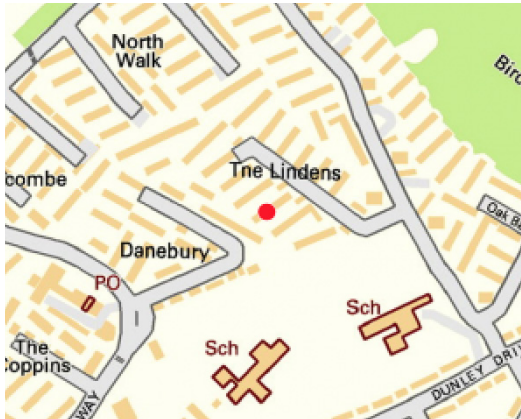


Preliminary Unexploded Ordnance Risk Assessment



Project: 19 THE LINDENS, NEW ADDINGTON, CROYDON CR0 9EG

Prepared for: London Borough of Croydon

Client ref: 19 - 21 The Lindens

Report prepared by Dynasafe BACTEC Limited and FIND Mapping Limited

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19 The Lindens, New Addington, Croydon CRO 9EG

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1 Executive Summary

1.1 Has a potential UXO Risk been identified at the site in question?

YES

Indicative British / Allied UXO risk

MEDIUM

Indicative German UXO risk

MEDIUM-HIGH

1.2 Does the site in question require further research to clarify the UXO risk to future ground works?

YES

1.3 Dynasafe BACTEC Limited's recommendation:

A Stage 2 Detailed Unexploded Ordnance Desktop Threat Assessment of the site is carried out.

To request a quotation please call Dynasafe BACTEC Limited: **01322 284 550**

If you order the recommended **Stage 2 Detailed Desktop Threat Assessment**, you will be refunded the fee for this **BombRisk Preliminary Threat Assessment**.

2 Introduction

2.1 Background

Since 1991, Dynasafe BACTEC Limited has supported the UK construction industry by assessing the risk of encountering items of unexploded ordnance (UXO) during intrusive works. Dynasafe BACTEC's specialist advice provides essential information for threat assessments, improving safety and enhancing reputations, helping contractors avoid costly delays.

Dynasafe BACTEC holds the following accreditations: Occupational Health & Safety Management Systems (OHAS 18001:2007), Environmental Management Systems (ISO 14001:2004) and Quality Management Systems (ISO 9001:2008).

The risk of encountering UXO on most sites in the UK is low. However, where a site is at increased risk it is necessary to take measures to mitigate that risk. The factors affecting UXO threat assessment are based upon the history and previous usage of a site and its surroundings.

In 2009, the Construction Industry Research and Information Association (CIRIA) established a set of guidelines to assist industry professionals.

CIRIA recommends a four stage risk management process:

- **Preliminary Threat Assessment**
- **Detailed Threat Assessment**
- **Risk Mitigation**
- **Implementation**

The preliminary threat assessment enables a non-UXO specialist to place a site in context and to identify whether a more detailed assessment is necessary. The assessment is based upon data obtained from desktop reviews of the site's history and its proximity to potential indicators of UXO contamination.

There are two principal groups of onshore UXO in the UK:

- **Historical British and / or Allied Army, Navy and Air-Force** – domestic military activity
- **Enemy action during WWI and WWII** – aerial bombing and naval bombardment

These two groups comprise many potential UXO risk contributing sources within the UK, the most significant of which are listed below. Georeferenced databases containing this information are used by BombRisk.com to identify areas of potentially elevated UXO risk.

