EOD Contracts Ltd

International Unexploded Ordnance Risk Mitigation

Many People...

...One Aim

EXPLOSIVE ORDNANCE DESK TOP STUDY FOR:

PROJECT 17323

MILL RYTHE
HAYLING ISLAND
HAMPSHIRE
PO11 0PB

ASHDOWN

Institute of Explosives Engineers
VOICE OF THE EXPLOSIVES INDUSTRIES

www.eodcontractsltd.com | Tel: 01926 485708

EXPLOSIVE ORDNANCE DESK TOP STUDY

Of

Mill Rythe
Hayling Island
Hampshire
PO11 0PB

Conducted by EOD Contracts Limited

On behalf of

ASHDOWN

Conditions of Release

This document was produced in the United Kingdom of Great Britain & Northern Ireland and is copyright © EOD Contracts Ltd. It has been prepared for the titled project, or named part thereof, and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of EOD Contracts Ltd being obtained. EOD Contracts Ltd accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned. To the extent that this report is based on information supplied by other parties; EOD Contracts accepts no liability for any loss or damage suffered by the client, whether contractual or otherwise, stemming from any conclusions based on data supplied by parties other than EOD contracts Ltd and used by EOD contracts Ltd in preparing this report. This document has been produced for the purpose of assessment and evaluation only. The contents of this document shall not in whole or in part: 1. Be used for any purpose other than that for which it was intended, 2. Be disclosed to any individual not having a need to know such information nor to any third party individual, organisation or government, 3. Be stored in any retrieval system nor be reproduced or transmitted in any form by any optical, electronic, mechanical or other means including photocopying, without the prior written permission of EOD Contracts Ltd, Unit G1, Holly Farm Business Park, Honiley, Kenilworth CV81NP United Kingdom.

Document Control & Enquiries

Document Reference: EOD/17/17323/DTS/Mill Rythe, Hayling Island, Hampshire, PO11 0PB	
Distribution Copy 1 (Electronic)	**Distribution Copy 2 (Electronic)**
Archived	Uncontrolled
EOD Contracts Limited. Part of the Pharos Group Holly Farm Business Park Unit G1 Honiley Kenilworth Warwickshire CV8 1NP	ASHDOWN

Document Originator	Alan Hall	11/08/2017
Authorised Release	Shane Meaker	11/08/2017

All enquiries regarding this document should be directed to:
Email: shane.meaker@eodcontractsltd.com
Telephone: 01926 485708.
Alternatively; the persons named above can be reached at the above address.

CONTENTS

Title	Pages
Front Cover	**i**
Document Control & Enquiries	**ii**
Contents Page	**iii-iv**
Terms and Definitions	**v-vi**
Executive Summary	**vii-xiii**
INTRODUCTION	**1**
Instruction	1
Scope of Work	1
Restrictions	2
Sensitive Documentation	2
Objective	2
SOURCES OF INFORMATION	**3**
Ministry of Defence Records	3
Attack Record Keeping	3
Attack Record Accuracy	4
Errors and Omissions	4
Bibliography	4
SITE DESCRIPTION AND DETAILS	**5**
Location	5
Description	6
Geology	6
Current Site Use	6
Future Works	6
HISTORICAL REVIEW	**7**
Historical Mapping and Aerial Photography	7
WWI	7
WWII	7-8
The Bristol Blitz	8-9
V1 & V2 Bomb Strikes	10
Abandoned Bombs/UXO	10
Anti Aircraft Artillery/Naval Decoy Sites	10
Prior Clearance Operations	10
SOURCES OF UXO CONTAMINATION	**11**
General	11-14
RISK ASSESSMENT	**15**
Risk Assessment	15
Likelihood of Encounter	15
Consequences of Encounter	15-16
Risk Level	16-17
CONCLUSIONS	**18**
RECOMMENDATIONS	**19-20**

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Annexes		
Annex A	Location Map	A-1 to A-3
Annex B	Historic Maps	B-1 to B-3
Annex C	WWI Bomb Raids	C-1
Annex D	Explosive Ordnance Information and Safety	D-1 to D-10
Annex E	Tables	E-1 to E-4
Annex F	Recent UXO Finds (UK)	F-1 to F-7

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

TERMS AND DEFINITIONS

Anti Aircraft Shells (AA)

Small High Explosive Shells (HE) shells ranging up to 100mm in diameter.

Battlefield Area Clearance (BAC)

The systematic clearance of munitions from military property or old battle sites e.g. ranges, airfields etc.

Borehole Search

The placing of boreholes in a set pattern, then using a magnetometer to take readings at specific depths along each borehole. When used with a geophysical survey system this will give a magnetic signature of the area. The depth of the borehole and the pattern will depend upon the type of Unexploded Bombs (UXB) and the geology of the ground.

Doodle Bug (See Pilotless Aircraft)

Explosive Ordnance (EO)

All munitions containing explosives, nuclear fission/fusion materials and or biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and Small Arms Ammunition (SAA); all mines, torpedoes and depth charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices (IED); and all similar or related items or components explosive in nature.

Explosive Ordnance Clearance (EOC)

See BAC.

Explosive Ordnance Disposal (EOD)

The detection, identification, field evaluation, render safe, recovery and disposal of **UXO**.

Geophysical Survey

The survey of an area using a Magnetometer and geophysical gathering device, after interpretation, this will produce a geophysical map and an object list for any metallic anomalies.

High Explosive (HE)

High explosives burn/detonate at rates of up to 9,000 m/per second.

Incendiary Bomb (IB)

Incendiary bombs ranged from 1kg in size to 500kg the larger sizes were sometimes called Oil Bombs. Fills range from thermite mixtures, phosphorus to kerosene.

Intrusive Survey

The use of a cone penetrometer (MagCone) or drilled boreholes (MagDrill) to take magnetometer test in a set pattern (see borehole search), or to prove pile positions.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Land Service Ammunition (LSA)

LSA is defined as “All items containing explosives or pyrotechnic compounds which are placed, thrown or projected so as to cause damage to men and equipment during land warfare.

Long Range Rocket (LRR)

The long range rocket sometimes codenamed Big Ben is the V2 rocket designed to deliver an approximate payload of 1000 kg.

Oil Bomb (OB)

A bomb containing a flammable liquid, normally the KC 250 Flam or the C 500 flam.

Pilot less Aircraft (PAC)

A flying bomb (Fly) or doodlebug is the V1 rocket or predecessors designed to deliver an explosive payload of approximately 500kg - 800kg.

Parachute Mine (PM)

Air dropped mine may have been used as a blast effect bomb maximum explosive content 1600lb always fitted with anti-handling and anti-stripping equipment.

Unexploded Bomb (UXB)

Any air dropped bomb that has failed to operate.

Unexploded Ordnance (UXO)

Explosive ordnance that has been primed, fused, armed or otherwise prepared for use or used. It may have been fired, dropped, launched or projected yet remains unexploded either through malfunction or design or for any other cause.

Vengeance Weapons (V)

V1 see Pilot less Aircraft.
V2 see Long Range Rocket.

WWI

First World War 1 (1914 – 1918)

WWII

Second World War 2 (1939 – 1945)

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

EXECUTIVE SUMMARY

1 Instruction

EOD Contracts Ltd, have been commissioned by ASHDOWN (hereafter, “the Client”) to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works at Mill Rythe, Hayling Island, Hampshire, PO11 0PB.

2 Scope Of Work

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of Mill Rythe, Hayling Island, Hampshire, PO11 0PB (See Photo 2.1), in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

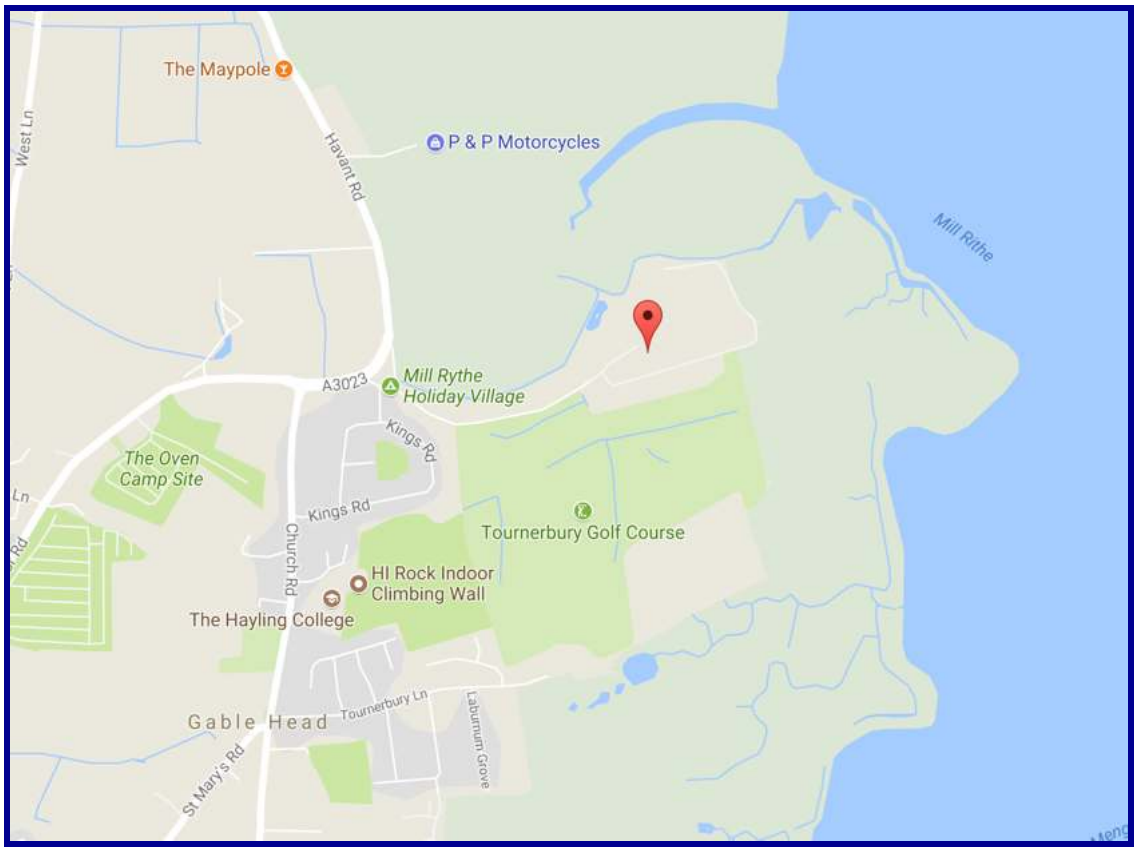
PHOTO 2.1: Clients Scope of works, this Desktop Study (DTS) will be covering all areas shown within the Red Boundary.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

2.1 Location

The site is located on Hayling Island (East of Portsmouth), with access being gained to the site via the main entrance of Havant Rd. During WWII the site was situated within the Southern Region (Region 6) of the HO 193 Mapping series.

PHOTO 2.1: Site location Map



Title	Description (Centre of Site)
Address	Mill Rythe Holiday village, Hayling Island
Post Code	PO11 0PB
Grid Reference	SU 730007
OS (X)	473064
OS (Y)	100702

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

3 Sources of UXO Contamination

3.1 Through the use of thorough research (utilising both modern and historic data) EOD Contracts Ltd deem that the three main sources of UXO contamination pertaining to the site are as follows;

- Air delivered ordnance bombs and sub munitions/incendiaries.
- Anti Aircraft Ammunition (AA)
- Buried or discarded items of ordnance

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

4 Key Findings

4.1 Based on the information researched by EOD Contracts Ltd for the proposed works being carried out at Mill Rythe Holiday Village, we can conclude the following:

4.2 Hayling Island was not subjected to bombardment during the period of WW1 (See **Annex C**).

4.3 EOD Contracts have found viable evidence to suggest that Hayling Island was the subject of direct attack during the Portsmouth Blitz

4.4 The closest HAA gun emplacements to the site were 3km SW of the site.

4.5 The closest Naval Decoy site was 1.7km NW of the site.

4.6 The Luftwaffe did not indicate that the site itself was of strategic importance, however due to shape of Hayling Island, and the use of decoy sites it was often confused with Portsmouth and bombed on several occasions.

4.7 EOD Contracts did find evidence that the site was utilised by the military (Royal Marines) during WWII.

4.8 The HO 193 Bomb mapping series that is utilised to identify Bomb Strikes throughout the UK does not cover this particular area of land, this could mean that items of UXO could have been dropped in and around the site and remained undetected until this time.

4.9 The site has remained as a Holiday Park/Campsite both Pre and post WWII, and is unlikely to have any significant structures constructed to any significant depth throughout this period, therefore it is possible for items of UXO to have remained undetected to this time.

4.10 Due to the lack of exact bomb mapping for Hayling Island and its surrounding area, and the subsequent evidence to suggest the large military presence/naval decoy sites/training areas, EOD Contracts conclude that there is a **MEDIUM** risk of UXO being located within the site footprint. Given that some UXO retains the potential to detonate if disturbed with possible severe consequences, it is concluded that it would be prudent to ensure basic precautions are taken to ensure that the project can proceed in the safest possible manner and that any residual risk posed by UXO is as low as it is reasonably practical to achieve (ALARP).

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

5 RECOMMENDATIONS

5.1 It is recommended that the following risk mitigation strategy be executed during phases of the project indicated previously as a **MEDIUM** risk. The removal of any structures within the site footprint can be carried out to ground level without any UXO risk mitigation.

5.2 Communicating the risks, all stakeholders should be made aware of the UXO situation on the site and the possible impact it may have on the project works and day to day running of the district. Clients have a legal duty under the Construction Design & Management Regulations (CDM) and Health & Safety at Work legislation to provide Designers and Contractors with project specific information needed to identify hazards and risks associated with the design and construction work. The possibility that UXO may be encountered on site falls within the category of a significant risk and as such it should be addressed as early as possible in the lifecycle of the project.

5.3 Further planning; the risks posed by UXO should be brought to the attention of the Project CDM Coordinators and other individuals with a responsibility for project safety and operations at the site. The matter of UXO should be considered critical to project safety and one requiring high priority action.

5.4 UXO safety awareness training should be given at all levels of site personnel and selected individuals on the project staff with relevant responsibilities. A competent person as part of the project safety induction course should provide the awareness training. It should be reinforced with specific safety briefings and toolbox talks to individuals involved in conducting intrusive earthworks.

5.5 Project overview and the responsibilities of those working on site with regard to duty of care and public safety.

5.6 UXO recognition and safety procedures to be followed on discovery of a suspicious object or the alarm being sounded.

5.7 Emergency procedures to be followed in the event of an explosion. Evacuation routes, muster stations and accounting for personnel.

5.8 Work permits, works methodology and specific UXO risk mitigation methods. Post-incident inspections and returning to normal works.

5.9 Prior to any intrusive piling or drilling commencing, UXO safety testing and appropriate clearance certification into the ground to sufficient depth to provide clearance from UXO. This can be done using a progressive drilling process or (where large numbers of piles are to be placed and ground permitting) using a vehicle borne hydraulic system to push a magnetometer into the ground to test for the presence of UXO prior to piling.

5.10 UXO safety monitoring of all “at risk” excavations, including geotechnical or archaeological trial pits to be conducted during the project. This should be provided by a UK Home Office Authorised EOD/UXO Contractor using qualified EOD Engineer with specialist locators and detectors to scan the ground ahead of the excavation wherever possible.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

6.1 Specifically

6.2 Geotechnical investigations, percussive drilling/trial pits/window/samples, require an EOD Engineer over watch.

6.3 Demolition of buildings to ground level, does not require any mitigation

6.4 Removal of old foundations does not require a specific mitigation; however it would be deemed prudent to have an Explosive Ordnance Safety presentation to all ground workers.

6.5 New foundations with piling should be mitigated by the insertion of a magnetometer to encompass the pile position, this would be carried out using a CPT rig (magcone), the expected radius of the magcone is 1.5m therefore multiple piles could be checked.

