PRELIMINARY RISK ASSESSMENT FOR POTENTIAL UNEXPLODED ORDNANCE CONTAMINATION

Government Property Agency Site 015

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Table of Contents

Abbreviations iii
Terminology iv

1 Executive Summary 1
1.1 Key Findings 1
1.2 Recommendations 1

2 Introduction 2
2.1 Instruction 2
2.2 Objective 2
2.3 Definitions 2
2.4 Reporting Conditions 2
2.5 Legislation 2

3 Site Details and Description 4
3.1 Site Location and Description 4
3.2 Proposed Scheme of Work 5

4 Sources of UXO Risk Factors 6
4.1 Sources of Information 6
4.2 Estate Intelligence Client / Stakeholder Issued Documents 6
4.3 Archive 6
4.4 National Archive 6
4.5 Aerial Mapping & Photography 7
4.6 Emergency Services Call Outs 7
4.6.1 UXO Related Incidents 7

5 Evaluation of UXO Risk Factors 8
5.1 Review 8
5.2 UXO Enemy Action 8
5.3 UXO Defensive Action 8
5.4 UXO From Training 8
5.5 Explosives Storage, Production & Processing 8
5.6 Potential Burial Sites 8
5.7 Disposal Sites 8
5.8 Assessed UXO Risk Factors 9

6 Preliminary Risk Assessment (UXO) 10
6.1 Sources / Hazards 10
6.2 Pathway 11
6.3 Receptors 11
6.4 Risk Matrix 11
6.5 Summary and Recommendations 13
6.6 Recommendations 13
6.7 Risk Mitigation Strategy 13

APPENDICES 14

Appendix A 15

Abbreviations

ACRONYM	DEFINITION
AOI	Area of Interest
AA	Anti-Aircraft
ASSI	Area of Special Scientific Interest
AT	Anti-Tank
BGL	Below Ground Level
DIO	Defence Infrastructure Organisation
DMS	Defence Medical Services
EOC	Explosives Ordnance Clearance
ha	Hectares
HE	High Explosive
I.B	Incendiary Bombs?
km	kilometre
lb	Pound (unit of weight)
MACA	Military Aid to Civil Authorities
MoD	Ministry of Defence
NARA	National Archives and Records Administration
NCAP	National Collection of Aerial Photography
RAF	Royal Air Force
SAA	Small Arms Ammunition
USA	United States of America
UXO	Unexploded Ordnance
WAA	Wide Area Assessment
WWII	World War Two 1939-1945

Terminology

Deflagration – reaction where materials decompose at a rate much below the sonic velocity of the material without any excess of atmospheric oxygen being required.

Detonation – form of reaction given by an explosive substance in which the exothermic chemical reaction produces a shock wave. High temperature and pressure gradients are created in the wave front so that the chemical reaction is initiated instantaneously.

Detonator – component within an explosive train which when initiated, in turn detonates a less sensitive but larger high explosive (i.e. booster) or when containing its own primer initiates the detonation.

Explosive Event - occurs when an explosive has been initiated to the extent that an explosive reaction, often deflagration or detonation occurs. Once initiated an explosive event is usually fast in occurring, often catastrophic and traumatic for personnel involved.

Explosive Ordnance Disposal (EOD) - The detection, identification, evaluation, rendering safe, recovery and disposal of UXO.

FFEH – free from explosive hazard is a term that applies to an item that contains no explosives-based hazard/threat. Can also be referred to as free from explosives (FFE) and free of explosives (FOE).

Fragmentation – shattering effect of an explosive upon its container.

High Explosive (HE) - An explosive that normally detonates rather than burns; that is, the rate of detonation exceeds the velocity of sound.

Initiation - A physical process that sets in motion a cascade of chemical reactions of ever-increasing energy (the explosive chain) that will eventually generate sufficient energy (the velocity of detonation) to allow the main charge to detonate in a violent, explosive chemical reaction, releasing energy in the form of heat and blast.

Low Explosives - are mostly solid combustible materials that decompose rapidly, but do not normally explode. This action is known as deflagration. Low explosives do not usually propagate a detonation. Under certain conditions, however they react in the same manner as high explosives and they may detonate.

Primary Explosives - are explosive that are sensitive to stimuli such as impact, friction, heat, or electrostatic sources of initiation. Examples are led, azide and lead Styphnate. They are often used in detonators or to trigger larger charges of less sensitive high explosives.

Propellant – low explosive which burns to produce high pressure gas used to propel a projectile, missile or other task e.g. start an engine or blow out pin.