- **Historic army, navy and air-force facilities**
- **Explosives / ammunition factories**
- **Munitions storage depots**
- **Historic military training areas and firing ranges**
- **British army explosive ordnance clearance tasks / recces**

2 Introduction continued

- **WWII heavy anti-aircraft batteries**
- **WWII anti-invasion defensive fortifications**
- **Miscellaneous WWII pipe mined locations**
- **WWII prisoner of war camps**
- **WWII German bombing density statistics**
- **WWII bombing decoy sites**
- **Press articles regarding UXO finds**
- **Locations of Dynasafe BACTEC UXO finds**
- **Locations of Dynasafe BACTEC desktop threat assessments**
- **Locations of Dynasafe BACTEC on-site support services**

Established in 2006, FIND Maps Limited is a pioneering web mapping and spatial data technology company offering online mapping and consultancy services.

www.findmaps.co.uk provides detailed mapping and a wealth of data sets to hundreds of the UK's top property, environmental and design/build companies.

FIND's consultancy services provide bespoke internet mapping solutions to a range of businesses enabling them to manage their spatial data more effectively.

While working closely with a wide range of reputable data providers including Ordnance Survey and the Environment Agency, FIND works independently of these organisations. A similar arm's-length relationship is maintained in terms of software and hardware providers. This enables the team at FIND to offer truly independent advice.

3 Methodology

3

Dynasafe BACTEC Limited and FIND have compiled a geo-referenced database of potential sources of UXO risk within the UK. From this information a range of risk zones have been defined.

The weighting of these zones is based upon the influence of all relevant factors. A WWII-era RAF airfield, for example, has a far greater zone of influence than a single WWII-era Anti-Aircraft Battery, as it would have covered a larger area, housed a much greater quantity / variety of munitions, seen more domestic troop training activities and would have been a more likely target for enemy bombers.

An online Preliminary Automated UXO Threat Assessment will determine an indicative level of UXO risk relating to a site. Note that these risk levels could be subject to change following the completion of any Detailed Desktop Threat Assessment for the same site.

The assessment will list all factors contributing to this weighting and will also give appropriate recommendations for further action, if considered necessary.

4 Search Results

4 Dynasafe BACTEC Limited's UXO Source Database

As a capital city, London was an obvious target for the Luftwaffe. The city was home to the British government, the largest docks system in the UK and numerous historic and cultural monuments.

The night time "carpet bombing" Blitz on London began on 7th September 1940 with concentrated attacks coming to an end in May 1941 as the Luftwaffe was diverted east to prepare for 'Operation Barbarossa'; the invasion of the Soviet Union. By the end of the war London had become the most heavily bombed city in Britain. Between 1940 and 1945 there were a total of 71 'major' air raids on the city, resulting in an estimated 190,000 bombs dropped; approximately 18,000 tons. This left some 29,000 people dead.

During 1942 and 1943 there were a number of minor intruder raids carried out by small formations of fighter bombers and then between January and May 1944 the Luftwaffe returned to London in mass, for Operation Steinbock, a series of large Blitz style raids.

From mid-1944 the "V-weapon" (for Vengeance) campaign, using unmanned cruise missiles and rockets carrying 1,000kg warheads, represented Hitler's final attempt to reverse Germany's imminent defeat. The V1 (Flying Bomb or Doodlebug) and the V2 (Long Range Rocket) were launched from bases in Germany and occupied Europe. Totals of 2,419 V1s and 517 V2s were recorded in the London Civil Defence region.

The map included at the end of this report shows the high explosive bombs recorded falling in the region of the site on the available bomb census mapping for the area. Please note that this information comes from a single source and should not be considered definitive in its accuracy or coverage.

Within 10km of the site the following potential sources of explosive ordnance have been recorded:

Source	Number within 10km
Military Airfield Sites	1
Abandoned Bombs	47
Press Articles regarding UXO Finds	3
WWII Defence Related Positions & Pillboxes	56
Historic Army Camps	8
Prisoner of War Camps	5
Heavy Anti-Aircraft Batteries	24
Army Explosive Ordnance Clearance Tasks/Recess	45
Sites Related to the Manufacture of Explosives and Explosive Ordnance	10
Dynasafe BACTEC Desk-top Threat Assessments	397
Bombing Decoy Sites	None recorded
Military Training Areas and Firing Ranges	None recorded

