Groundsure
LOCATION INTELLIGENCE

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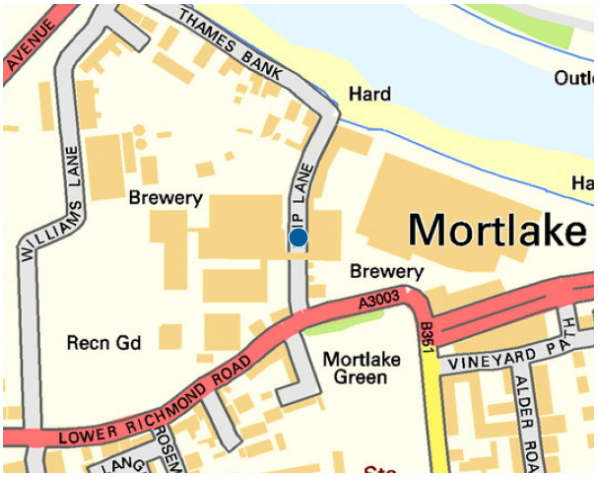
# Preliminary Unexploded Ordnance Risk Assessment





Project: STAG BREWING CO LTD, THE STAG BREWERY, MORTLAKE, LONDON, SW14 7ET

Groundsure Ref: SCL-3318495

*Report prepared by Dynasafe BACTEC Limited and FIND Mapping Limited*

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# Preliminary Unexploded Ordnance Threat Assessment

## STAG BREWING CO LTD, THE STAG BREWERY, MORTLAKE, LONDON, SW14 7ET

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# 1 Executive Summary

## 1 Has a potential unexploded ordnance (UXO) risk been identified at the site in question?

**YES**

| | |
|---|---|
| **Indicative British / Allied UXO Risk** | **LOW** |
| **Indicative German UXO Risk** | **MEDIUM** |

## 2 Does the site in question require further research to clarify the unexploded ordnance (UXO) risk to future ground works?

**YES**

## 3 Dynasafe BACTEC'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 on 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

## About Dynasafe BACTEC Limited

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:

- **British / Allied Army, Air Force and Navy activities – domestic military activity**
- **Enemy bombing 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**
- **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**

## About FIND Mapping Limited

Established in 2006, FIND Mapping Limited is a pioneering web mapping and spatial data technology company offering online mapping and consultancy services. FIND technology powers the generation of this report.

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

**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

## London during WWII

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.

## Dynasafe BACTEC Limited's UXO Source Database

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

| *Source* | *Number within 10km* |
|---|---|
| Military Airfield Sites | 1 |
| Bombing Decoy Sites | 1 |
| Abandoned Bombs | 15 |
| Press Articles regarding UXO Finds | 2 |
| WWII Defence Related Positions & Pillboxes | 63 |
| Historic Army Camps | 4 |
| Prisoner of War Camps | 6 |
| Military Training Areas and Firing Ranges | 1 |
| Heavy Anti-Aircraft Batteries | 10 |
| Army Explosive Ordnance Clearance Tasks/Recces | 20 |
| Sites Related to the Manufacture of Explosives and Explosive Ordnance | 9 |
| Dynasafe BACTEC Desk-top Threat Assessments | 135 |
| 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 the most significant:

### Abandoned Bombs

| Description | Approximate distance (km) from site |
|---|---|
| 1 x unknown size. 27 Grove Park Gardens, Chiswick | 1.4 |