Pyrotechnic – mixture containing both an oxidising agent and fuel. Capable when initiated, of combustion to produce a desired effect (i.e. heat, flame, smoke, gas, noise, delay).

Remediation – process of preparing a site/item to ensure that it is suitable for its intended usage.

Unexploded Ordnance (UXO) - Explosive Ordnance that has been primed, fuzed, armed or otherwise prepared for action, and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a threat to the safety and/or security of people, animals, property or material and remains unexploded either by malfunction or design or for any other reason.

UXO Contamination - UXO that is present within any given physical context that is considered to be an impediment to the safe ongoing or intended use of a facility. Safety in this instance is measured against an acceptable level of exposure to the potential risks that UXO present.

1 Executive Summary

This Preliminary UXO Assessment has been undertaken on behalf of the Government Property Agency (GPA) in order to provide an initial assessment of the likelihood of encountering UXO within the specified site boundary during ground disturbing works.

The proposed scheme consists of the work is understood to construction of accommodation for 3,510 service users. Levels of risk have been identified relating to Explosives Storage, Production and Processing, Potential Burial Sites, Disposal Sites and UXO from Defensive Action.

Risk mitigation consists of the provision of site-specific Explosive Site Safety Guidelines training and a site-specific Emergency Response Plan in the event of discovery of suspected UXO.

Standards/best practice. State that if not a DIO project, DIO TSOR's/standards have been applied

1.1 Key Findings

The AOI has been in military use since the Second World War. Its use is primarily as an ordnance depot used for storing, processing and issuing military stores. Research for this preliminary level report has not identified information relating to the storage of munitions, but given the long association as a military site, this cannot be discounted at this stage, and further research is warranted to ascertain more details relating to any potential association with munitions.

1.2 Recommendations

As detailed above, to ensure the risk from UXO remains ALARP, it is recommended that all personnel undertaking breaking ground processes within the bounds of the site undertake site-specific Explosive Site Safety Guidelines training.

An Emergency Response Plan that establishes clear lines of communication and responsibilities will be required to determine if and when UXO site presence is required.

2 Introduction

2.1 Instruction

This report has been commissioned by the Government Property Agency (hereafter GPA or Client) to conduct a UXO Preliminary Risk Assessment at Site 015.

2.2 Objective

The purpose of the Preliminary Risk Assessment is a qualitative screening exercise to assess the likelihood of finding UXO at a specified site. The assessment uses available sources of information to place a potential development site in context with events that may have led to the presence of aerial-delivered or military UXO within the bounds of the site and to identify an appropriate course for further action.

The content of this report is presented in such a way that it can be read and understood by non-UXO/explosives industry personnel.

As a construction project has not yet been defined for this site, it is not possible to complete a UXO Detailed Risk Assessment (UXO-DRA), as the method of construction in relation to potential UXO has not been established. Therefore, in accordance with CIRIA C681 and the client's instruction, this UXO Preliminary Risk Assessment (UXO-PRA) has been progressed to the stage whereby it only requires the addition and consideration of a defined construction project or change of use to complete a UXO-DRA should this be required in the future.

2.3 Definitions

The term 'site' refers to the area encompassing the extent of the works associated with the Site 015 AOI. A location map is presented in *Appendix A*, which details the extent of the site.

For the purpose of this assessment, the term UXO will relate to unexploded ordnance, bulk explosives and pyrotechnics, and small arms ammunition.

2.4 Reporting Conditions

This study consists of a desk-based collation and review of accessible official records relating to the possibility of UXO being present within the project area. Certain information acquired for the purpose of this study is either classified or restricted material; therefore, summaries of such information have been provided.

It must be emphasised that this desk study can only indicate the potential for UXO to be present. Further characterisation of the reporting area may be required to provide confirmation of the presence of UXO and the actual associated risks.

This appraisal relies on the accuracy of the information contained within the documents consulted and, as such, we will in no circumstances be held responsible for the accuracy of such information or data supplied.

The reader is to be aware that this assessment only encompasses ground conditions within the reporting area. It does not take into account any structures, including foundations and associated utilities.

2.5 Legislation

Whilst undertaking this UXO PRA, the requirements of various legislation have been considered. These include:

- Construction (Design and Management) Regulations 2015 (CDM 2015).
- Health and Safety at Work etc. Act 1974.

The following guides have also been considered:

- CIRIA – Unexploded ordnance (UXO) A guide for the construction industry (C681).