4 Search Results continued

Pipe Mined WWII Airfields	None recorded
Miscellaneous WWII Pipe Mined Locations	None recorded
Dynasafe BACTEC Unexploded Ordnance Finds	None recorded
Dynasafe BACTEC On-Site Support Services	None recorded

Of these sources, the following are deemed significant enough to be a risk and therefore warrant further research:

Army Explosive Ordnance Clearance Tasks / Recess

Location	Approximate distance (km) from site
Baseswift Ltd, Hoskins Street, Greenwich	1.1
Transporter Yard, Isle Of Dogs, E14	1.6

The site lies within or close to an area where a military clearance operation has been recorded. A clearance operation can describe anything from the recovery of a single item of ordnance found by a member of the public to large scale tasks involving detailed surveys.

Specific research is recommended in order to ascertain the scale of the clearance operation. This would include the type and quantity of ordnance recovered.

Records of a clearance task may indicate a history of military presence in an area. This history increases the risk that further munitions may be present.

Sites Related to the Manufacture of Explosives and Explosive Ordnance

Facility Name	Approximate distance (km) from site
Brunner Mond and Co Ltd, Crescent Wharf/Venesta Wharf, North Woolwich Road, Silvertown, Great War 1915-17, Explosives factory	1.9
Woolwich Road, Silvertown, Great War 1915-17, Explosives factory	–
Vacuum Oil Co Ltd, Millwall, Great War, oil distillery - mineral jelly	2.2

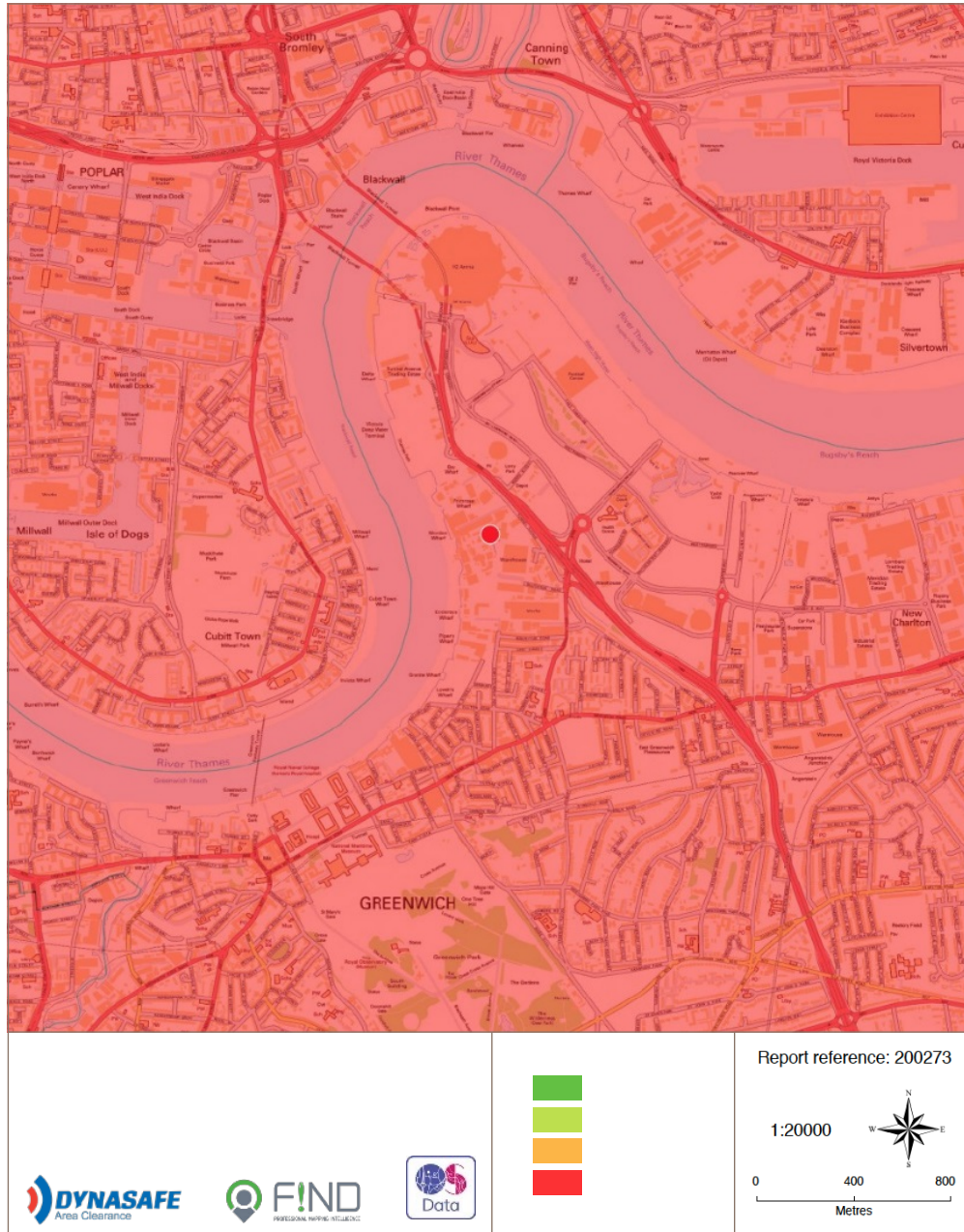
During both WWI and WWII many factories were established (or existing sites converted) to produce explosives and/or fill ordnance with explosive and chemical constituents. These ranged from small engineering works to large National Filling Factories (WWI) and Royal Ordnance Factories (WWII). The site of the proposed works lies in the vicinity of one of these facilities.