6.6 Non-Intrusive Magnetometer surveys generally prove inconclusive on “Brownfield sites”, this is due to the high ferromagnetic background, therefore this methodology is not recommended for this site and shallow excavations should be overseen by a qualified EOD Engineer.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

7.0 EOD Contracts Ltd can supply a turnkey solution to your UXO requirements. Therefore, the following mitigation strategies can be supplied for land or water based operations:

7.1 Intrusive survey using CPT *(Cone Pressure Testing)* or borehole equipment, *supplying risk mitigation to all Borehole and Pile locations, down to a maximum bomb penetration depth determined within this document.*

7.2 Non-Intrusive Survey using multiple array system with DGPS *(Digital Global targets be identified.*

7.3 Offshore, near-shore, estuarine and freshwater water environments magnetic, side scan and bathymetric supported by state of the art DGPS.

7.4 The aforementioned surveys are supported with post processing of data and intrusive investigations if required.

7.5 EOD Engineer over watch using Suitably Qualified and Experienced Personnel, normally former British Army, Navy or RAF Bomb Disposal specialists.

7.6 Explosive Ordnance Safety Presentations.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

PHAROS EOD

1.0 INTRODUCTION

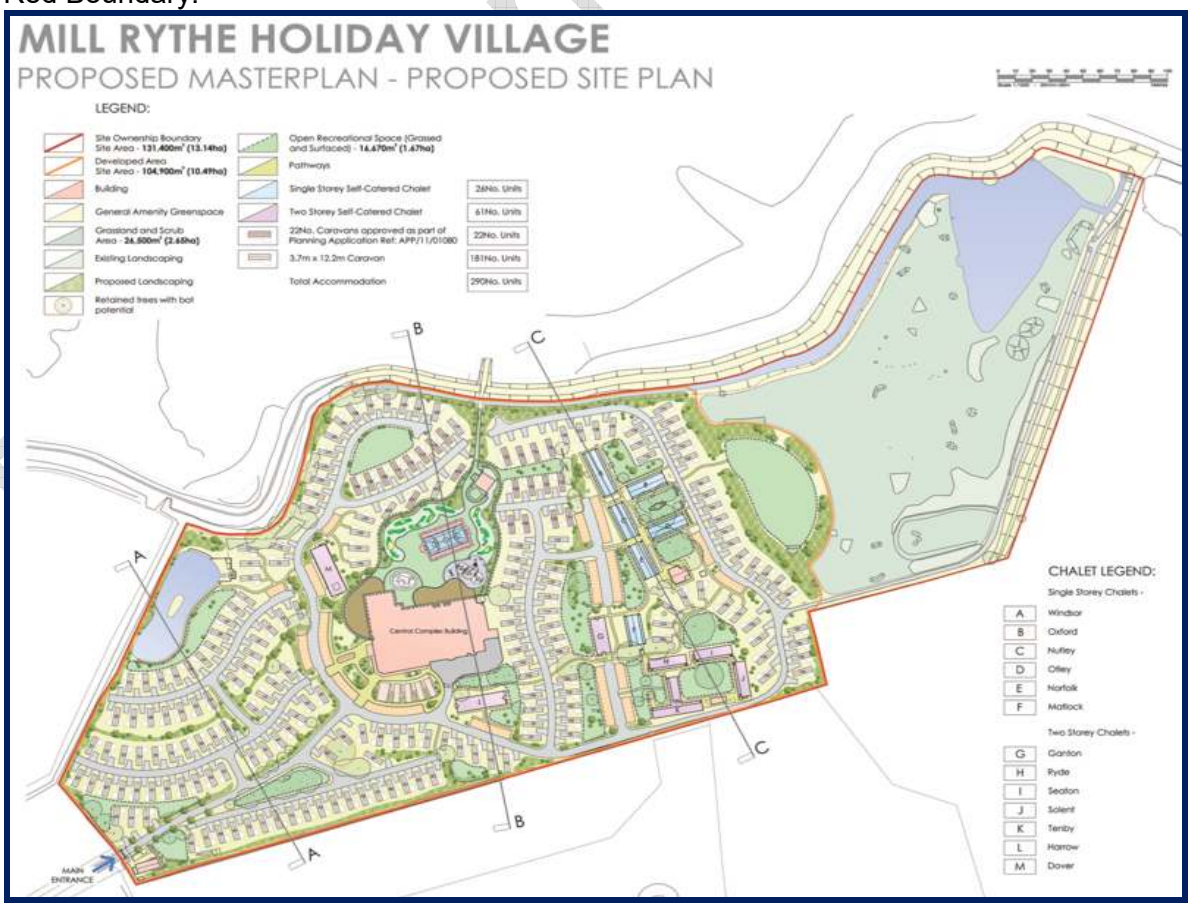
1.1 Instruction

EOD Contracts Ltd, have been commissioned by ASHDOWN (hereafter, "the Client") to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works at Mill Rythe, Hayling Island, Hampshire, PO11 0PB.

1.2 Scope Of Work

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of Mill Rythe, Hayling Island, Hampshire, PO11 0PB (See Photo 2.1) in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

PHOTO 1.1: Clients Scope of works, This DTS will be covering all areas shown within the Red Boundary.



© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

1.3 Restrictions

It must be emphasized that a desktop study can only indicate the potential for UXO to be present on the site. A geophysical survey and intrusive investigation is fundamentally important to provide proof that the site is free of the UXO threat.

This study was written with the site conditions prevailing at the time of the study and no liability can be accepted for any change in the condition of the area.

Please note that our appraisal relies on the accuracy of the information contained in the documents consulted and that EOD Contacts Ltd will in no circumstances be held responsible for the accuracy of such information or data supplied.

1.4 Sensitive Documentation

Information may be classified, restricted or deemed to be confidential in nature to EOD Contracts Limited, where such material has been gained a summary of the documentation has been approved.

1.5 Objective

The objective of this document is to define the UXO contamination routes as defined in Unexploded ordnance (UXO) A guide for the construction industry (C681) dated July 2015 and offer remediation methodologies if required.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

2.0 SOURCES OF INFORMATION

Research of the site's history, with regard to military usage, bombing raids and bomb impacts has been undertaken to establish the following:

- Frequency and intensity of enemy bombing raids for the site and immediate vicinity up to 500m.
- Bomb impacts and associated damage on the Site and in the immediate vicinity.
- The potential for UXO to remain on the Site and in the vicinity.
- Records of UXO removal activities for the Site and immediate vicinity.

The main sources of information consulted include:

- EOD Contracts Ltd company records
- Ministry of Defence records
- Central and Local Government Records
- Public Records Office (Kew)
- Historic Maps and Air Photography
- Open Source information (Internet)

2.1 Ministry of Defence (MOD) Records

33 Engineer Regiment (Explosive Ordnance Disposal) Royal Engineers is the unit responsible for maintaining the records concerning conventional Bomb incidents, reports, clearances and related UXO matters. These records are known to be incomplete and are no longer supplied. Based on in-house information released by the MOD previously, it is considered unlikely that any information released will have any significant impact on the findings of this study.

2.2 Attack Record Keeping

In general, the quality and accuracy of bombing and shelling records prior to 1939 varied greatly from one region to another. Records relating to the limited air attacks on the United Kingdom are considered to be sufficiently accurate in urban areas to provide a reasonable level of confidence in determining the likelihood that an area was or was not bombed during this period. Wartime records, maps etc held within the civil archives are considerably more comprehensive than those still in existence within the MOD, where it is acknowledged that large numbers of records have been disposed of since 1945. Records from some areas, particularly rural districts or near large bodies of water should still be regarded as an incomplete picture of the extent and effect of the bombing campaign.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

2.3 Attack Record Accuracy.

While an Air Raid was in progress it was inevitable that mistakes would be made in the transcription of rushed verbal reports into the written records. Discrepancies did occur between the total of bombs dropped against detonations witnessed. In some cases records were made several hours after the event and mistakes were inevitable. Some reports were drafted before the full extent of the raid had been determined which has led to significant omissions in the records. Reports of raids on rural areas were often witnessed and submitted by untrained individuals and passed through third parties before being recorded. Suspect UXBs occasionally went unreported by local farmers and freeholders who saw the event as insignificant, or were reluctant to report their findings for fear of valuable land or crops being destroyed by the authorities in their attempts to find the UXB. It should also be noted that bomb strikes in water were notoriously difficult to spot, particularly if the bomb had failed to detonate. As a result bomb record accuracy in areas containing large bodies of water or marshland is considered to be questionable.

2.4 Errors and Omissions

The accuracy of bombing records has been shown to vary greatly; this may have been a result of the individual record keeper's expertise. Additionally, in some cases, errors occurred as a result of poor or incomplete transcription and copying. Some "errors and omissions" were intentional, designed to serve as dis-information to confuse German intelligence. So long after the event, official verification of such incidents has often proven to be impossible to obtain. At present, UXBs are found on construction sites and other locations where there had been no documentary evidence to suggest their presence. These events, although infrequent, do serve as confirmation that records cannot be considered definitive.

2.5 Bibliography

The significant published documents referred to during this study are listed below:

- HO 193 series from National Archives
- HO 198 series from National Archives
- The Blitz Then and Now Volumes 1 to 3
- AA Command Colin Dobinson
- German Air Raids on Britain 1914-1918
- Osprey - Campaign 193 - London 1914-17 - The Zeppelin Menace
- Portsmouth City Council records
- Hayling At War – 1940 to the D-Day Landings
- BBC News
- Wikipedia
- Historic England

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

3.0 SITE DESCRIPTION AND DETAILS

3.1 Location

The site is located on Hayling Island (East of Portsmouth), with access being gained to the site via the main entrance of Havant Rd. During WWII the site was situated within the Southern Region (Region 6) of the HO 193 Mapping series.

PHOTO 3.1: Site location Map

Title	Description (Centre of Site)
Address	Mill Rythe Holiday village, Hayling Island
Post Code	PO11 0PB
Grid Reference	SU 730007
OS (X)	473064
OS (Y)	100702

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

3.2 Description

The application site at present is occupied by Mill Rythe Holiday Village and contains Open areas, Chalets (of various descriptions), Clubhouse, Children's areas, Bowling Green and a swimming pool (See **Annex A** Site Location and Client Drawings).

3.3 Geology

At present there is no published borehole data available to EOD Contracts to assess the likely ground make up for the subject site.

Table 3.1: Assumed Geological Model

Geological Unit Description	Anticipated Thickness (m)	Anticipated Depth (m bgl)
Top Soil	0.1	0.1
Soft to Firm grey Clay	1.8	1.9
Sub angular flinty gravel	0.6	2.5
Clay varying in strength	7.5	10
Siltstone	Unknown	At 10m

3.4 Current Site Use

See 3.2 Description

3.5 Future Works

At the time of writing this report it is understood that the site will be redeveloped (the exact scope of works is not known at this time). Therefore it is assumed that the following intrusive construction works will be carried out (See site plan **Annex A**):

- Geotechnical investigations, percussive drilling/trial pits/window/samples
- Removal of buildings to ground level
- Removal of old foundations
- Foundations with large diameter rotary bored piling

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

4.0 HISTORICAL REVIEW

4.1 Historical Mapping

The Historic Mapping in **Annex B** detailing the land usage is attached.

4.2 WWI

Although many people associate wartime bombing with The Blitz during World War II, the first airborne terror campaign in Britain took place during the First World War. Air raids in World War One caused significant damage and took many lives. German raids on Britain, for example, caused 1,413 deaths and 3,409 injuries. Air raids provided an unprecedented means of striking at resources vital to an enemy's war effort. Many of the novel features of the war in the air between 1914 and 1918—the lighting restrictions and blackouts, the air raid warnings and the improvised shelters—became central aspects of the Second World War less than 30 years later. The East End of London was one of the most heavily targeted places. Poplar, in particular, was struck badly by some of the air raids during the First World War. Initially these were at night by Zeppelins, which bombed the area indiscriminately, leading to the death of innocent civilians.

The first daylight bombing attack on London by a fixed-wing aircraft took place on 13 June 1917. Fourteen German Gotha G bombers led by Squadron Commander Hauptmann Ernst Brandenberg flew over Essex and began dropping their bombs. It was a hot day and the sky was hazy; nevertheless, onlookers in London's East End were able to see 'a dozen or so big aeroplanes scintillating like so many huge silver dragonflies'. These three-seater bombers were carrying shrapnel bombs, which, were dropped just before noon. Numerous bombs fell in rapid succession in various districts. In the East End alone 104 people were killed, 154 seriously injured and 269 slightly injured.

The gravest incident that day was a direct hit on a primary school in Poplar. In the Upper North Street School at the time were girls' class on the top floor, a boys' class on the middle floor and an infant class of about 50 students on the ground floor. The bomb fell through the roof into the girls' class; it then proceeded to fall through the boys' classroom before finally exploding in the infant class. Eighteen students were killed, of whom sixteen were aged from 4 to 6 years old. The tragedy shocked the British public at the time.

Using the map located within **Annex C** it would appear that the area in which the subject site is located was not the subject of bombardment throughout WWI.

4.3 WWII

4.4 Hitler targets London

On 4 September Hitler, frustrated by the RAF's superiority over the Luftwaffe and enraged by its bombing of German cities, vowed to destroy the British capital and the spirit of its people.

In response, the Luftwaffe shifted its focus from attacking RAF Fighter Command's bases and communications networks to bombing Britain's cities. Hermann Goering, the Head of the Luftwaffe, had severely lost face over both the bombing of Berlin, and his force's failure to defeat the RAF. He hoped that the intense bombing of British cities would both destroy public morale and draw the remaining RAF fighters into battle and annihilation.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

4.5 The bombing begins

After a preliminary raid on 5 September, the bombing started proper on the afternoon of the 7th. Almost 1,000 German aircraft - over 300 bombers escorted by 600 fighters - crossed the Channel. It was the largest collection of aircraft ever seen. Fighter Command had not expected raids on London, but now attempted to intercept the waves of bombers. A huge dogfight developed over London and the Thames Estuary.
Convinced that the German invasion of Britain was imminent, the country was put on the highest alert. Signals of impending invasion went out - the code word "Cromwell" was sent to military units and church bells rang.
Some of the German bombs did fall on their intended target of the docks, but many fell on the residential areas around them. Substantial parts of East and South-East London were devastated, 430 civilians were killed and 1600 seriously injured. Firestorms ravaged the city, acting as beacons for the second wave of bombers that evening.
After the raids Winston Churchill shared the public's fury and defiantly announced: "He [Hitler] has lighted a fire which will burn with a steady and consuming flame until the last vestiges of Nazi tyranny have been burnt out of Europe".

4.6 Bombing continues for the next 76 nights

Although no one knew at the time, this was the beginning of the Blitz. With the exception of one night, when the weather was bad, the bombing continued for the next 76 nights consecutively, with daytime raids as well. Liverpool, Manchester, Swansea, Cardiff, Bristol, Southampton were also targeted.
Now that the Luftwaffe's resources were directed into bombing civilians, Fighter Command had an opportunity to repair its infrastructure and attack anew. As well as their own lives, the pilots were now battling to protect their homes and loved ones all over the country.

4.7 Bombing raids over the rest of Great Britain

Ports and industrial centres outside of London were also targeted, this included Hull, Bristol, Cardiff, Plymouth, Portsmouth, Southampton and Swansea. Also bombed as part of Hitler’s revenge bombings were the cities of Birmingham, Liverpool, Coventry, Sheffield, Glasgow and Manchester.

4.8 The Portsmouth Blitz (Hayling Island)

During WWII Portsmouth sustained significant levels of bomb damage, but this went largely unreported during the war due to strict news censorship. As a Major Naval base and Dockyard Portsmouth was considered a huge viable target for the Luftwaffe during this period, and it is for this reason that Hayling Island was targeted during the war.