- CIRIA – Assessment and management of Unexploded Ordnance (UXO) risk in the marine environment (C754).
- DIO – Assessment of UXO Risk – Construction Activity on the MoD Estate, Technical Statement of Requirement.
- DIO – Preliminary Risk Assessment for Estate Intelligence, Technical Statement of Requirement.
- DIO – Policy Instruction, Guidance for Unexploded Ordnance in Infrastructure Activities.

3 Site Details and Description

3.1 Site Location and Description

The Site 015 area of investigation (AOI) consists of an irregularly shaped land parcel measuring 50.5 hectares and centred approximately on British NGR SP 63225 17763 and is located to the NW of the village of Piddington and is bounded by Widnall Lane to the south, the B4011 to the west, Lower Lane to the east and open ground to the north. The AOI comprises areas of undeveloped ground, road and former railway infrastructure, woodland, hardstandings, water storage pools, large warehouse-type buildings and other associated military ordnance-type depot buildings and industrial-type buildings. The AOI is illustrated in *Figure 1* below.

Figure 1. – Showing the current AOI boundary (Google Earth 2025)

The Central Ordnance Depot (COD) at the AOI was built during WWII. It was built specifically to support 21st Army Group operations in northern Europe. Its purpose was to provide MT spares and assemblies, vehicles and technical and warlike stores. The depot was also responsible for the provisioning of small arms and machine guns. This function ceased in 1947 when it was moved to the COD Weedon. In 1944, the depot became responsible for the storage and handling of large quantities of US stores. Various types of weapons were stored at the AOI, which included large quantities of 20mm cannons, 40mm guns, 25pdr guns, 95mm guns and large quantities of barrels for 6pdr and 17pdr anti-tank guns. After the war, the AOI was responsible for purchasing, storing, and distributing worldwide for general and clothing stores. In 1961, a major reorganisation of Ordnance depots (*Operation Nettlerash*) saw a number of depots being closed. Stores from these closed depts were transferred to the AOI. Research has not specifically identified any munitions-type storage at the AOI. The COD in context to the AOI covers a large area and comprises different sites. Details and structure of the depot are shown in the map below.

