

FELLOWS

The UXO risk management experts

Part of the Optima Group



Detailed UXO Risk Assessment

FIL Reference: 3133R

Client: Gravesham Borough Council

Project: St Columbas Close

Site Location: St Columbas Close, Gravesend, Kent

Report date: 03 March 2022



www.fellowsint.com

Document Control

Version Date	Version	Author	Reviewer	Comments
03 Mar 22	1.0	Toby Chesson	Mark Khan AExpE	Original

Quality Check

Version Date	Version	Checked by	Comments
03 Mar 22	1.0	Kirsty Parry	QC / format check

Document Approval

	Reviewed by	Approved by
Signature		
Print Name	Mark Khan AExpE	Michael Jarwood
Date	03 March 2022	03 March 2022

Distribution

Date	Copy No.	Recipient	Format
08 Mar 22	1	Gravesham Borough Council	PDF
08 Mar 22	2	Potter Raper	PDF
08 Mar 22	3	Fellows International Ltd	PDF

Contents

Acronyms and Abbreviations.....	3
1. Executive Summary	4
2. Risk Assessment	5
3. Recommendations to Reduce UXO Risk to ALARP.....	6
4. Site History	7
5. UXO Risk at the Site	8
6. Report Methodology	14
7. Requirement for UXO Risk Assessment.....	15
8. Sources of Potential Unexploded Ordnance.....	16
9. Aerial Bombing.....	17
10. Military Ordnance.....	21
11. Air Service Ordnance.....	22
12. Land Service Ordnance	26
13. References	28

Acronyms and Abbreviations

AAA	Anti-Aircraft Artillery
AP	Armour Piercing
AP	Anti-Personnel
ARP	Air Raid Precaution (Wardens)
BD	Bombing Density
BGL	Below Ground Level
BGS	British Geological Survey (UK)
BH	Borehole
CDM	Construction (Design and Management) Regulations 2015 (UK)
CIRIA	Construction Industry Research and Information Association
CPT	Cone Penetrometer Test
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
ERP	Emergency Response Plan
ERW	Explosive Remnants of War
FFE	Free From Explosives
GI	Ground Investigation
GPS	Global Positioning System
HE	High Explosive
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act 1974
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operations Centre (UK)
LE	Low Explosive
LM	Luftmine (Germany)
LSA	Land Service Ammunition
MOD	Ministry of Defence (UK)
NEQ	Net Explosive Quantity
RAF	Royal Air Force
RN	Royal Navy
ROF	Royal Ordnance Factory
SAA	Small Arms Ammunition
SAP	Semi-Armour-Piercing
SI	Site Investigation
SIP	Self-Igniting Phosphorous
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V1	Vengeance Weapon 1 - Flying bombs or doodlebugs
V2	Vengeance Weapon 2 - Long range rocket
WW	World War

1. Executive Summary

Site details

The site is located at St Colombas Close, Gravesend, Kent. The nearest postcode for the site is DA12 4AJ with an approximate grid reference of TQ 65984 72135.



Figure 1. Showing Satellite Imagery of the site area. [Google, 2022]

2. Risk Assessment

Unexploded Ordnance (UXO) risk at the site is assessed as:

UXO	RISK
Air Service Munitions	Medium Risk
British Anti-Air defensive munitions	Low Risk
Other (Land service Ammunition / Historic [Home Guard] / Military Training)	Low Risk

Full detail of the UXO risk and the risk assessment process is within section 11.

Air Service Munitions

During the Second World War Gravesend was targeted by Luftwaffe bombing raids between September 1940 and February 1944, and German V weapon strikes in 1944. Two HE bomb strikes and one unexploded bomb were recorded within a 600m radius of the site, with a further 11 HE bomb strikes recorded at unknown locations within the perimeter of RAF GRAVESEND, located approximately 250m south east of the site boundary. The closest recorded bomb strike was recorded approximately 460m northwest of the site. During the Second World War, the site occupied open land and was in close proximity to the RAF GRAVESEND airfield, which was targeted in at least two separate raids, with both HE and oil bomb strikes recorded. Post war development has taken place on the site and in areas surrounding the site. Some areas of the site however remain undeveloped ground. The risk of encountering deep buried German aerial UXBs has therefore been assessed as **medium**.

AAA Emplacements

There were three HAA batteries located within a 5km radius of the site, with the closest approximately 1.86km to the north of the site. At least nine light anti-aircraft gun positions were identified within 2km of the site, located in and around RAF GRAVESEND. Given the small site area however, it is assessed that there is a **low** risk of encountering 'fall to earth', AA munitions.

Other (Allied Air and Land service Ammunition etc.)

No direct military usage of the site has been established. It assessed therefore that there is a **low** risk of potential encounter with other munitions.

3. Recommendations to Reduce UXO Risk to ALARP

UXO Risk mitigation recommendations

For all works within the site area:

UXO Awareness Training

A UXO Awareness Brief (UXOAB) to be delivered to all site personnel. This can also include a site safety walk-through and discussion of existing safety and emergency documentation.

For piling and deep excavations

Risk mitigation processes can be carried out for pile positions into virgin ground. We recommend intrusive magnetometer Cone Penetration Testing (CPT) to the maximum bomb penetration depth based for any piling or deep excavations within the site areas marked as medium risk.

For deep open excavations (deeper than 2m below existing ground level) a UXO Engineer should be retained on-site to oversee groundworks.

Emergency Response Plan

A site-specific emergency response plan (ERP) should be produced to provide clear and precise guidance on what to do should UXO be encountered, and / or detonated as part of the site works. It should be accompanied by emergency management team roles and responsibilities.

The ERP should be included in the health and safety plan for the proposed works and communicated to the work force at the operational level, typically as part of a toolbox talk.

Fellows International Limited can provide all of the above services and would be pleased to provide a proposal accordingly.

For further information, or to discuss requirements, please get in touch.

Web – www.fellowsint.com

Tel – 08000 424 424

Email – info@fellowsint.com