Hayling Island closely resembles Portsmouth and the island was set up as a decoy to distract enemy aircraft from the city. In April 1941 alone, Hayling Island received over 200 bombs and parachute mines.

4.9 Anti Aircraft Gun Sites on Hayling Island

The gun site was built early in 1939 during the ‘phoney war’, prior to the outbreak of hostilities on September 3rd. Three anti-aircraft batteries were established - one at Sinah Common, another at Northney, and a mobile unit, plus a search- light battery in the present Cherrywood Gardens area.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

The Sinah battery was initially equipped with Mk 2 4.5” naval guns, later replaced by four 5.7” AA guns. The heavy guns were brought in by sea, as they were too heavy to come across the bridge. Later there were three mobile 3.7 inch guns.

The site consisted of four permanent concrete gun emplacements, all connected by concrete paths to ammunition stores, command and control buildings and accommodation blocks. On the night of 17th April 1941 more than 30 bombs were dropped on the Sinah Warren gun site, knocking out three of the four guns, killing six of the gunners and injuring 30 others.

Early models of the parabolic radar aerial were installed at the Sinah gun site to help with the detection of incoming enemy aircraft. The gun site was initially manned by the gunners of 219 Battery 57 HAA Regiment Royal Artillery, but soon after the direct hits on the gun site, the majority of the gunners were drafted onto active service overseas. They were largely replaced by ATS women, who operated the site with outstanding success during the following three years.

4.10 Decoy Units

When the night air raids started in late 1941, the authorities made a tactical decision based on Hayling’s similarity to Portsmouth from the air It was decided to try diverting bombers away from the vital Naval Dockyard onto Hayling Island, using burning oil drums and lights known collectively as 'Q Decoy Sites'. Fire baskets and burning oil drums were triggered from a control bunker about 600 yards away.

Sinah Common, the Golf Course and Langstone Harbour were chosen as being ideal places for these 'Q Decoy Sites'. There were carefully positioned structures, which when lit from the inside, would mimic the effect of light shining through chinks in doors and windows in a carelessly blacked out area, to simulate people at home and burning buildings in Portsmouth.

The ruse was often dramatically successful, and on the night of 17/18th April 1941, over 140 enemy aircraft were lured away from Portsmouth and unloaded in excess of 200 air-dropped munitions into Langstone Harbour and Farlington Marshes. The 'Q Decoy Site' operations of the war, but sadly led to the destruction of much of the Sinah gun site. Although by June 1944, 'Q Decoy Sites' had been attacked on over 730 occasions, casualties on Hayling Island were remarkably light.

4.11 Exercise Fabius 2

In the spring of 1944, the allies were preparing for D-Day and the invasion of mainland Europe. This would involve the surprise landing of 150,000 men and their equipment onto the Normandy beaches from over 7,000 ships and landing craft, in the last and most decisive event of the war in Europe.

This massive operation required detailed planning and rehearsal to ensure its success. Six Fabius exercises were carried out in all, three in the local area. Hayling Island was chosen as the location for D-Day rehearsal Fabius 2, while Bracklesham Bay [Fabius 3] & Littlehampton [Fabius 4] were used on the same day to check all aspects of the invasion plans.

During this period Hayling Islands Holiday Camps, including Mill Rythe (then called Sunshine Holiday Camp) were utilised by the Military to billet their personnel.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

4.12 V1 & V2 Bomb strikes

EOD Contracts could find no indication that the site was subjected to any attacks from Hitler's Long Range Weapons (V weapons).

4.13 Abandoned Bombs/UXO

EOD Contracts records could find no evidence of any items of UXO abandoned in or around the subject site.

4.14 Anti Aircraft Artillery/Naval Decoy Site

The closest recorded location of heavy anti aircraft gun (HAA) position was 3.06km SW from the site.

The closest recorded location of a Naval Decoy Site was 1.7km NW from the site.

4.15 Prior Clearance Operations

EOD Contracts could find no evidence to suggest that there have been any prior UXO clearance operations in or around the site footprint.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

5.0 Sources of UXO Contamination

The main sources of UXO contamination that are deemed a threat to the site are:

- Air delivered ordnance bombs and sub-munitions/incendiaries.
- Anti Aircraft Ammunition (AA).
- Buried or discarded items of ordnance.

5.1 General

Due to the fact that there is evidence to suggest that there was close proximity bombing to the subject site and that there isn't an accurate record as to where they landed. EOD Contracts conclude that a **MEDIUM** risk is considered to exist with respect to UXO within the site footprint.

UXO's are essentially dangerous; therefore further information on UXO and Safety is detailed in **Annex D**.

5.2 Weapon Sub-surface Penetration.

Weapons penetrate a significant depth into the ground and other types of ammunition are designed to permit the weapon time to penetrate deeply into the target before detonating a short time after coming to rest or a considerable number of hours afterwards. The second reason is where the weapon has failed to function as designed becoming a UXB. A number of studies have been carried out into weapon penetration and it is an inevitable consequence of a number of variable factors acting on the bombs trajectory that figures can and do differ significantly. Careful consideration must be given to the weapon's velocity, trajectory and shape. Also surface conditions and subsurface geology. The largest of the common German bombs, (500kg) can penetrate to significant depths given favourable conditions for penetration. In the case of projectiles and shells, the potential for deep penetration is significantly less.

5.3 Penetration Assumptions.

A number of assumptions were used in determining the maximum threat depth within the project footprint, which were;

5.4 Factors Affecting Penetration

The penetration of sub-surface bombs will be affected by the following:

- Height of release
- Weight, shape and design of bomb
- Aerodynamic qualities
- Angle of flight and impact
- Nature of impact surface
- Nature of sub soil

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

The expected bomb depths for the site assuming the following criteria:

- 15,000 feet, the vast majority of bombs were dropped from height to avoid AA fire and balloons
- General Purpose Bombs of 50kg to 1000kg
- Near Vertical impact 80 to 90 degrees
- Surface geotechnical conditions are made ground
- Subsurface geotechnical conditions are generally clays see Paragraph 3.3

Therefore the expected depths for Air dropped UXB's on site are indicated in **RED** in the following table:

TABLE 5.1: *Bomb Penetration Depths*

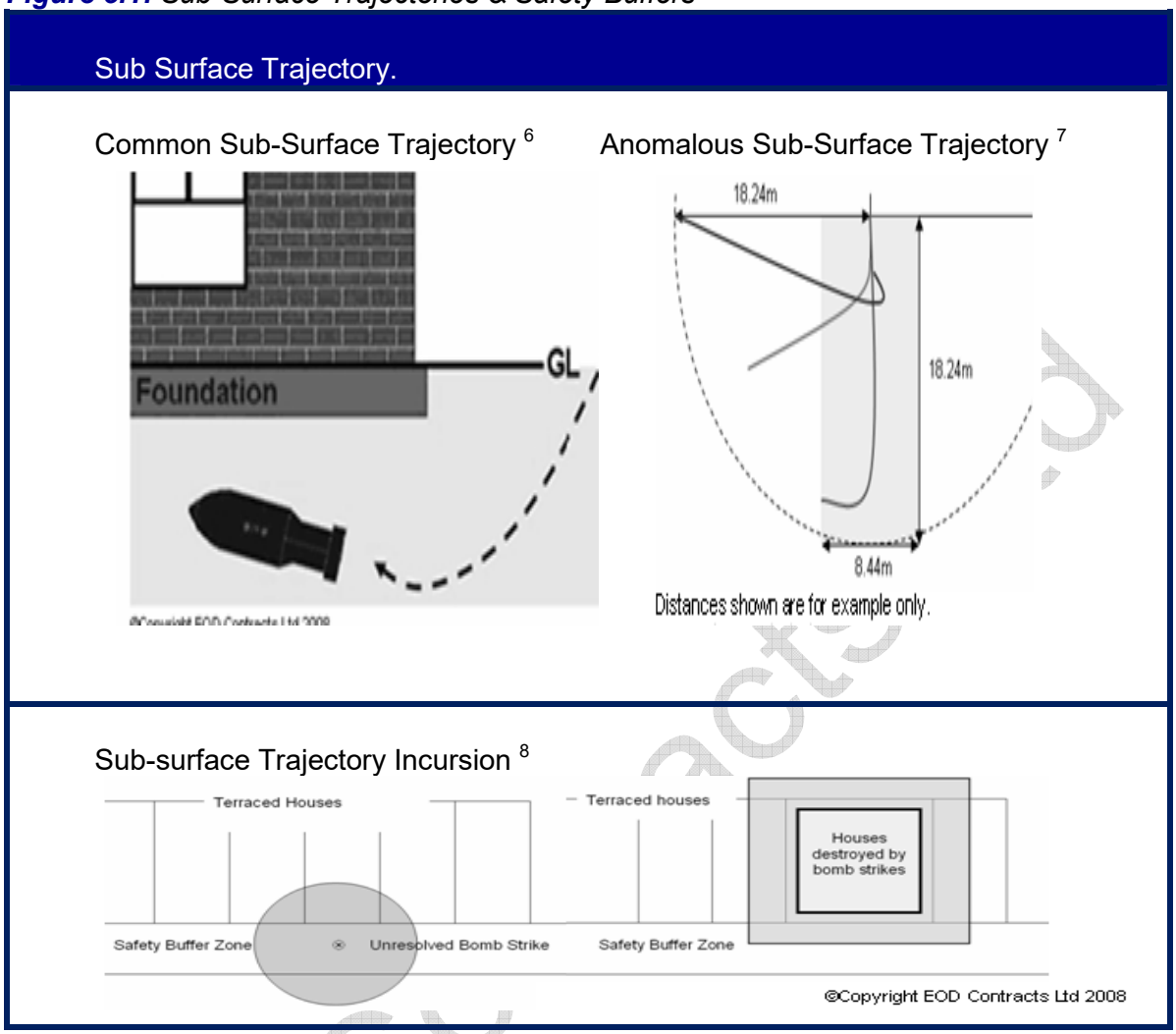
	Bomb Weights			
Sub Soil Type	50kg	250kg	500kg	1000kg
Soft Rock	2.442	5.016	6.006	7.062
Gravel	**2.442**	**5.016**	**6.006**	**7.062**
Sand	**2.442**	**5.016**	**6.006**	**7.062**
Chalk	3.7	7.6	9.1	10.7
Shingle	3.7	7.6	9.1	10.7
Dry Clay	3.7	7.6	9.1	10.7
Wet Sand	**5.55**	**11.4**	**13.65**	**16.05**
Wet Clay	**5.55**	**11.4**	**13.65**	**16.05**
Average Offset (m)	**0.8-1.6**	**1.6-3.7**	**3-4.5**	**3.4-5.3**

Bombs on penetration of the surface do not follow a straight-line trajectory they can and do curve; this is called a "J" curve where the bomb's path bends back towards the surface. This gives what is known as the Offset, which may place a bomb under a structure and at a shallow depth.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

Figure 5.1: *Sub-Surface Trajectories & Safety Buffers*



Note; *the common sub-surface trajectory will follow a path best described as a 'J' curve. The curve can result in a weapon coming to rest some distance from its impact point. The distance from impact point to resting place is referred to as the "Off set Distance and is normally considered to be 1/3 of the depth. This mechanism can permit a weapon to strike outside a building and travel below ground finally coming to rest within the building footprint. Where a strike is known to have occurred close to a building or structure such as a dock wall, a danger zone should be considered to exist around the area of the strike of sufficient size to accommodate the likely sub-surface travel distance for the weapon.*

Note; *the typical offset distance is shown as the shaded area, on rare occasions a near surface deflection of the weapon can occur and the offset distance can be substantially increased up to 5/4 of the penetration depth. This mechanism does however reduce the penetration depth considerably with the net result that while the offset is increased the overall travel distance is for the most part unaffected.*

Note; *scenario 1 shown top left shows a hypothetical bomb strike outside a structure or building. The strike location has been accurately identified and as a consequence; a potential danger zone (circular shaded area) can be placed around the point of impact. Scenario 2 shown top right; depicts a direct HE bomb or Incendiary strike within a building which totally destroyed the building. In circumstances such as this UXB entry the building rubble may have concealed hole and the weapon may still be present within the building footprint or it may have travelled sub-surface and come to rest*

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

outside the footprint. Here the danger zone (square shaded Area) extends outwards on all sides of the original building footprint.

5.5 Recent UXO Finds within the UK

The threat of Items of UXO being located on work sites throughout the UK is still high, as indicated in **Annex F**.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

6.0 RISK ASSESSMENT

6.1 Risk Assessment

Assessing both the likelihood of occurrence and the consequences of the encounter has derived the overall risk for the site from unexploded ordnance. Review of the site's history and geographic location can provide an overall likelihood of encounter factor, which is used in the subsequent determination of a risk level when a Figure can be determined for the consequence.

6.2 Likelihood of Encounter

Given the study findings and other criteria (See **Annex E** Tables) it is considered that there is a **MEDIUM** risk of encountering UXO within the site footprint. This finding is based on assessment of all of the available information and taking account of the following factors:

6.3 Consequence of Encounter

The consequence (See **Annex D**) of an uncontrolled encounter with UXO, given its lethal design and its unpredictable nature could be catastrophic and warrants a high severity factor. With regards to the consequences, the following factors were considered:

The project works may make use of a number of common ground investigation and construction techniques in its methodology during the project. Any intrusive groundwork has the potential to encounter UXO.

Intrusive earthwork, piling driving and dynamic ground compaction are by nature, aggressive, significant force (kN) is often required to achieve the desired results. As a precaution it is prudent to assume that any external stimulus, no matter how slight, may result in an unstable weapon detonating.

Records of encounters with UXO, particularly where plant machinery has been involved have resulted in detonations of the items with varying degrees of consequence; ranging from slight injuries sustained to piling contractors when a bomb detonated at 6.0m bgl to fatal injuries sustained to a construction worker while conducting near surface machine works on a motorway.

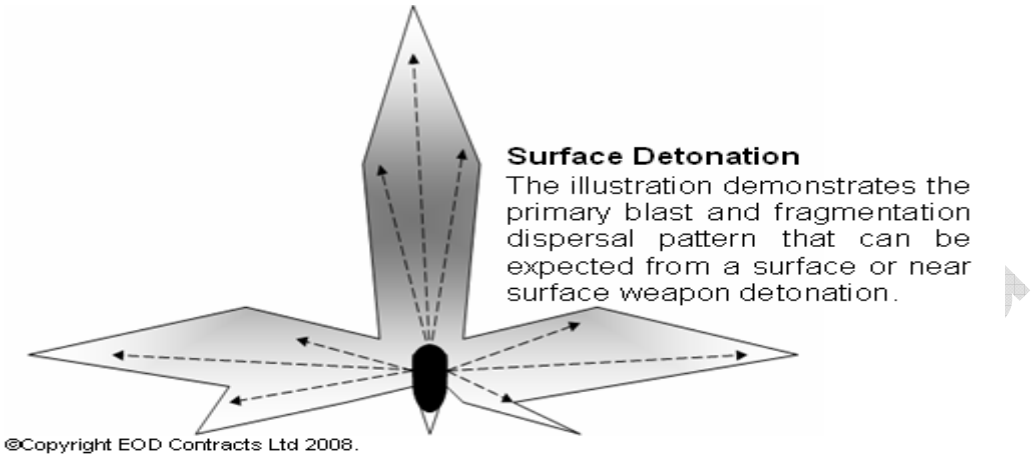
Detonation on land; the effects of a detonation at depth will be more localised and less destructive than one occurring on the surface. Figure 6.1 shows an illustration of the primary blast and fragmentation dispersal from explosive ordnance when it detonates on the surface. The weapon's design, and other key factors such as the ratio of explosive charge weight to total weapon weight (CWR) and the Net Explosive Quantity (NEQ) will determine the size and effects of a blast. The effects will also be enhanced or reduced by a number of factors including, the presence of other energetic materials in close proximity to the blast or if the weapon is buried or exposed on the surface. As a guide **Annex D** Table 1 gives an indication of the likely blast radius for common types of UXO.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

Figure 6.1: *Primary Blast & Fragmentation on Land*

Blast and fragmentation dispersal.



