following techniques may be employed:-
- Visual/Camera screening of materials by EOC Engineer.
  - Primary magnet (on plant feed conveyor) with safe access;
  - Metal detector with safe access interlocked to stop the feed conveyor; and
  - Secure inert munitions container.
  - Any live UXO found during the screening of the slate waste will be disposed of in the EOD facility already on site.

### 3 Key Staff & Competencies

3.1.1 The following organogram identifies typical key roles and staff using Zetica as an example.

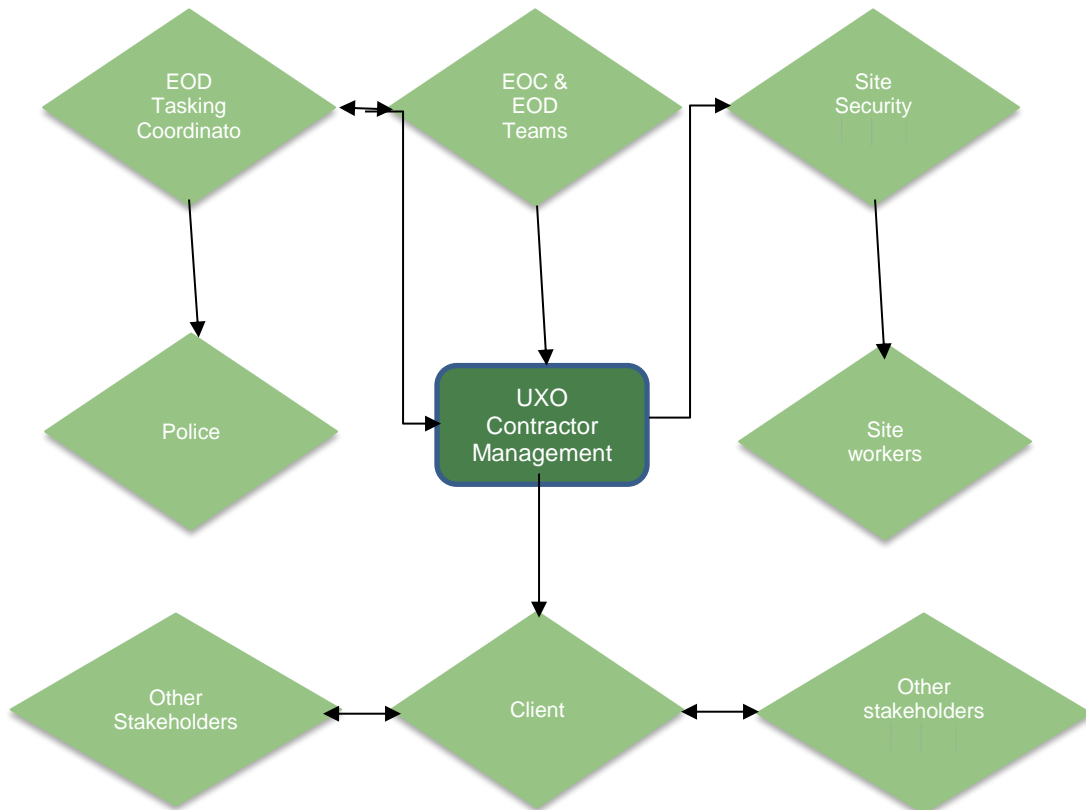


**Figure 2: Draft project organogram**

3.1.2 Key competencies of each staff member would be established and verified prior to starting any operation.

### 3.2 Liaison with Local Community/Authorities

- 3.2.1 Whilst this approach will mean that EOD operations offer no significant impact on the local community, routine liaison with the community and/or with the local authority is expected.
- 3.2.2 Such liaison will provide information on the intended work and offer an opportunity to ask questions in order to allay any concerns.
- 3.2.3 Routine liaison with the Police and MoD will also be undertaken by the Ordnance Management Contractor, in coordination with the Environmental Liaison Officer.



**Figure 3: Typical EOD Communications Flowchart**

### 3.3 Security

3.3.1 The site will have 24hour security. Any hazardous UXO discovered will be dealt with in an immediate and continuous operation (i.e. 'make safe' operations will not be delayed awaiting a quantity of UXO to be accumulated/cached), with the chain-of-custody maintained by the Senior Explosive Ordnance Disposal (EOD) Engineer. All such operations are also dealt with discretely in order to not attract unwanted attention.

3.3.2 On encounter any hazardous UXO will fall under a chain of custody which will ensure its security until made safe. It is the Senior EOD Engineer's responsibility to ensure the security of the item, with the primary aim being to make the item safe as soon as reasonably practicable to avoid storage/caching.

3.3.3 If impractical to make safe immediately (e.g. lack of light/end of working day), then overnight storage will involve secure storage of the item with a full-time security detail. This will comprise a bunded secure store (secure metal ISO container) and secure fencing with keys held only by the Senior EOD Engineer and spares held at the UXO specialist head office controlled by the Managing Director.

### 3.4 Community Impact

3.4.1 Given the location of the development it is not considered that there will be any significant impact on the local community from any EOD operation.

3.4.2 In spite of this, it is important to consider some of the potential affects the operations may have on the wider area so that they can be effectively communicated to local residents.

3.4.3 The following provides detail of what the local community may experience:-

- Disposal operations may involve a 'deep-thud'. It can provoke some people to inform the Police, but the Police will already be aware and will take no further action.

- Temporary closure (by sentries) of any public footpaths that run in close proximity to the quarry (which is already off-limits to the public).

**3.4.4** Any EOD operations will be conducted in normal working hours, avoiding times such as weekends and bank holidays where more people may be walking near to the site.

**3.4.5** Core hours for any EOD operations will be agreed prior to the risk mitigation works. Once constructed, a testing of the EOD facility will give stakeholders the opportunity to monitor a disposal operation from areas typically used by the local community throughout the working day. This will help determine the requirement for core hours.

### **3.5 Ordnance Scrap**

**3.5.1** It is anticipated that a considerable amount of ordnance scrap will be removed from Q6 during construction works. Whilst inert, this has to be dealt with in a sensitive manner.

**3.5.2** A contract with a local smelting company or alike would be arranged to dispose of ordnance scrap.

**3.5.3** A Free from Explosives (FFE) certificate will be issued for all such material to provide comfort to the receiver, and the chain of custody recorded to ensure that the arrangement is not breached.



### Target chain of custody record

Item details		Safe to move?		Other	
Target ID	Description	EOD Superintendent	Comments	Disposal route	Other remarks
T01		Signature			
T02		Signature			
T03		Signature			
T05		Signature			
T06		Signature			
T07		Signature			
T08		Signature			
T09		Signature			
T10		Signature			
T12		Signature			
T13		Signature			

**Figure 5: Example target chain of custody record**