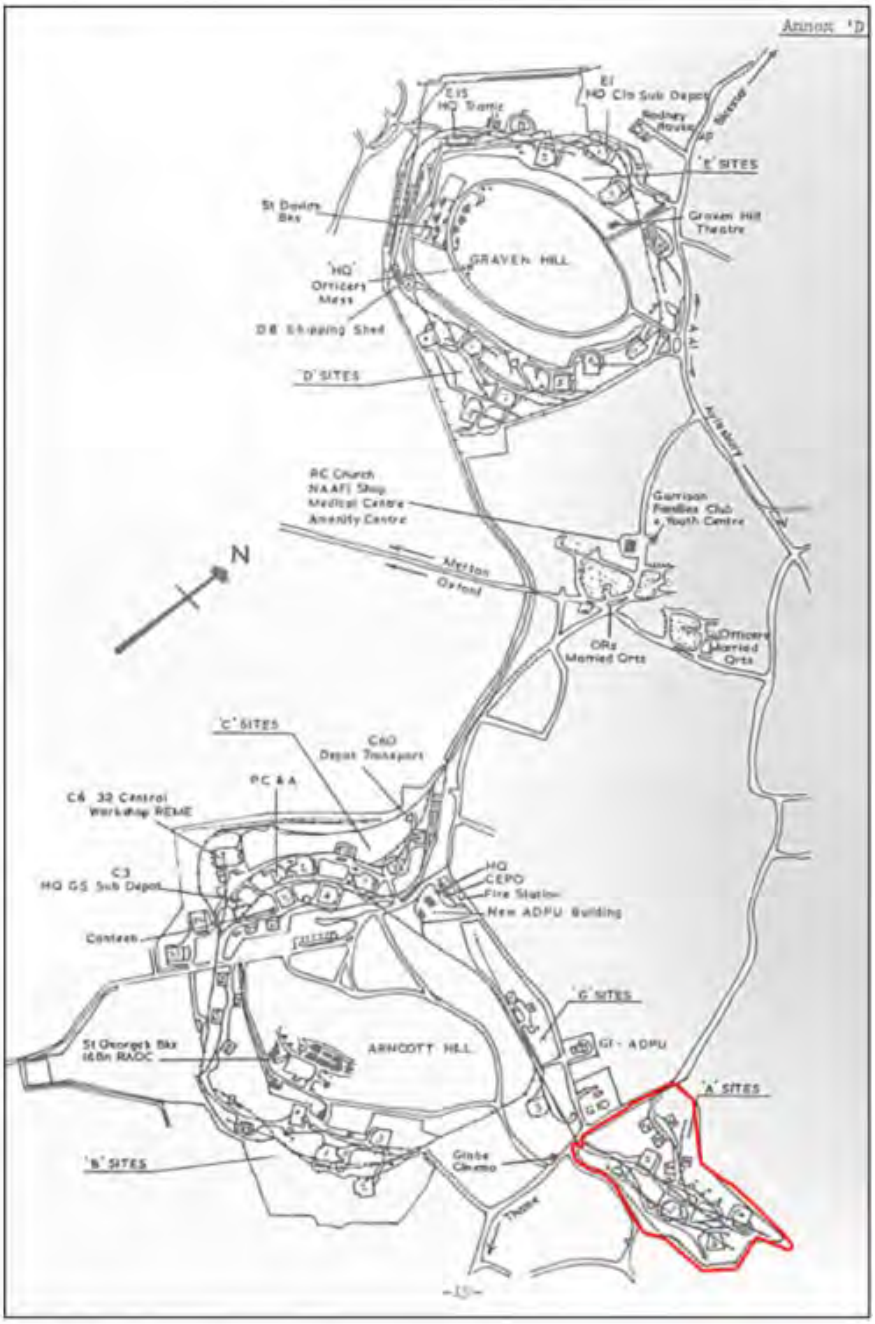

Figure 2. The AOI in relation to its surrounding environment is shown from a 1965 dated map.

3.2 Proposed Scheme of Work

The proposed scheme consists of the work is understood to construction of accommodation for 3,510 service users. We assume any development will likely involve intrusive (deep) works in the form of ground investigations, foundations, piling, excavation, and landscaping. These activities have the potential to disturb UXO, should it be present.

4 Sources of UXO Risk Factors

4.1 Sources of Information

The primary sources of information reviewed for this report were obtained from within the public domain and further included:

- Aerial Photographs
- Bomb Census Maps and Records
- Historical Texts
- Internet
- Local Authority Records
- Libraries
- National Archives
- Newspaper Articles
- Official Abandoned Bomb Register

4.2 Estate Intelligence Client / Stakeholder Issued Documents

The following documents have been used to assist in this assessment of the indicated project area. They have been used to obtain baseline information to assist in the reporting process:

Ser	Title	Document Reference/Date	Info Type
Drawing number 250902-PEV-000-ZZ-D-A-0200	Project TF21	Red Line boundary map/27.11.2025	Factual

This report has been produced without sight of information that MOD may or may not hold in relation to UXO contamination of this site, or UXO clearance activity that may have been undertaken in the past. If such information becomes available in the future, it should be considered by a UXO specialist, and the risk from UXO should be revised accordingly.

4.3 Archive

We have reviewed the information they hold on file for the project area (previously collected from archives) and is aware that the AOI has a long history of military usage.

4.4 National Archive

A review of historical information held on file by the National Archive based in Kew, London, has been undertaken. The following documents were recovered when conducting a search for the AOI.

Ser	Document Reference	Comments	Date	Info Type
4.4.1	WO 166/17379	COD War Diary	1945 Jan.-Oct	Factual
4.4.2	WO 166/15729	COD War Diary	1944	Factual
4.4.3	WO 166/13265	COD War Diary	01 March 1943 –	Factual

Ser	Document Reference	Comments	Date	Info Type
			December 1943	
4.4.4	WO 305/3614	Central Ordnance Depot (COD), r	1965 Apr – 1969 Mar	Factual

4.5 Aerial Mapping & Photography

Further to National Archive records, a review of open-source historical mapping and Aerial imagery has been completed. The following table documents the historical changes observed within the AOI.

Ser	Document Reference	Comments	Date	Info Type
4.5.1	OS 1:25,000 Mapping	The AOI is detailed, showing large buildings, roadways and railway infrastructure.	1945-65	Map
4.5.2	Air Photograph	The composition of the AOI remains the same as 1952 mapping, with the addition of 3 large buildings having been constructed in the NW area of the AOI.	08 February 1952	Photo

The above detailed historic mapping & air photography was reviewed. The aerial imagery viewed is a compilation of our Reference library images and open-source images.

Interrogation of the imagery also shows no signs of anything indicating the AOI was anything other than a military depot AOI since WWII.

4.6 Emergency Services Call Outs

There is no public information available at present to indicate that any emergency response to UXO has taken place within the AOI.