In addition to the dangers of explosion, many common chemicals used in the manufacture of explosive ordnance fillings are; in sufficient quantity, and level of exposure, toxic or poisonous. Although it is unlikely that such chemicals would be encountered in significant quantity to represent a significant risk to personnel, leakage or venting could pose a risk to the local marine environment. In addition to heavy metals; copper, lead, zinc etc used in the weapon body and fuze, hydrocarbon propellants such as Kerosene may also be present.

6.4 Risk Level

The overall risk has been determined to apply to all of the ground within the site footprint.

The prevailing risk level has been determined to be **MEDIUM** risk for all areas within the site footprint.

6.5 Encounter Consequences

It is acknowledged that when viewed from a “likelihood versus consequence” scenario; the consequences of an explosion may have the potential to include:

- Multiple casualties or fatalities.
- Extensive damage to high value private and public assets and property.
- Significant delays to the construction project.

EOD Contracts

6.6 Those at Risk

The risk is considered to have the potential to pose a direct and indirect threat to a wide range of individuals and facilities. While the impact on fixed assets can be estimated based on the asset's proximity to the seat of the explosion. The impact to transient assets and people will, for the most part, be the result of both; proximity to the explosion and the time at which the event occurs. The overall impact therefore has the potential to range from little more than a minor localised event to a level, which may be considered to be a more widespread major incident involving some or all of the following:

- Construction and other specialist personnel carrying out the work.
- General public in open spaces, at their places of work and transient population on foot or road users in proximity to the construction work.
- Public services including; transport, water, gas and electricity supplies.
- Public facilities, including; buildings, vehicles, other high value assets and equipment.
- Private business property including construction equipment.
- Private residential property in proximity to the work.

6.7 At Risk Activities

Based on our understanding of the scope of the most common construction projects, it is considered that a wide range of intrusive processes may be required to complete the project. Any intrusive groundwork's has the potential to encounter UXO and each activity therefore has a degree of risk attached to it. The severity or level of the risk is derived as a consequence of activity's; location, methodology and volume or quantity of risk material to be worked, at risk activities are considered to include:

- Site preparation and levelling can be carried out down to ground level **with out** any UXO Risk Mitigation being required.
- Intrusive geotechnical and archaeological investigations including drilling and pitting.
- Foundation construction, trenching and other excavations.
- Intrusive construction works, which may include piling.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

7.0 CONCLUSIONS

Based on the information researched by EOD Contracts Ltd for the proposed works being carried out at Mill Rythe Holiday Village, we can conclude the following:

Hayling Island was not subjected to bombardment during the period of WW1 (See **Annex C**).

EOD Contracts have found viable evidence to suggest that Hayling Island was the subject of direct attack during the Portsmouth Blitz

The closest HAA gun emplacements to the site were 3km SW of the site.

The closest Naval Decoy site was 1.7km NW of the site.

The Luftwaffe did not indicate that the site itself was of strategic importance, however due to shape of Hayling Island, and the use of decoy sites it was often confused with Portsmouth and bombed on several occasions.

EOD Contracts did find evidence that the site was utilised by the military (Royal Marines) during WWII.

The HO 193 Bomb mapping series that is utilised to identify Bomb Strikes throughout the UK does not cover this particular area of land, this could mean that items of UXO could have been dropped in and around the site and remained undetected until this time.

The site has remained as a Holiday park/Campsite both Pre and post WWII, and is unlikely to have any significant structures constructed to any significant depth throughout this period, therefore it is possible for items of UXO to have remained undetected to this time.

Due to the lack of exact bomb mapping for Hayling Island and its surrounding area, and the subsequent evidence to suggest the large military presence/naval decoy sites/training areas, EOD Contracts conclude that there is a **MEDIUM** risk of UXO being located within the site footprint. Given that some UXO retains the potential to detonate if disturbed with possible severe consequences, it is concluded that it would be prudent to ensure basic precautions are taken to ensure that the project can proceed in the safest possible manner and that any residual risk posed by UXO is as low as it is reasonably practical to achieve (ALARP).

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

8.0 RECOMMENDATIONS

It is recommended that the following risk mitigation strategy is executed during the project:

Communicating the risks, all stakeholders should be made aware of the UXO situation on the site and the possible impact it may have on the project works and day to day running of the district. Clients have a legal duty under the Construction Design & Management Regulations (CDM) and Health & Safety at Work legislation to provide Designers and Contractors with project specific information needed to identify hazards and risks associated with the design and construction work. The possibility that UXO may be encountered on site falls within the category of a significant risk and as such it should be addressed as early as possible in the lifecycle of the project.

Further planning; the risks posed by UXO should be brought to the attention of the Project CDM Coordinators and other individuals with a responsibility for project safety and operations at the site. The matter of UXO should be considered critical to project safety and one requiring high priority action.

UXO safety awareness training should be given at all levels of site personnel and selected individuals on the project staff with relevant responsibilities. A competent person as part of the project safety induction course should provide the awareness training. It should be reinforced with specific safety briefings and toolbox talks to individuals involved in conducting intrusive earthworks.

Project overview and the responsibilities of those working on site with regard to duty of care and public safety.

UXO recognition and safety procedures to be followed on discovery of a suspicious object or the alarm being sounded.

Emergency procedures to be followed in the event of an explosion. Evacuation routes, muster stations and accounting for personnel.

Work permits, works methodology and specific UXO risk mitigation methods. Post-incident inspections and returning to normal works.

Prior to any intrusive piling or drilling commencing, UXO safety testing and appropriate clearance certification into the ground to sufficient depth to provide clearance from UXO. This can be done using a progressive drilling process or (where large numbers of piles are to be placed and ground permitting) using a vehicle borne hydraulic system to push a magnetometer into the ground to test for the presence of UXO prior to piling.

UXO safety monitoring of all “at risk” excavations, including geotechnical or archaeological trial pits to be conducted during the project. This should be provided by a UK Home Office Authorised EOD/UXO Contractor using qualified EOD Engineer with specialist locators and detectors to scan the ground ahead of the excavation wherever possible.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

9.0 SPECIFICALLY

Geotechnical investigations, percussive drilling/trial pits/window/samples, require an EOD Engineer over watch.

Demolition of buildings to ground level, does not require any mitigation

Removal of old foundations does not require a specific mitigation; however it would be deemed prudent to have an Explosive Ordnance Safety presentation to all ground workers.

New foundations with piling should be mitigated by the insertion of a magnetometer to encompass the pile position, this would be carried out using a CPT rig (magcone), the expected radius of the magcone is 1.5m therefore multiple piles could be checked.

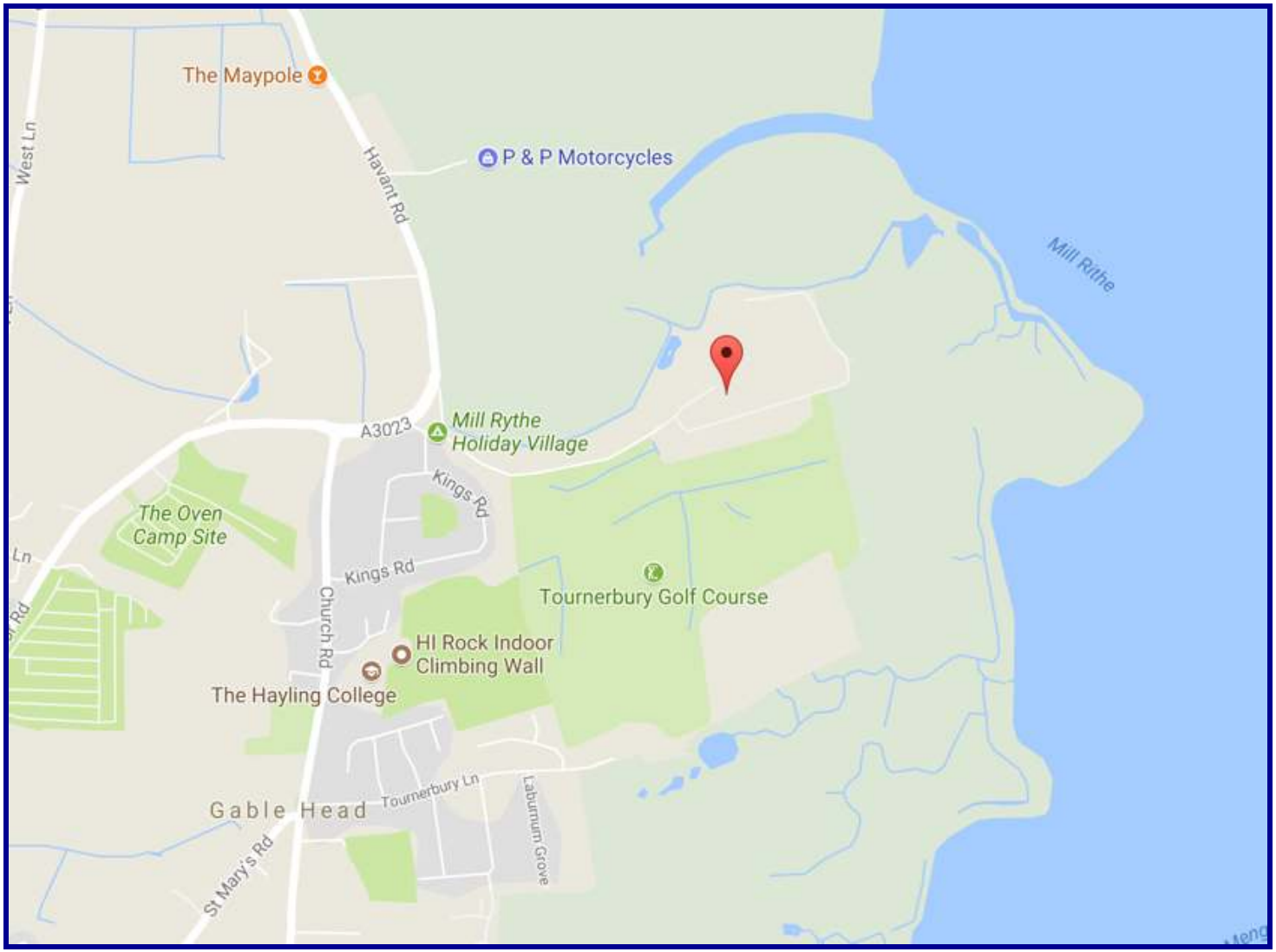
Non-Intrusive Magnetometer surveys generally prove inconclusive on “Brownfield sites”, this is due to the high ferromagnetic background, therefore this methodology is not recommended for this site and shallow excavations should be overseen by a qualified EOD Engineer.