For example, a factory producing casings the associated risk is negligible. However, on sites handling or producing explosive and chemical weapons the risk of soil contamination can be high. Disposal areas (often on site boundaries) can pose considerable risk. The history of the facility should be more fully researched.

5 Risk of UXO

5 Risk of UXO based on WWII German bombing density

Sample Report



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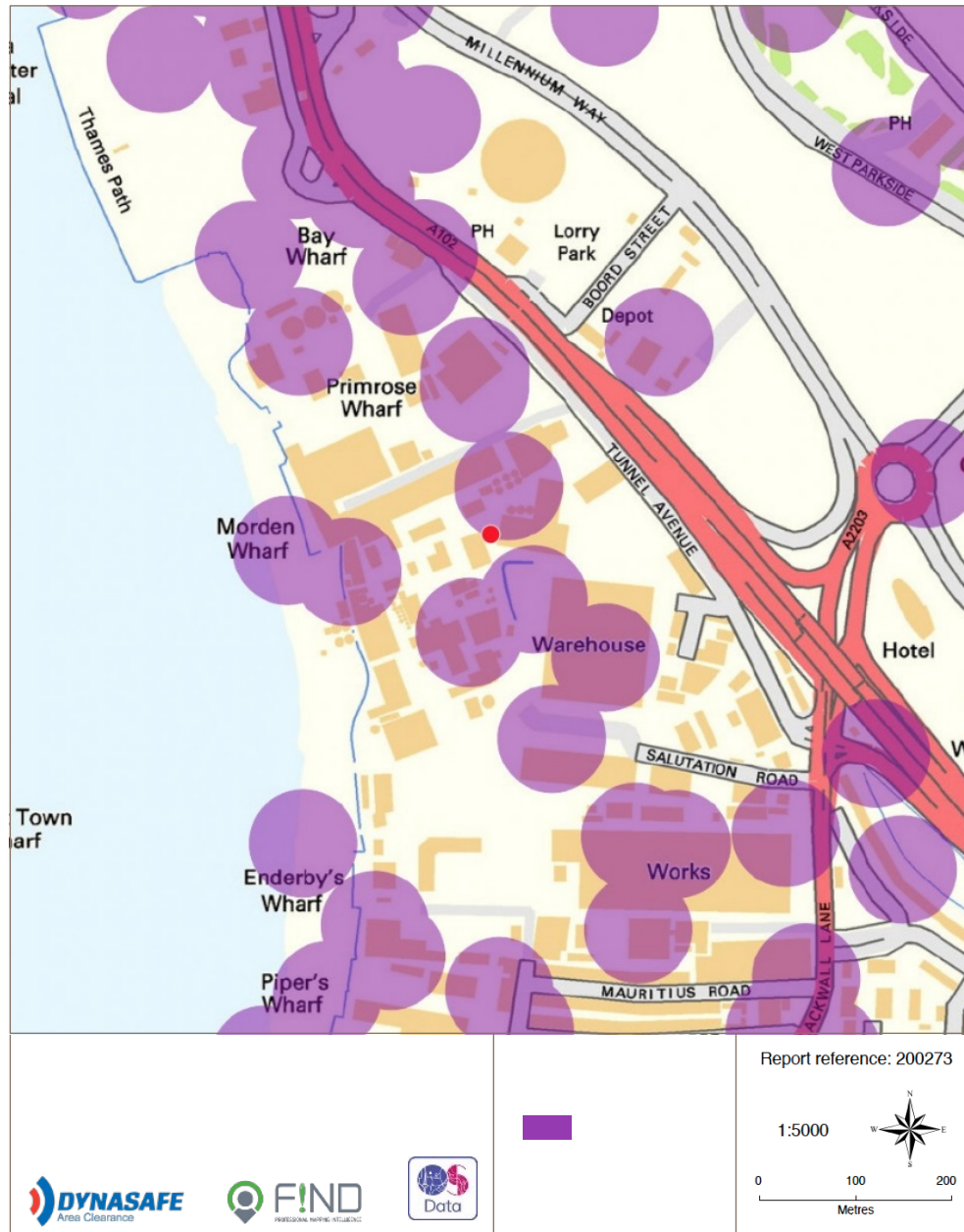
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NEGLIGIBLE
LOW
MEDIUM
HIGH