4.6.1 UXO Related Incidents

No information has been found in the public domain relating to UXO incidents within Site 015.

5 Evaluation of UXO Risk Factors

5.1 Review

The information collated in *Section 3* of this assessment has been reviewed based on its proximity and potential impact on the reporting area; this has been summarised in the sections below:

5.2 UXO Enemy Action

Research has not identified any historic WWII bombing within the AOI boundary or in proximity to the AOI.

It is therefore considered that this activity has no potential for direct impact on the assessment area.

5.3 UXO Defensive Action

We consider it likely that, due to the military association with the AOI and as a secure location, defensive positions are likely to have been present at the AOI. Any defensive positions are likely to have been manned by military guards or, more recently, by the Military Provost Guard Service (MPGS), who are responsible for maintaining physical security at British Armed Forces locations throughout Great Britain. Those responsible for guarding the AOI are likely to have been armed with small arms.

We have not found any evidence that Heavy Anti-Aircraft (HAA) positions were located within the AOI or within 5km of the AOI during WWII. It is considered likely that light anti-aircraft defences would have been in place at the AOI during WWII.

It is therefore considered that this activity has limited potential for direct impact on the assessment area.

5.4 UXO From Training

Research has not identified any military training activity at the AOI. The nearest military training area (Piddington - a dry training area) is located approximately 1.4 km to the south of the AOI.

It is therefore considered that this activity has no potential for direct impact on the assessment area.

5.5 Explosives Storage, Production & Processing

Taking into account that the AOI has been in military occupation since WWII, the potential presence of UXO associated with this source cannot be completely discounted without further detailed research.

It is therefore considered that this activity may have potential for direct impact on the assessment area.

5.6 Potential Burial Sites

Taking into account that the AOI has been in military occupation since WWII, the potential presence of UXO associated with this source cannot be completely discounted without further detailed research.

It is therefore considered that this activity may have potential for direct impact on the assessment area.

5.7 Disposal Sites

Taking into account that the AOI has been in military occupation since WWII, the potential presence of UXO associated with this source cannot be completely discounted without further detailed research.

It is therefore considered that this activity may have potential for direct impact on the assessment area.

5.8 Assessed UXO Risk Factors

Having reviewed all potential UXO Risk Factors, the following facets have the potential to provide an elevated likelihood of encountering UXO within the AOI:

- UXO Defensive Action (*Section 5.3*)
- Explosives storage, production and processing (*Section 5.5)*
- Potential burial sites *(Section 5.6)*
- Disposal sites *(Section 5.7)*

As such, the aforementioned factors will be taken forward into the risk assessment phase of this report.

For completeness, the factors below will also be considered during the risk assessment:

- UXO Enemy Action (*Section 5.2*)
- UXO from Training (*Section 5.4*)

6 Preliminary Risk Assessment (UXO)

Using the information from the research undertaken by us and previously by DIO, a UXO Preliminary Risk Assessment will be carried out.

To facilitate this, we will conduct a 3D-based risk assessment rather than a conventional 2D risk assessment. This will allow for various end land uses to be assessed

- Agricultural and Allotments
- Commercial
- Residential
- Public Open Space

The client has not defined the end use for the site, although we believe the site will remain in use for the foreseeable future. That said, we have taken into consideration all of the above factors for the completeness of reporting.

For ease of understanding, the following figure outlines the risk assessment process for each facet under consideration:

Risk assessment is a formalised process for assessing the level of risk associated with a particular situation or action. It involves identifying the hazards and the potential receptors that could be affected by this hazard. The degree of risk is associated with the potential for a pathway to be present linking the hazard to the receptor. This relationship is usually summarised as the Source – Pathway – Receptor.

6.1 Sources / Hazards

Previous sections of this report have highlighted a number of activities that are known to have occurred on/around the site. The following sections will assess if they have the potential to cause significant contamination:

- Explosives Storage, Production and Processing (*Section 5.5*)
- Potential Burial Sites (*Section 5.6*)
- Disposal Sites (*Section 5.7*)
- UXO Defensive Action (*Section 5.3*

6.2 Pathway

The pathway is described as the route by which the hazard reaches the site personnel. Given the nature of the site, the only pathways would be during:

- Enabling Works,
- Intrusive Site Works (Piling etc.),
- Demolition,
- Excavations.

6.3 Receptors

Sensitive receptors applicable to this site would be:

- People (Construction Workers, Site Users, General Public),
- Plant and Equipment,
- Structures (Including existing buildings and nearby properties),
- Environment and Ecology.