EOD Contracts Ltd

© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

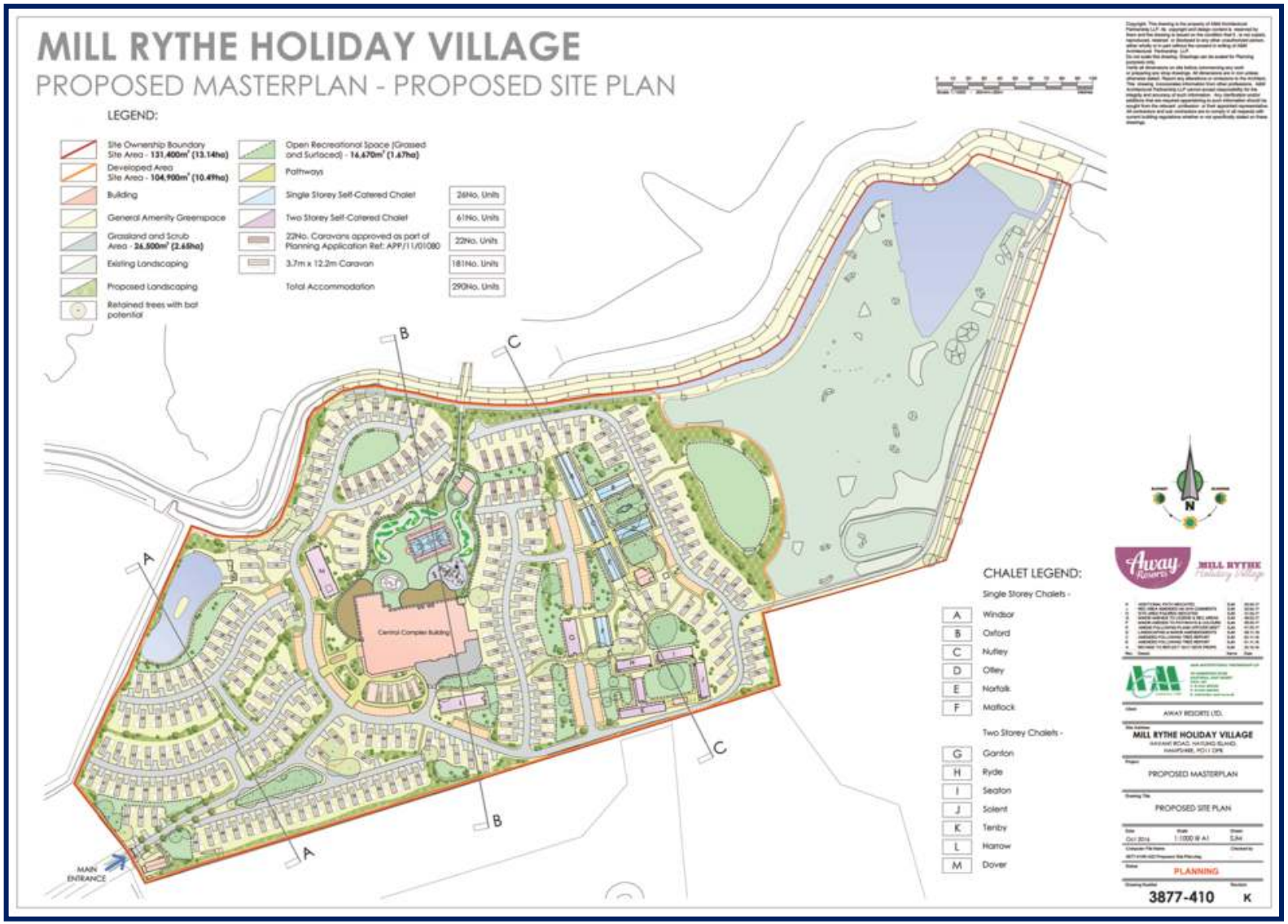
Annex A

SITE LOCATION



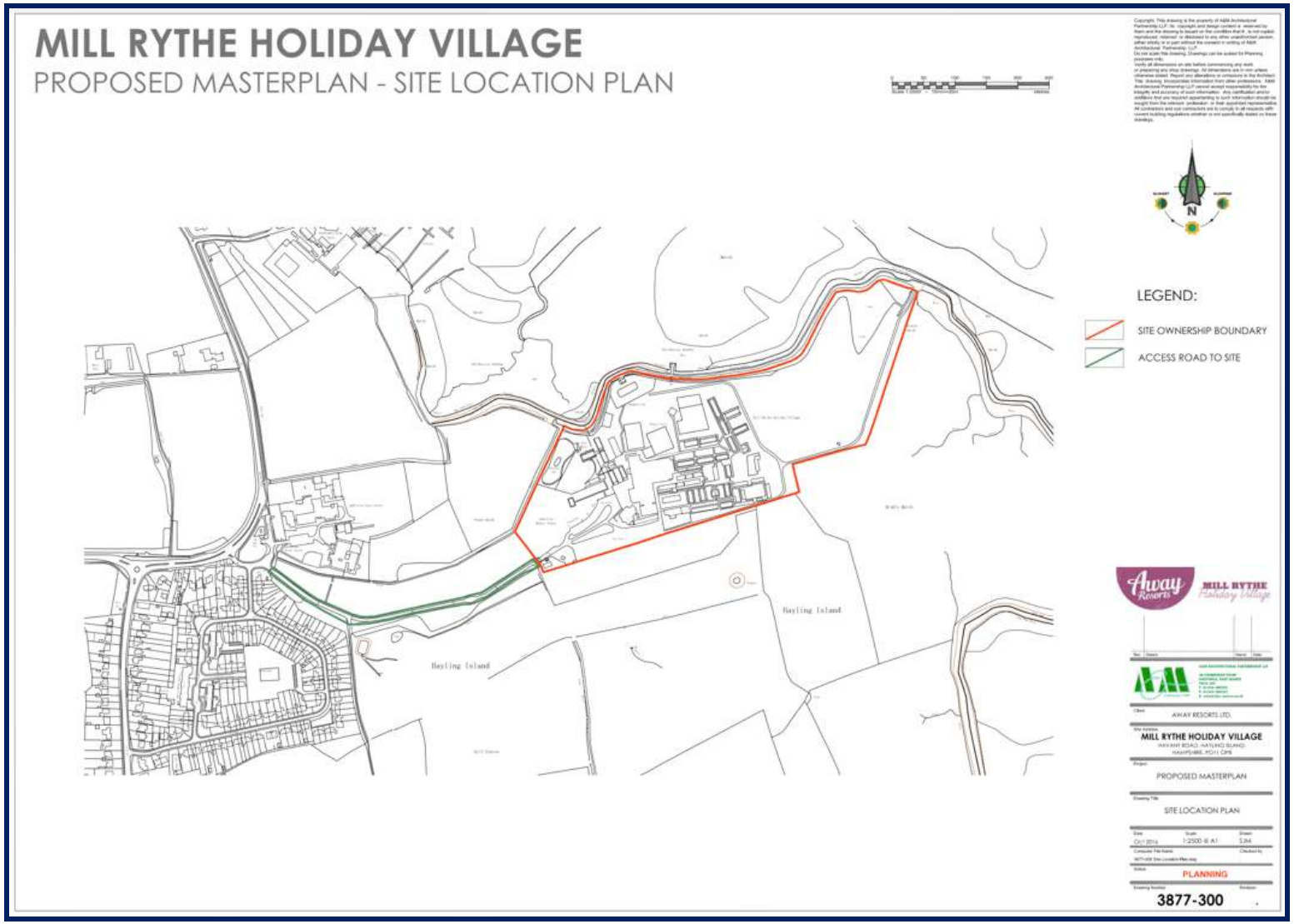
© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

CLIENTS DRAWING



© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

CLIENTS DRAWING

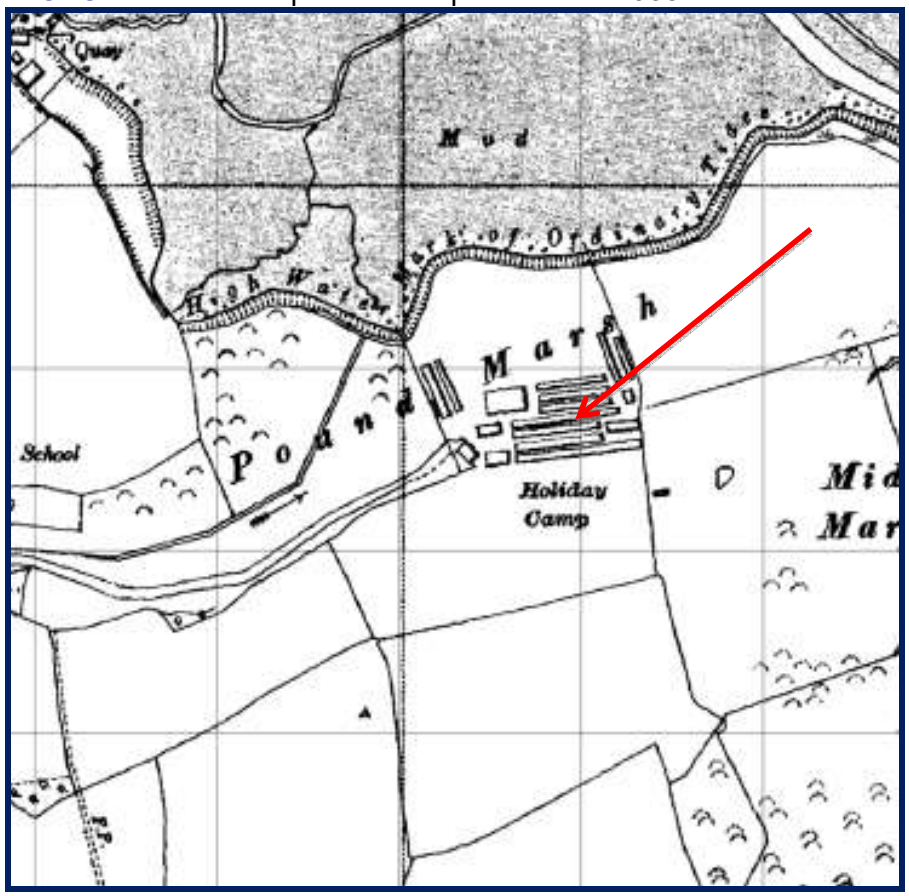


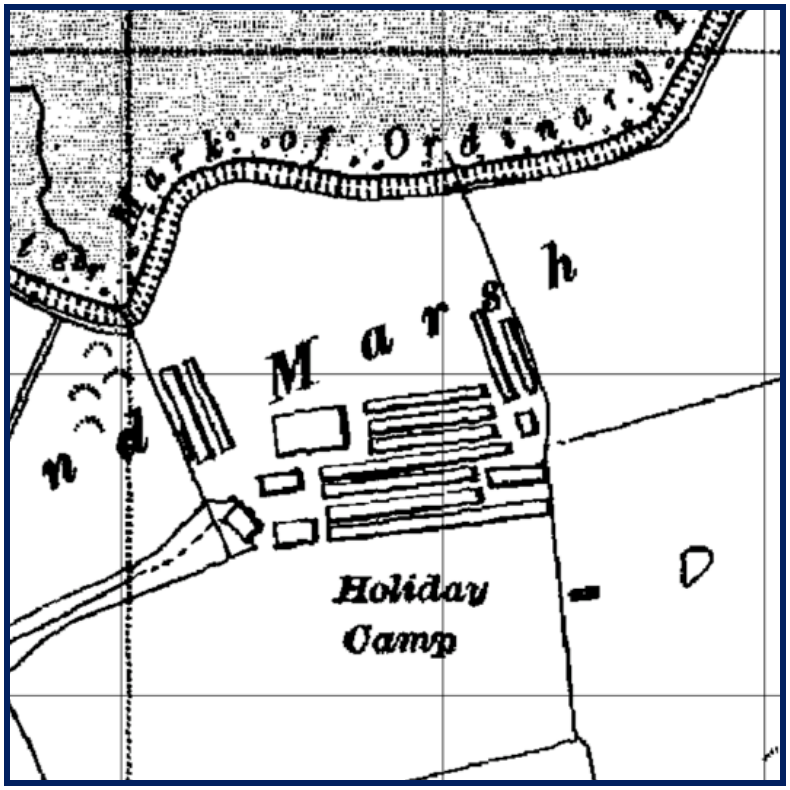
© 2017 EOD Contracts Ltd, UK. Company Registration Number 4483560

Annex B

HISTORICAL MAPPING

PHOTO 1: Historic map of the site published in 1938.



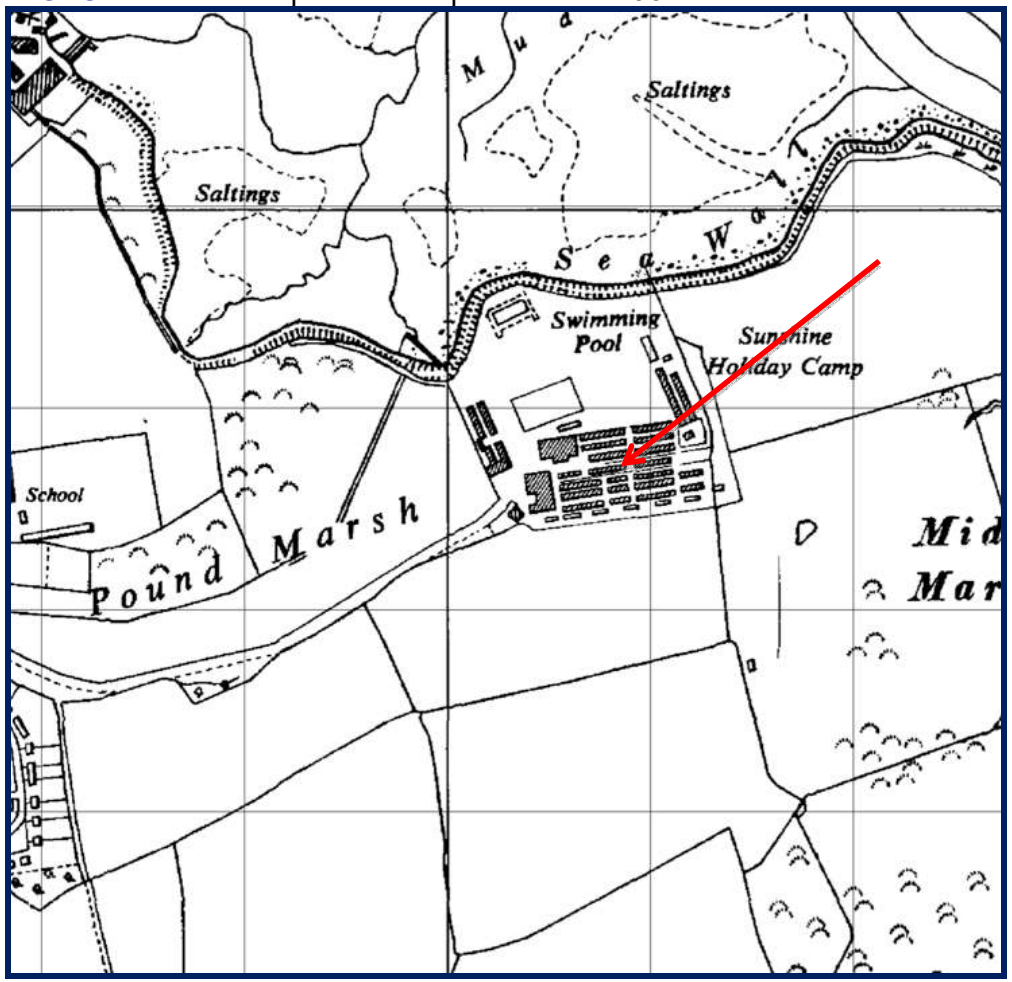


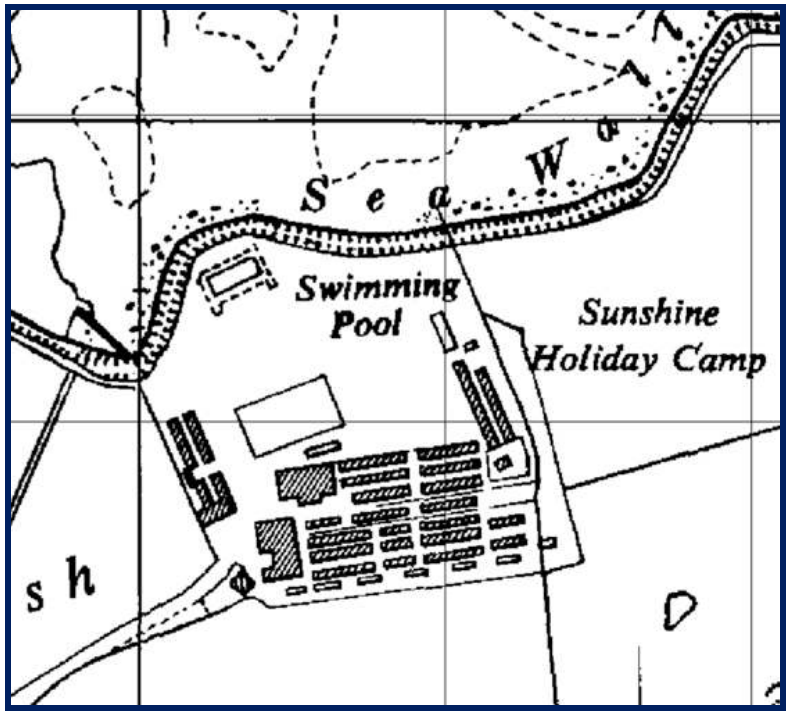
Published – 1938
Site indicated – Red arrow
Map Scale - 1:10,560

The above map shows that at the time of publishing the land is being utilised as a Holiday Camp.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

PHOTO 2: Historic map of the site published in 1962



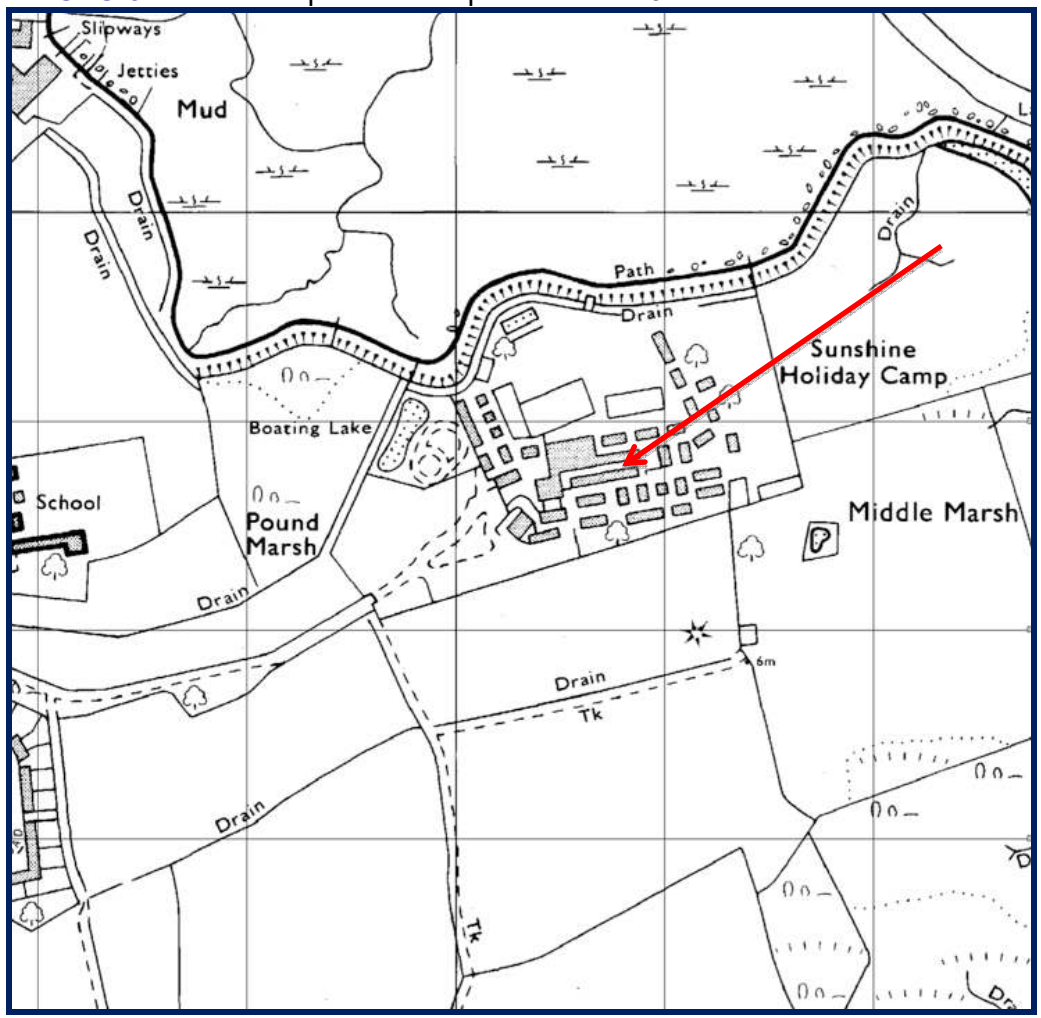


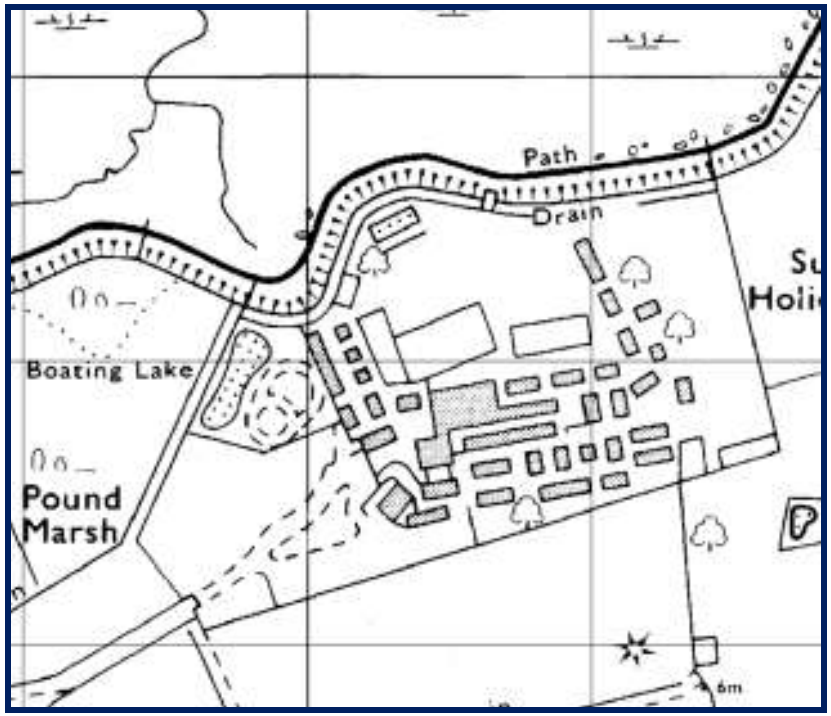
Published – 1962
Site indicated – Red arrow
Map Scale – 1:10,560