6 Risk of UXO

6 Risk of UXO based on WWII German bomb strikes

Sample Report



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7 Conclusions

7 Risk Levels and Recommendation

Indicative British / Allied UXO Risk

MEDIUM

Dynasafe BACTEC's historical database has identified potential sources of British / Allied UXO within a significant radius of the site. It is recommended that further research is undertaken to determine more about these potential sources, how they may have affected the site and whether or not an elevated UXO risk exists.

Indicative German UXO Risk

MEDIUM – HIGH

Historical records indicate that the borough, within which the site is situated, sustained an overall medium density of bombing during WWII. Furthermore, a bomb strike(s) was recorded within 50m of the site on the London ARP Bomb Census Maps.

Close proximity to recorded bomb strike(s) indicates a potential risk from UXBs – especially if the site sustained serious damage resulting in rubble and debris.

Conclusion

This Preliminary Assessment has resulted in an overall (indicative) Medium-High risk from UXO at the site in question.

Consequently Dynasafe BACTEC recommends that a Stage 2 Detailed Desktop Threat Assessment be undertaken to clarify the UXO risk to any future construction works.

Detailed Threat Assessments are conducted offline by Dynasafe BACTEC's researchers, who use additional site specific records and information, such as historical OS mapping, WWII-era aerial photography, internet resources, publications and local archive records to fully qualify the risk on site.

Historical land use, geological conditions and post-WWII redevelopment will also have an impact on the potential for UXO to remain buried at a site.

Detailed Threat Assessments also have the potential to 'zone' sites into areas of differing risk.

If an elevated UXO Risk is confirmed by a Stage 2 report, Risk Mitigation Measures will be recommended to reduce the UXO Risk to ALARP level.

The lead time for a Stage 2 Detailed Threat Assessment will vary between 5-10 working days dependent upon the complexity of the site and the additional site specific information required.

For a quotation for a detailed UXO threat assessment, or more information, please contact Dynasafe BACTEC Limited on 01322 628178.

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