6.4 Risk Matrix

In order to identify an appropriate risk mitigation strategy for the works, it is now necessary to complete a semi-quantitative assessment of the identified risks.

Once the factors detailed above have been assessed for the site, the probabilities of encounter and detonation/deflagration are also deduced and given a rating between 'Highly Improbable' and 'Highly Probable'. This results in a 'Probability of Explosive Event'.

The consequence level is obtained from the table presented within the matrices, which provides a consequence rating from 1 to 5, depending on the severity.

These ratings are then combined to determine the final risk levels to the proposed site works from the various threat items, again using the risk matrix below, taking into account the potential UXO threat items as detailed earlier.

Figure 2. Risk assessment matrix for Intrusive activities prior to mitigation measures (Disposal and burial of munitions)

Stage 2—Potential Consequence of Explosive Event

Consequence Level	Potential Consequences of Detonation/Deflagration				
	People	Environment	Assets: Plant and Equipment	Assets: Structures	Reputation
1	No Injury / First aid injury	Minor disturbance.	No noticeable effect	No noticeable effect	No significant impact
2	Lost time injury < 3 days	Significant disturbance.	Slight superficial damage	Slight superficial damage	Slight Impact
3	Serious debilitating injury	Moderate damage to habitats.	Minor component replacement repair	Repairs - non-structural	Moderate Impact
4	Localised fatalities	Moderate damage of habitats. Some long term effects.	Significant component replacement repair	Repairs - structural	Major Impact
5	Multiple fatalities over extended area	Localised destruction of habitats. Moderate long-term effects.	Unit loss, un-repairable damage	Localised structural failure and collapse	Massive Impact

Stage 1—Probability of Explosive Event

Probability of Encounter*	Probability of Detonation/Deflagration: 1 Highly Improbable (<2%)	2 Improbable 2-10%	3 Remote 10-40%	4 Probable 40-70%	5 Highly Probable 70-100%
1 Highly Improbable (<2%)	1	2	3	4	5
2 Improbable 2-10%	2	4	6	8	10
3 Remote 10-40%	3	6	9	12	15
4 Probable 40-70%	4	8	12	16	20
5 Highly Probable 70-100%	5	10	15	20	25

Result carried forward

Result carried forward

Probability of Explosive Event	Consequence of Explosive Event: 1	2	3	4	5
≤6	6	12	18	24	30
≤12	12	24	36	48	60
≤16	16	32	48	64	80
≤20	20	40	60	80	100
≤25	25	50	75	100	125

Risk Level Key:

- [redacted]
- Low
- Moderate
- [redacted]

6.5 Summary and Recommendations

The project area has been researched and reviewed. The findings of these activities have been used to complete the Phase 1 PRA, which is summarised in the following table:

Activity	Risk Level
Agricultural and Allotments	Low
Commercial	Low
Residential	Low
Public Open Space	Low

Based on these risk levels, we have assigned a **Low** risk of encountering UXO within the area of interest only, as detailed within the site map at *Appendix A*.

6.6 Recommendations

The reader should be aware that this report has been compiled to inform potential land users of the UXO-based risks within the project area based on desktop research only, and thus it should not be considered the final stage of the UXO risk management process.

Although we have assigned the AOI a **Low** risk for the likelihood of encountering UXO, given the area's long-standing military history, we recommend that all personnel undertaking construction/maintenance processes undergo site-specific UXO/ Explosive Awareness training. This recommendation is in line with both CIRIA C681 & DIO TSoR Assessment of UXO risk – Construction Activity on the MOD Estate.

6.7 Risk Mitigation Strategy

As detailed above, to ensure the risk from UXO remains ALARP, it is recommended that all personnel undertaking breaking ground processes within the bounds of the site undertake site-specific Explosive Site Safety Guidelines training.

An Emergency Response Plan that establishes clear lines of communication and responsibilities will be required to determine if and when UXO site presence is required.

APPENDICES

Appendix A

Legend

Site Boundary (Approximate)

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 500 1,000 1,500 2,000 2,500 Feet

Geodetic Information:
CRS: British National Grid, Datum: OSGB 1936
EPSG Code: 27700

Data Sources: Client
Service Layer Credits: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, Intermap, NASA, NGA, USGS, Esri, Ordnance Survey, NASA, NGA, USGS, Microsoft, Vantor

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Page: 1 of 1

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Project: Project Nettlefire: Site 015

Title: Site 015 Location

Project Number: [redacted]

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