The above map shows in greater detail the land usage at the time of publishing, the Camp Site has remained relatively unchanged since the previous 1938 map.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

PHOTO 3: Historic map of the site published in 1972





Published – 1972
Site indicated – Red arrow
Map Scale – 1:10,000

The above post war map still indicates the site being utilised, there does not appear to have been to many significant changes to the Camp Site layout indicating that the site has remained relatively undisturbed since the previous maps time period.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Annex C

BOMB RAIDS WWI

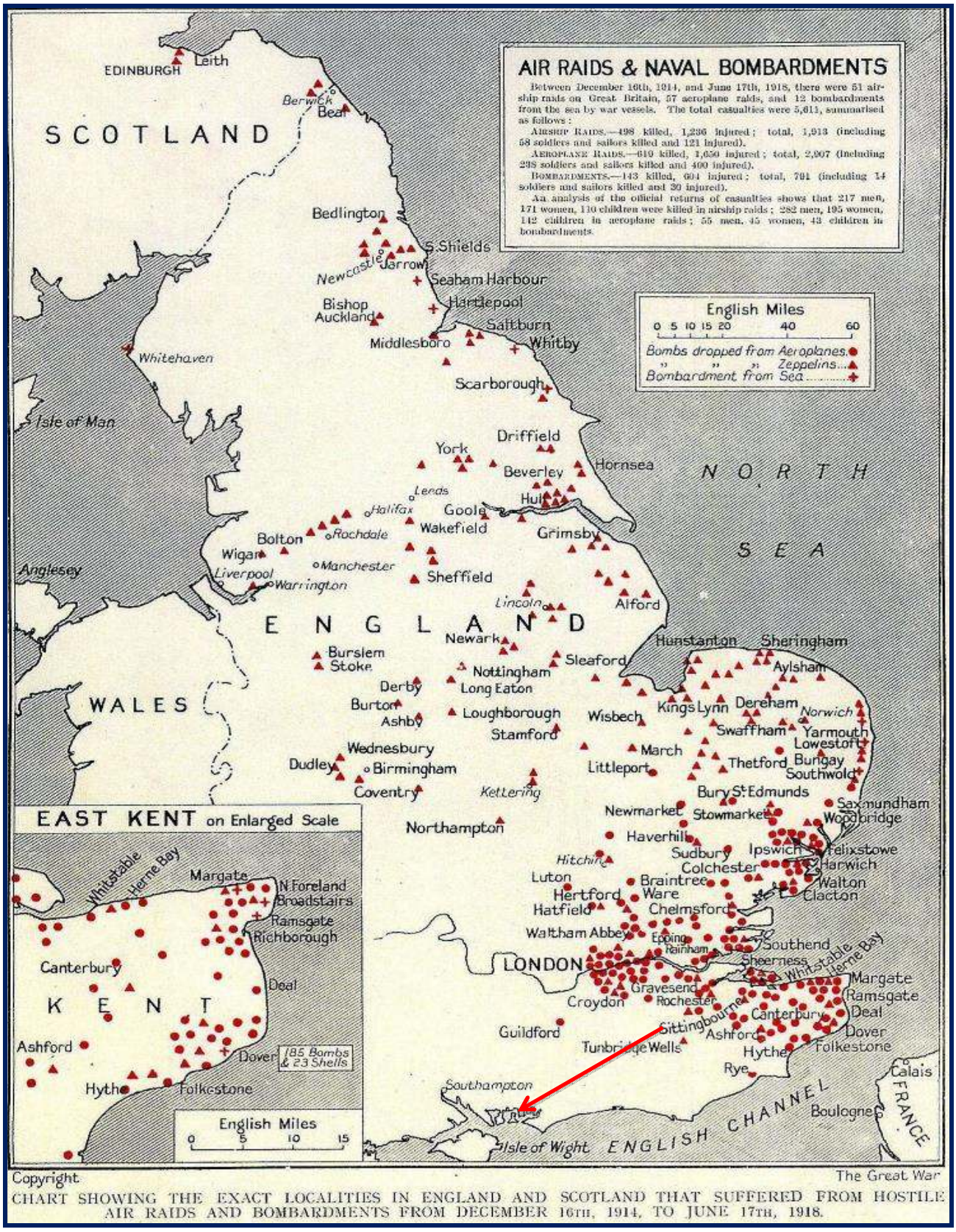


CHART SHOWING THE EXACT LOCALITIES IN ENGLAND AND SCOTLAND THAT SUFFERED FROM HOSTILE AIR RAIDS AND BOMBARDMENTS FROM DECEMBER 16TH, 1914, TO JUNE 17TH, 1918.

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Annex D

EXPLOSIVE ORDNANCE SAFETY AND INFORMATION

UNEXPLODED ORDNANCE

Since the end of WWII, there have been a limited number of recorded incidents in the UK where bombs have detonated during engineering works, though a significant number of bombs have been discovered.

The threat to any proposed investigation or development on the site may arise from the effects of a partial or full detonation of a bomb or ordnance item. The major effects usually being shock, blast, heat and shrapnel damage. It should be noted that the detonation of a 50kg buried bomb could damage brick/concrete structures up to 16m away and unprotected personnel on the surface up to 70m away from the blast. Larger ordnance is obviously more destructive. Table 1 denotes recommended safe distance for UXO.

Table 1: Safety Distances for Personnel

UXO (Kg)	Safety Distances (m)			
	Surface UXO		Buried UXO	
	Protected	Unprotected	Protected	Unprotected
2	2O	200	10	20
10	50	400	20	50
50	70	900	40	70
250	185	1100	120	185
500	200	1250	140	200
1000	275	1375	185	275
3000	450	1750	300	450
5000	575	1850	400	575

Explosives rarely become inert or lose effectiveness with age. Over time, fuzing mechanisms can become more sensitive and therefore more prone to detonation.

This applies equally to items that have been submersed in water or embedded in silt, clay, peat or similar materials.

Once initiated, the effects of the detonation of the explosive ordnance such as shells or bombs are usually extremely fast, often catastrophic and invariably traumatic to the personnel involved.

The degradation of a shell or bomb may also offer a source of explosive contamination into the underlying soils. Although this contamination may still present an explosion hazard, it is not generally recognised that explosives offer a significant toxicological risk at concentrations well below that at which a detonation risk exists.

TYPES OF ORDNANCE

German Air Delivered Ordnance. Technical information on the nature and characteristics of the ordnance used by the German Air Force during both world wars has been available for a number of years. Assessment that began during the 1930's has continued to the present day. Experts have conducted research in many countries as part of national research programmes and as individual research projects. Consequently a

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

well-informed assessment of the threat posed by unexploded ordnance, and the hazards that they represent, can be made with a high degree of confidence.

Terminology. It should be noted that two terms used in bomb records can lead to some confusion as to their meaning and therefore significance. The term Unexploded Bomb (UXB) refers to a bomb that has fallen, failed to function and has been subsequently dealt with and removed from the site. The term Abandoned Bomb (A/UXB) refers to a UXB that could not be found or recovered, or the decision was taken not to pursue the matter further. Consequently the unexploded bomb remains where it came to rest when it was dropped or fell to the present day. It should also be noted the word 'bomb' can be used to describe an airdropped bomb or a shell as in some cases no differentiation was made and the term was interchangeable.

Abandoned Bombs. The records of known abandoned unexploded bomb locations in the London area were released in response to a written Parliamentary Question from Simon Hughes. (Hansard: Volume; 282. Dated 15th October 1996). The information was provided by the Ministry of Defence (MOD) and supplied under an indemnity.

Explosive Ordnance Failure Rates. Over the course of both World Wars a considerable quantity of ordnance dropped on UK targets failed to function as designed and subsequently penetrated the ground without exploding. Information gathered during the war by the MOD and its research partners provide typical failure rates for different types of ordnance. Figures significant to this study are:

- 10% of all German airdropped bombs failed to function as intended.
- 30% of all anti-aircraft and other types of shells failed to function as intended.

Deductions & Considerations. The following points were considered as part of the assessment and have been given due consideration:

Records were found that indicated that the general area was subjected to heavy bombing.

Bombs, which struck previously, hit or burned out targets and did not function; consequently their impact was unseen and therefore no report was ever made.

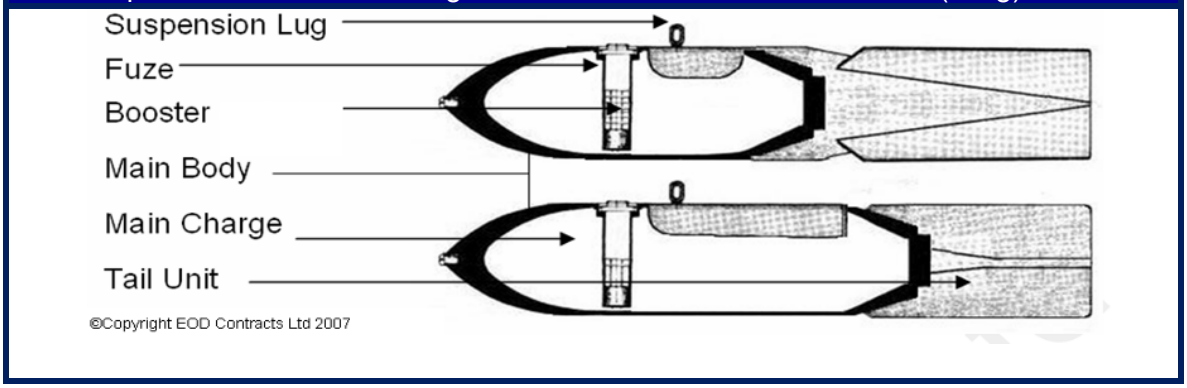
In all likelihood, the local anti-aircraft battery would have fired a far higher number of shells than the bombers dropped HE bombs. Contamination by anti aircraft shells can not be rules out.

Generic German Bomb Types. The majority of German bombs dropped were 50kg in weight, accounting for approximately 16% of the total bombs dropped. The range of common bombs increased in weight to a maximum of 1700kg. Regardless of size, German bombs were fitted with one or more Electrical Condenser Resistance (ECR) fuzes many of which included a mechanical component. The fuzes were mounted transversely in the bomb body with the booster directly below, and in contact with, the fuze. The booster; sometimes referred to as the Gaine, is composed of a sensitive explosive material (Picric Acid). Picric Acid is known to deteriorate over time becoming increasingly unstable. The internal layout of two common German bombs and a German fuze is shown in Figures 6.1 & 6.2.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

FIGURE 1: Generic German Bomb Design.

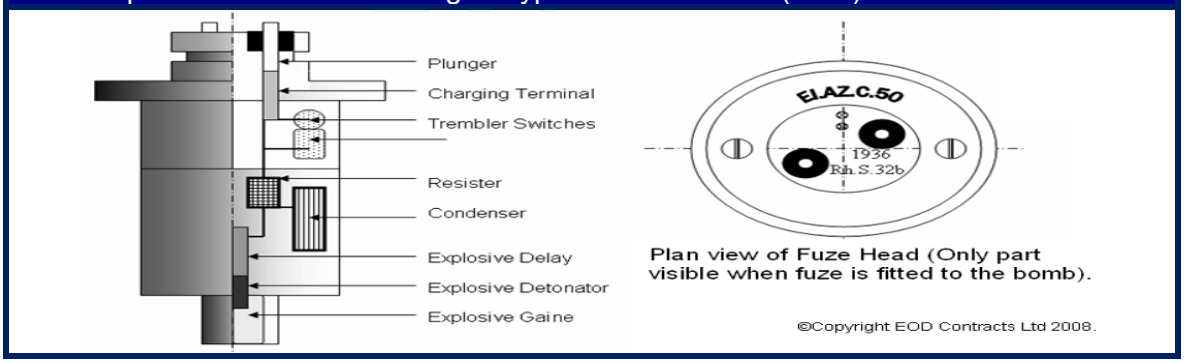
Graphic Cross Section through the most common German bombs (50kg)



Note; the diagram shows that there can be a significant difference in the quantity of High Explosive contained within bombs of similar size and shape; the Grade 1 bomb on the bottom having 30% more HE than the Grade 2 shown at the top. This serves to demonstrate the importance of an accurate identification of any item of UXO.

FIGURE 2: Generic German Bomb Fuze Design.

Graphic Cross Section through a typical German fuze (ECR)



© 2017 EOD Contracts Ltd, Company Registration Number 4483560

FIGURE 3: Range of HE bombs dropped on the United Kingdom.

German bombs

NOTE: *The smaller sub-munitions (Bomblets) seen to the right, ranged in size between 1 and 3kg, were dropped in large numbers and were intended as incendiary bombs, anti-personnel bombs or as bombs filling both roles. The smaller bomblets were dropped in larger container bombs designed to hold between 360 and 620 of the bomblets. The containers were designed to burst open at a predetermined height above ground level, dispersing the bomblets over a wide area. Air raid damage was far greater by using both incendiary, and HE bombs on a single raid. The fires started by the incendiaries being rapidly spread by the blast waves from the HE bomb. This scenario was shown to devastating effect on the 14th February 1945 in the German city of Dresden. Where fires started and spread by the bombing increased to a point where the oxygen was being sucked into the flames at such a high speed that the fire became a "Fire Storm". At the time the city's population had increased due to a high number of refugees fleeing the Russian advance to the east, the exact civilian death toll from fire and suffocation will never be known, but is considered to be somewhere between 25,000 and 100,000.*

High Explosive (HE) Bomb. Some of the most common type of ordnance to be dropped on the United Kingdom, HE bombs are often the type encountered as UXBs. Relatively thick cased, they are still recovered in remarkably good condition. Ranging in size from 50 to 1700 kg, their typical release height (1,500m) allowed them to penetrate deep into the ground as a result of design or flaw. Towards the end of the bombing campaign, as steel became scarce the German Engineers produced a range of bombs that used steel reinforced concrete as the bomb body. Figure 6.3 shows the range of steel HE bombs dropped on the UK.

Incendiary Bomb. The larger incendiary bombs, containing bottles of white phosphorus and an incendiary mixture contained within a thin steel case were designed to burst on contact with the ground. A fixed dispenser on the aircraft delivered the smaller type of bomb or 'Bomblet' to the target area in container bombs or; both types of container would open dispersing the smaller Incendiary bombs. Relatively small and light they were unlikely to penetrate the ground to any significant depth. However, once concealed in bomb damage rubble or below water they were easily missed and are still unearthed today from in-fill and drained land. Later versions of the incendiary bomb contained an additional explosive charge used as a short delay "Booby Trap" device that contained a significant amount of high explosive. The Booby Trap component was designed to kill or injure fire fighters and hinder the damage control. See Figure 4.

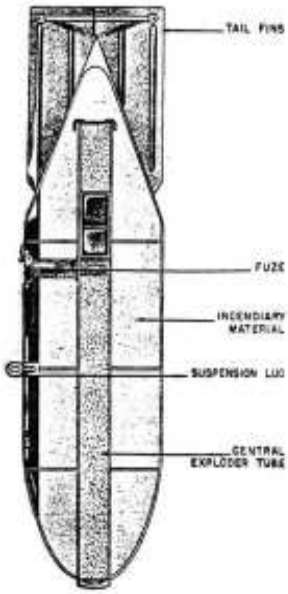
© 2017 EOD Contracts Ltd, Company Registration Number 4483560

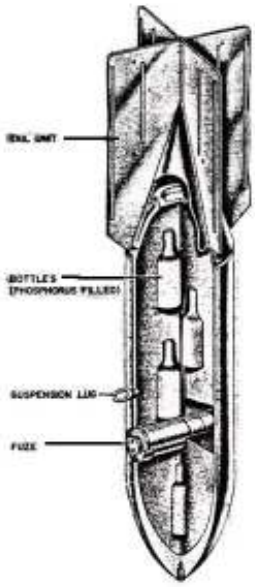
FIGURE 4: Incendiary Bombs.

Common German Incendiary Bombs

250 mm

Above 1kg incendiary bomblet, below left the larger 500kg incendiary bomb
Below right a 50kg incendiary bomb containing bottles of white phosphorus.





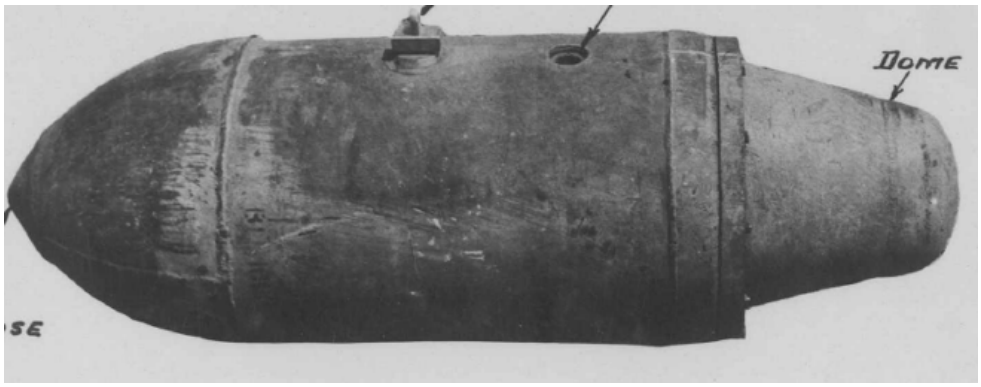
Note; *Incendiary bomblets were made of a flammable alloy similar in appearance to aluminium, which resists corrosion well. The tail unit was made of thin tin-plate steel and is more prone to have rusted away. Some Incendiary models were fitted with a High Explosive (HE) steel nose. With the tail and explosive nose attached the bomb was 480mm long.*

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Blast Bomb / Parachute Mine. The parachute mine was extensively used on land and at sea and was fitted with specialist fuzes designed to trigger the weapon at a predetermined altitude, water depth or to switch on other magnetic influence mechanisms to trigger the weapon when a ship approached (Magnetic or Acoustic influence). While early versions were based on the standard 1000kg SD Bomb case others were specially designed and manufactured with an aluminium body, making them extremely difficult to detect using magnetometers. The thin cased versions would normally disintegrate on impact on land and are normally considered to pose little threat to work on land based projects, but the risk increases significantly on projects over water or in marshland. Thicker cased versions however will survive impact and pose a significant risk regardless of the local ground conditions. (See Figure 5)

FIGURE 5: Common Airdropped Mines.

Parachute & Ground Mines



Note; *all mine fuzes were designed to arm after deployment from the ship, submarine or aircraft, some fuze designs incorporated anti-removal booby traps. Unexploded mines found today are the result of a failure within the arming mechanism or procedure whereby the mine never fully armed. Sudden shock or jarring of a weapon in this state has the potential to complete the arming sequence and could result in the mine detonating with lethal consequences.*

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Non Steel Cased Bombs. Used primarily in the construction of training or practice bombs, some high explosive variants were introduced towards the end of the war. With resources running scarce, German Engineers produced a small number of blast bombs with a concrete body. The design utilised a steel framework onto which concrete was cast. The explosive filling was also contained within a thin steel container within the bomb body. Very few "concrete" bombs were dropped on the UK. In common with standard steel cased weapons, this type of bomb can be detected using standard magnetometer detection techniques (albeit; providing a smaller ferromagnetic signature than its all steel counterparts). This type of bomb represents a very small percentage of the total number of bombs dropped worldwide and are not considered a significant threat, particularly when viewed from an overall bomb threat in the UK.

Anti-Personnel Bomb. Generally these were small weapons of 1-3 kilograms in weight and are often referred to as 'Bomblets' and possessing similar ground penetration ability as the Incendiary Bomblets. They were often located during the post-raid searches. This type of bomb has been recovered within the bomb rubble being cleared or used as in-fill on construction projects and poses the same potential to function as the Incendiary bomb with a greater potential to cause localised casualties.

Specialist Bomb. These types of bombs were designed to meet a specific mission requirement. Typically, this would be a design modification or special fusing to enable the bomb to destroy hardened/armoured targets or deep buried and sub-marine targets. Similar to the more common HE bombs, they differ in that they rarely contain large amounts of high explosive. Therefore the consequence of a detonation is reduced but remains a significant risk, particularly when the detonation occurs on or near the surface.

Depth Bombs & Depth Charges. These types of weapons were designed to meet a specific mission requirement. Typically, the modifications would include the type of explosive filling and special fusing to enable the bomb to penetrate to a significant depth into the ground or water before detonating. Depth bombs intended for maritime attack and sub-marine targets would be fitted with one or more fuzes, one of which would be a hydrostatic fuze designed to detonate the bomb at a predetermined depth. The bomb would be fitted with an anti skip ring to reduce the deflection of the bomb as it entered the water. Similar in many ways to Depth Bombs, Depth Charges were exclusively designed to detonate at a predetermined depth. This was achieved by fitting the Charge with a short time delay or hydrostatic fuze. Depth bombs; having a similar configuration to general purpose bombs had the potential to penetrate deeply into the sea bed where an attack occurred in the relatively shallower water of a dock.

Unmanned Rocket Bombs & Missiles. The most famous in this category of weapons were the V1 (Fi103 flying bomb) commonly known as the Doodlebug and the Larger V2 (A4 missile). Both V1 & V2 with high explosive warheads containing 850kg & 1000kg (respectively) represent some of the largest weapons to land in the United Kingdom. Both types were built in a similar manner to an aircraft and would generally disintegrate on impact even if the warhead failed to detonate. The impact would spread debris over a wide area which was difficult to miss and any resulting unexploded 'V' weapons were comprehensively dealt with at the time. For this reason they are rarely encountered on land. However, where a 'V' weapon landed in water the opportunity for the event to have been missed and/or follow-up action abandoned was greater and they continue to pose a significant risk. Other, less well known rocket bombs were also produced by the Luftwaffe to attack maritime targets. Some were equipped with TV/Radio guidance from the parent bomber. Two of the most common were the Fritz X which consisted of an adapted SD1400kg bomb and the Henschel Hs293 which was based on a smaller 500kg bomb. No record of one having been recovered on land as a UXB can be found but these large HE bombs are considered to pose a significant risk, particularly to maritime projects. No records were found to indicate this type of bomb was ever used on targets in the area.

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

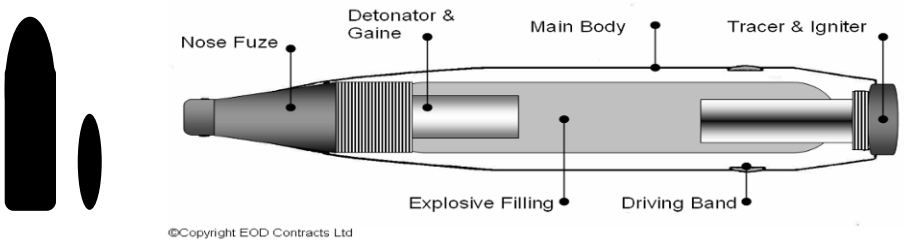
Photoflash Bomb. This type of bomb was dropped by specialist "Pathfinder" aircraft and although this type of bomb can be included with the category of specialist bombs, it is worthy of specific comment due to the danger it may still pose. Photoflash bombs were designed to explode with a blinding flash, rather like a camera flashbulb. They were used to enable photographs to be taken of targets at night and also served to identify ground targets for other aircraft to attack. The speed at which the highly energetic filling detonated, and energy it produced in doing so, was significant. Although these bombs were thin skinned and are prone to corrosion the functioning of one can be compared to a high explosive bomb detonation.

High Explosive Shells & Projectiles. As mentioned previously, one of the most common sources of UXO contamination encountered in the United Kingdom is High Explosive Shells and Projectiles. This is most commonly found to be as the result of firing practice ranges, bombardment and anti-aircraft defence, the latter often positioned to defend Major cities and Strategic installations and ports from German Bombing. Anti Aircraft Shells and projectiles are generally smaller (Up to 4.7" inch diameter) than the airdropped bombs and as a consequence were more easily missed amongst the bomb rubble. However, coastal bombardment guns could fire a shell weighing 1000kg, (larger than most common airdropped bombs) and capable of significant ground penetration. The generic layout of a projectile can be found at Figure 6.6. It should be noted that the fatal incident on the German autobahn in 2006 was thought to be the result of a shell or projectile detonating, not an airdropped bomb as first reported.

The Fuzes used in Anti-Aircraft Ammunition were designed to ensure the projectile would detonate in contact with the target, or at a pre-set altitude, or in close proximity to the target. The fuzes employed different means to achieve this, including; direct impact, or indirect impact, Barometric, Delay and Electro-magnetic influence. Some were fitted with more than one fuze, which served to reduce the chance of the projectile falling to earth and detonating. Artillery fuzes are activated during the firing process, using the projectile's acceleration or spin within the gun barrel to switch off the safety mechanisms. For this reason fired projectiles are considered more dangerous than unfired ones.

FIGURE 6: Generic Shell Design

Scale & Graphic Cross Section of a typical High Explosive (HE) Shell



Approximate size of a large shell used by battleships and coastal bombardment guns (Left) and Anti-aircraft shell (Right)

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

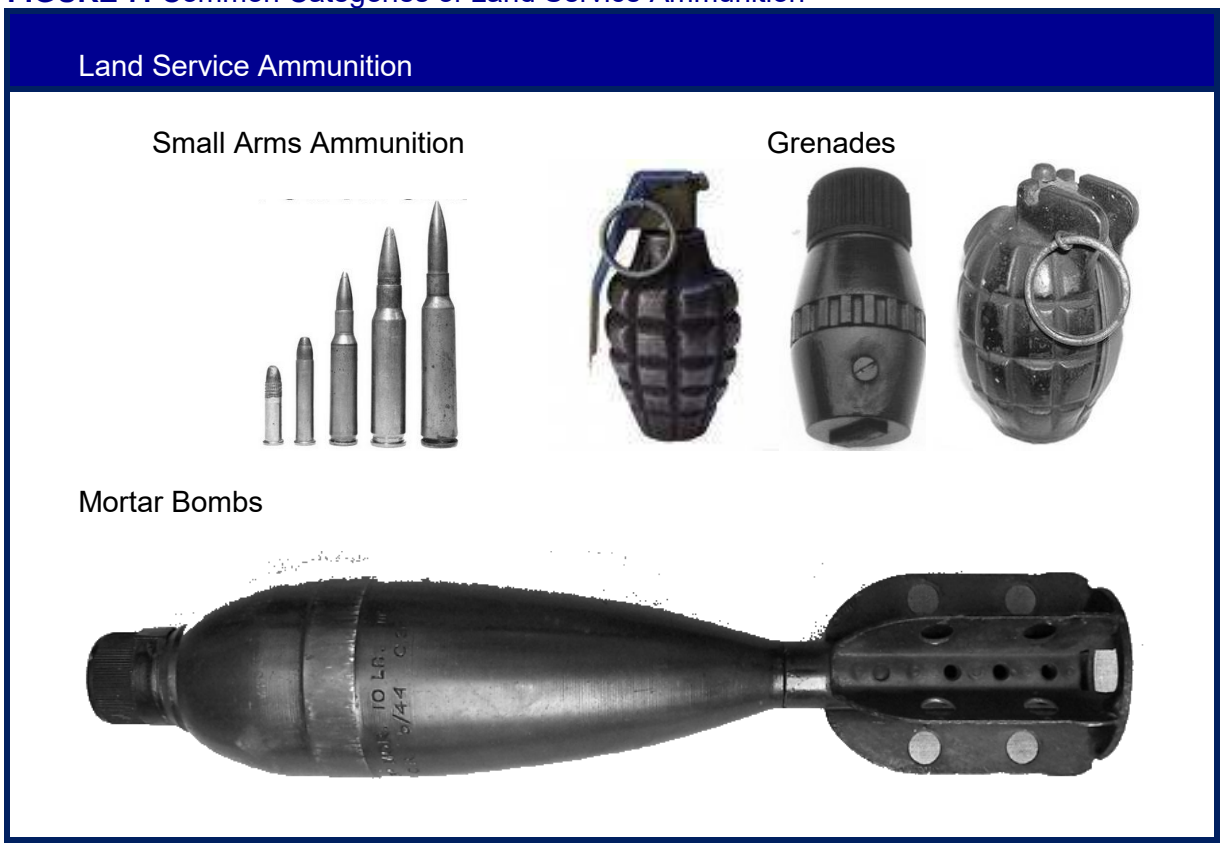
Other Types of Ordnance.

The following additional sources of ordnance types have been considered, and inherent risks taken account of:

Flares and Pyrotechnics. Flares and pyrotechnics were used for a variety of reasons throughout the war and continue to be found today in the most unlikely places. However, due to the thin casings of these weapons a high level of corrosion is likely to have occurred since manufacture. Depending on the specific nature of the weapon, this effectively renders them inert with the exception of any white phosphorous content or explosive gaine.

Land Service Ammunition (LSA). While as the name implies this type of ammunition was designed for use on land, it was also issued to naval personnel for close protection of vessels and their crew and to provide a limited offensive capability even to relatively small craft. This type of ammunition includes some shells and projectiles such as those covered previously. Other natures of LSA range from Small Arms Ammunition (SAA), having little or no high explosive content to Grenades, Mortars and Rockets which may pose a risk of detonation due to their explosive content and the design of their fuzes (impact) which; if subjected to sufficient shock or friction may result in the weapon functioning. (See Figure 7)

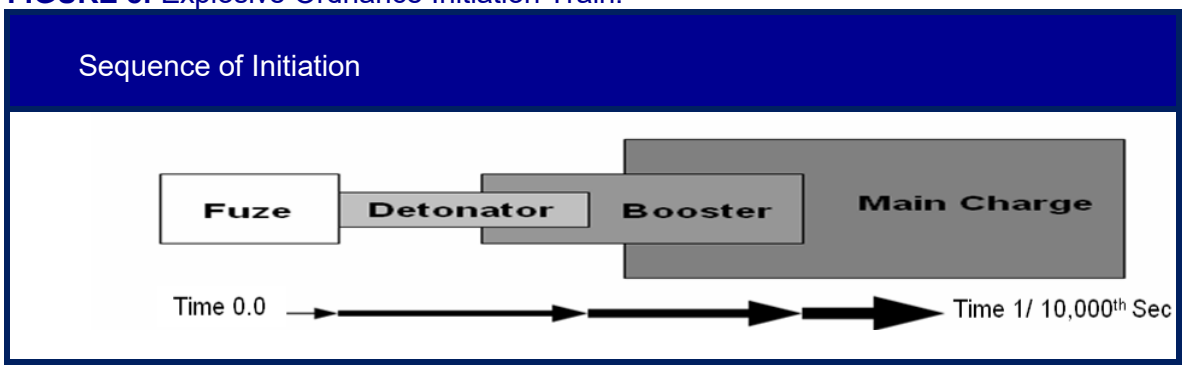
FIGURE 7: Common Categories of Land Service Ammunition



Initiation of Unexploded Ordnance. Explosive Ordnance is highly unlikely to spontaneously explode. The energetic chemical compounds, (Explosives) used in weapon manufacture are chosen to be as stable as possible and they all require a significant application of additional energy to create the right conditions for detonation to occur. If stored correctly, most explosive materials are designed to remain stable for the duration of their expected lifespan (typically 20 years). During this time, the correct functioning of the weapon is achieved by means of the 'Initiation Train' (See Figure 8).

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

FIGURE 8: Explosive Ordnance Initiation Train.



Initiation Train. This is a means by which, once the safety features have been switched off or removed, a chain reaction occurs through the weapon. Starting within the fusing system as a small ignition or spark, causing a detonator to explode, which in turn causes the booster charge to detonate with a greater energy and ending in the full detonation of the main explosive filling. Each part of the process has in-built safety features to prevent an unintended detonation. A failure in any of the components within the Initiation Train can result in a UXO. In the case of a UXB; the chain reaction has broken down and the Initiation Train is brought to a halt, albeit, a temporary one. There are a number of ways that sufficient energy could be introduced to the otherwise stable UXB / UXO that may allow the Initiation Train to set off once more, overcoming the initial reason for failure. In addition to subjecting the weapon to excessive heat, such as a fire, the most common methods to bring about an explosive detonation in such items are considered to be:

Direct impact onto the main body of the bomb by mechanical excavation or pile driving: Such an occurrence can cause the bomb to detonate, should the point of impact be on the bomb fuze; less force would be required to bring about a full or partial explosive detonation.

Re-starting the clock timer in the bomb fuze. Only a small percentage of bombs were fitted with clockwork fuzes. It is likely that corrosion has taken place within the fuze that may prevent the clockwork mechanism from functioning. However, the restarting of the clock is by no means a scenario that can be completely ruled out. This is considered to be one of the two most credible mechanisms by which sufficient energy could be introduced to the bomb and result in a detonation.

Induction of a static charge or exposure to an external power source (Electrical Services), causing a current in an electrical fuze. The majority of German bombs employed an electrical component within the fuzes, it is likely that corrosion would have taken place within the fuze mechanism and that it would no longer contain, or conduct sufficient electrical charge to initiate the bomb.

Friction initiating the sensitive fuze explosive. Some chemical constituents may have deteriorated, due to oxidisation. Components designed with a high degree of stability at the time of manufacture may no longer be as safe. **This is considered to be the most likely mechanism by which sufficient energy could be introduced to the bomb and result in a detonation.**

© 2017 EOD Contracts Ltd, Company Registration Number 4483560

Annex E

Risk Assessment Tables

Table 1: Summary of Potential Contamination Sources

Source	Applicable	Not Applicable
Enemy Attack & Counter Measures		
Bombing WW1		☒
Manned Aircraft Bombing WW2	☒	
Unmanned V1 & V2 Rocket Attack		☒
Shelling		☒
Anti-Shipping Mines & Depth Charges	☒	
Anti-Aircraft Shells & Rockets		☒
Beach Mines & Coastal Defences.		☒
Airfield/Key Point Defensive Mines/Charges		☒
Abandoned Unexploded Bomb (A/UXB)		☒
Migration of UXO		
UXO Migration in Rubble & Infill		☒
UXO Migration by Tide & River Current		☒
UXO Migration by Marine Dredging		☒
Ship Wrecks		☒
Dispersal by Explosion, Fire & Accident		☒
Aeroplane Crash		☒
Private Collections		☒
MOD Facilities		
Bombing Range		☒
Artillery, Mortar & Tank Range		☒
Grenade Range		☒
Small Arms Firing Range		☒
Weapon Research & Development Facilities		☒
Ammunition Burial Grounds		☒
Docks & Harbour Facilities		☒
Offshore Ammunition Dumping Grounds		☒
Ammunition Storage & Manufacture Sites		☒
Airfields & Air Stations		☒
Bombing Decoy Site	☒	
Army Barracks & Camps	☒	
MOD Training / Concentration Areas	☒	
Home Guard & SOE Weapon Caches		☒

Table 2: Baseline Bomb Penetration Assessment

	Bomb Weights			
Sub Soil Type	50kg	250kg	500kg	1000kg
Soft Rock	2.442	5.016	6.006	7.062
Gravel	**2.442**	**5.016**	**6.006**	**7.062**
Sand	**2.442**	**5.016**	**6.006**	**7.062**
Chalk	3.7	7.6	9.1	10.7

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Sub Soil Type	Bomb Weights			
	50kg	250kg	500kg	1000kg
Shingle	3.7	7.6	9.1	10.7
Dry Clay	3.7	7.6	9.1	10.7
Wet Sand	**5.55**	**11.4**	**13.65**	**16.05**
Wet Clay	**5.55**	**11.4**	**13.65**	**16.05**
Average Offset (m)	**0.8-1.6**	**1.6-3.7**	**3-4.5**	**3.4-5.3**

Table 3: Site Specific Bomb Penetration Assessment

Input Figures			
Bomb Weight	Release Height	Velocity on Impact	Angle of Strike
500 kg	5000 m	340 m.s^{-1}	10º to vertical
Geology	Made Ground – Alluvium – Wet Sand/Clay		
Output Figures			
Maximum Penetration Depth		Maximum Offset	
16.5 m		**5.3 m**	

The maximum threat depth from airdropped weapons is considered to be: **Bombs 16.5 m**

The maximum threat depth for smaller shells is considered to be: **AA Shells 3.0 m**

Input figures based on the most common bombing methods and largest common bomb type Figures derived from computer simulation. All depths based on 1939 levels.

Table 4: Airdropped Weapon Strike Indicators (UK)

Item	Increasing Potential Level of Risk ⇨			
Site Location	**Rural**	Small Town	Brown Field Large Towns	Cities
Site Description and Use	Greenfield or Agricultural Land	Near Strategic Target	**Adjacent to Strategic Target**	Strategic Target
Site History	No history of Attack	**Near area of Attack**	**Immediate Area Attacked**	Direct Attack

Strategic Target: Military Installation, Industrial or Munitions Manufacturer, Power Station, Gas or Water Works, Port, Dock, Railway Yard, Decoy Site.

Table 5: Weapon Strike Records (UK)

Source	Availability			
Archive	None	Non specific	Specific	**Extensive**
In-house	None	Non specific	**Specific**	Extensive
Anecdotal	None	**Non specific**	Specific	Confirmed

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Table 6: Anti-Aircraft Weapon Strike Indicators (UK)

Item	Increasing Potential Level of Risk ⇨			
Site Location	**Rural**	Town	City	Military Site
Fixed Battery Location	None	General Area	**Nearby**	Onsite
Mobile Battery	Rural	Town	City	**Military Site**
Military Site: Airfield, Port, Radar, Barracks, Depots, Arsenal or Similar.				

Table 7: Abandoned Bomb Records (UK)

Item	Increasing Potential Level of Risk ⇨		
In-house	**None**	Yes	On-site
Other	**None**	Yes	On-site

Table 8: Bomb Strike Density Assessment

Bombs & Mines	Bomb density placed at MEDIUM

Table 9: Opportunity to have detected Bomb or Shell Strikes (UK)

Increasing Potential Level of Risk ⇨
Light bomb damage
Good ARP cover
Significant development
No significant ground cover
Light bomb damage
Moderate ARP cover
Moderate development
Frequent public access
Little ground cover
Significant bomb damage
Poor ARP cover
Minimal development limited to shallow excavations
Infrequent public access
Moderate ground cover
Heavy bomb damage
No ARP cover
Development limited to site clearance
Controlled private access
Heavy ground cover, vegetation, ploughing or body of water

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Table 10: Post Contamination Development Indicators (UK)

Nature of Post Contamination Development	Increasing Potential Level of Risk ⇨
	100% excavations of the entire site to below contamination depth.
	Significant development
	Moderate development
	Minimal development
	No development

Table 11: Construction Activities Encounter Indicators

Activities	Increasing Potential Level Risk ⇨
	Borehole Drilling
	Dynamic Sampling
	Shallow Trial Pit
	Services Trenching
	Bored (CFA) Piling
	Sheet Piling
	Shallow Excavations over extended area
	Deep Excavations over a limited area
	High Density Piles
	Deep Excavations over extended area
	Bulk Excavations

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Annex F

16th May 2017

Bomb disposal experts in Birmingham are taking part in a "major, delicate operation" to make a wartime bomb safe.

A major route into the city remains closed for a second day, rail services are affected and people have been evacuated from their homes.
The bomb disposal team said 13 lorry loads of sand had been brought in to create a "sizeable igloo" around the 250kg (551lb) bomb.
Junctions four to seven of the M6 have been closed ahead of detonation.
West Midlands Police, who has praised the bravery of the team at the scene, said the motorway between junction four near Coleshill and seven at Great Barr will shut in both directions while a controlled explosion is carried out.

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Mike Luedicke, deputy commander of the Army's UK bomb disposal unit who is coordinating the operation, said the team was "very confident it was a classic Second World War German air drop bomb".

"It's called an SC2 50 - 250kg in weight, 139kg of high explosives," he said.
He said a "large cave of sand bags" consisting of 250 tonnes of sand had been put around the site.

Major Luedicke said it had been a particularly "complex" case because the fuses were "on the underside and pressed into the earth and so our process of identification and diagnostics has been a real challenge".

"We need to either magnetically or chemically freeze the fuses to essentially put a handbrake on them," he said.

A 500m cordon was set up after the discovery at about 09:45 BST on Monday and hundreds of homes and businesses evacuated.
About 80 people were forced to spend the night in a rest centre, the Red Cross, said Paige Collins, of Aston, and her 10-month-old daughter, were among residents who spent the night at Alexander Stadium in Perry Barr.

"We're in a dusty gym - I think it is normally used for martial arts. It is a bit draughty," she said.
Ms Collins said she slept for about "an hour" on a mat and sheet after putting her daughter to sleep in her pushchair. She said cots should have been provided.
"I was trying to go into my house about 2:45pm [on Monday] and the police were at the bottom of my road saying everyone has to be evacuated," she said.
Residents were told they could be there until about 18:00 BST, she said.

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

Analysis by Birmingham historian Carl Chinn

Birmingham was a major munitions centre, as were Manchester and Coventry, and on 19 November 1940, the Germans attacked the city very heavily. At the time Aston and Tyseley were very industrial areas.
The raid carried on for nine hours on 19 November, but it could have been the next night when this device was dropped.

On 20 November, nearby Queen's Road was absolutely destroyed by a big bomb. Queen's Road is right next to where this bomb was found.

SOURCE: http://www.bbc.co.uk/news/uk-england-birmingham-39932247

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

BBC

Wembley WW2 live bomb posed 'risk to life'

22 May 2015 | London

Share

A blast wall was put up around the bomb to minimise damage if it exploded

An unexploded World War Two bomb uncovered by builders near Wembley Stadium posed "a genuine risk to life", the Army has said.

The 50kg (110lb) device was removed by a specialist Army team and safely detonated.
The bomb, thought to date from the early 1940s German air raids on London, was found on Thursday.
Homes and businesses were evacuated and the Army built a blast wall around the device in case it exploded.
The device was taken away by the Royal Logistic Corps disposal teams to a safe area to be detonated in a controlled explosion.

Police confirmed it was blown up in an unspecified location in Bedfordshire shortly after 17:00 BST.
After the bomb was removed from its position near Wembley, street cordons were taken down and people were allowed back into the area.
Wembley Stadium said its weekend games would go ahead including the Championship Middlesbrough v Norwich play-off on Monday.

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

"This weekend's games remain unaffected and we look forward to welcoming supporters of all six Football League Play-Off finalists to Wembley", it **tweeted**.

The Army said the bomb was located about 200m (656ft) away from Wembley Stadium but there was no risk to the venue. Empire Way had been partially closed and a 400m cordon was in place while bomb disposal experts dealt with the device.
The bomb was reported at about 15:00 BST on Thursday and Met Police officers said about 300 properties had been evacuated, which included the TV studio where Britain's Got Talent is filmed.

Chief Supt Mick Gallagher, from Brent Police, said the public had been "very mature" in its response to the bomb.
He said 70 people had spent the night in an evacuation centre and more people joined them in the morning.
"I must also thank our courageous soldiers from various Army regiments for working tirelessly for over 24 hours, using their skill and experience to safely bring this incident to its conclusion," he added.
An Army spokesman said: "This bomb is a live munition in a potentially dangerous condition so it's important that people listen to the police and evacuate their homes if asked.
"Any bomb, even under a controlled explosion, could cause significant damage to property and there is a genuine risk to life."

The Met Police said it had worked with disposal experts and partner agencies "to keep disruption to local residents and businesses to an absolute minimum", while ensuring everyone's safety.

SOURCE: http://www.bbc.co.uk/news/uk-england-london-32841971

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

EveningStandard.

Friday 20th January 2017

Discovery: the unexploded German SD 50kg bomb was dropped by an aircraft during the second world war.

This is the World War Two bomb which caused chaos after it was found in the Thames near the Houses of Parliament on Thursday evening.

Waterloo and Westminster bridges were both closed for several hours, Westminster underground station was closed and river traffic was halted after the device was dredged up near the Victoria Embankment.
Scores of police carried out safety checks in the area and the riverfront remained closed until around 3am on Friday morning.

The Royal Navy operation to dispose of the unexploded bomb involved towing it along the river to Tilbury where a controlled detonation was carried out.
In pictures released by the Royal navy today, the German SD 50kg bomb appears to be covered in years of river slime but is still in a reasonable condition.

It is thought to have been dropped from an aircraft during the Blitz.
Lieutenant Mike St Pierre, the officer who led the bomb disposal team on scene, said: “It was a long night for me and the team but this is exactly what we are trained for so it was a successful operation, although it was a little surreal carrying out our job right next to the Houses of Parliament.

© 2017 EOD Contracts Ltd. Company Registration Number 4483560

“I’d like to thank the authorities who worked with us so well on this operation, particularly the Met Police. The bomb itself was in good condition considering how old it was, and it clearly still

"We removed it from the barge and towed it along the Thames, working very closely with the Met Police to safely close off bridges as we went, until we were sure we could detonate it safely.”
Large crowds of tourists and passers-by had gathered at the police tape with some calmly taking photographs of the odd sight.

SOURCE: http://www.standard.co.uk/news/london/pictured-ww2-bomb-found-in-thames-which- caused-chaos-in-london-a3445831.html

© 2017 EOD Contracts Ltd. Company Registration Number 4483560