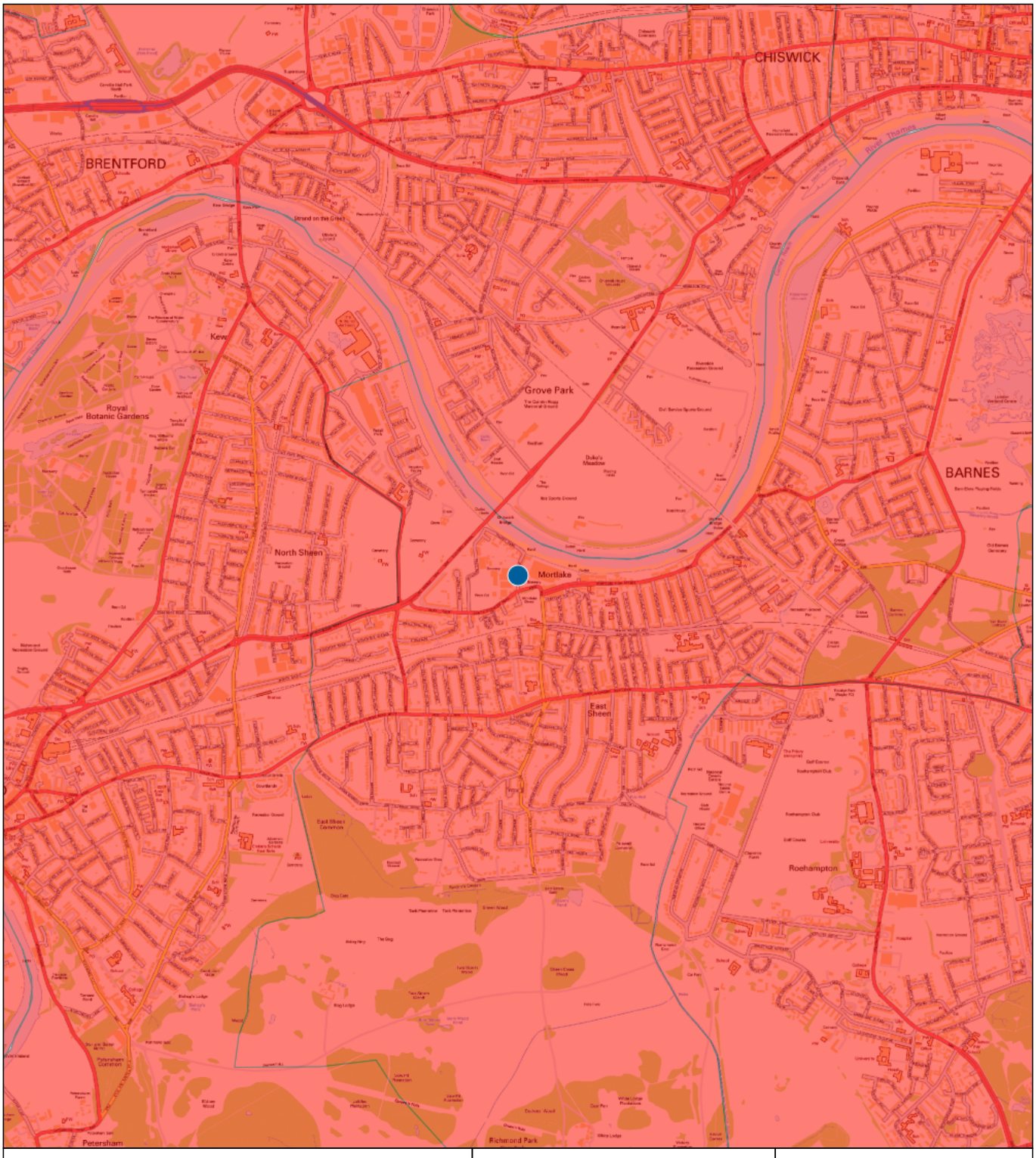
An Abandoned Bomb (AB) is a suspected unexploded WWII bomb or anti-aircraft projectile recorded during 1940-1945, but not definitively located/removed at the time.

A typical post-air raid survey of buildings, facilities and installations included a search for evidence of bomb entry holes. Where entry holes were identified, a bomb disposal team would usually be called upon to locate, render safe and dispose of any unexploded bomb (UXB). However, when the position of a UXB

was considered relatively benign, where access was problematic or resources short, the UXB may not have been exposed and rendered safe. Such incidents were noted AB.

Given the inaccuracy of WWII records the location of ABs cannot be considered definitive. The geographic location of ABs must therefore be regarded as approximate.

# 5 Risk of UXO based on WWII German bombing density



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DYNASAFE Area Clearance

FIND PROFESSIONAL MAPPING INTELLIGENCE

Map data

- NEGLIGIBLE
- LOW
- MEDIUM
- HIGH

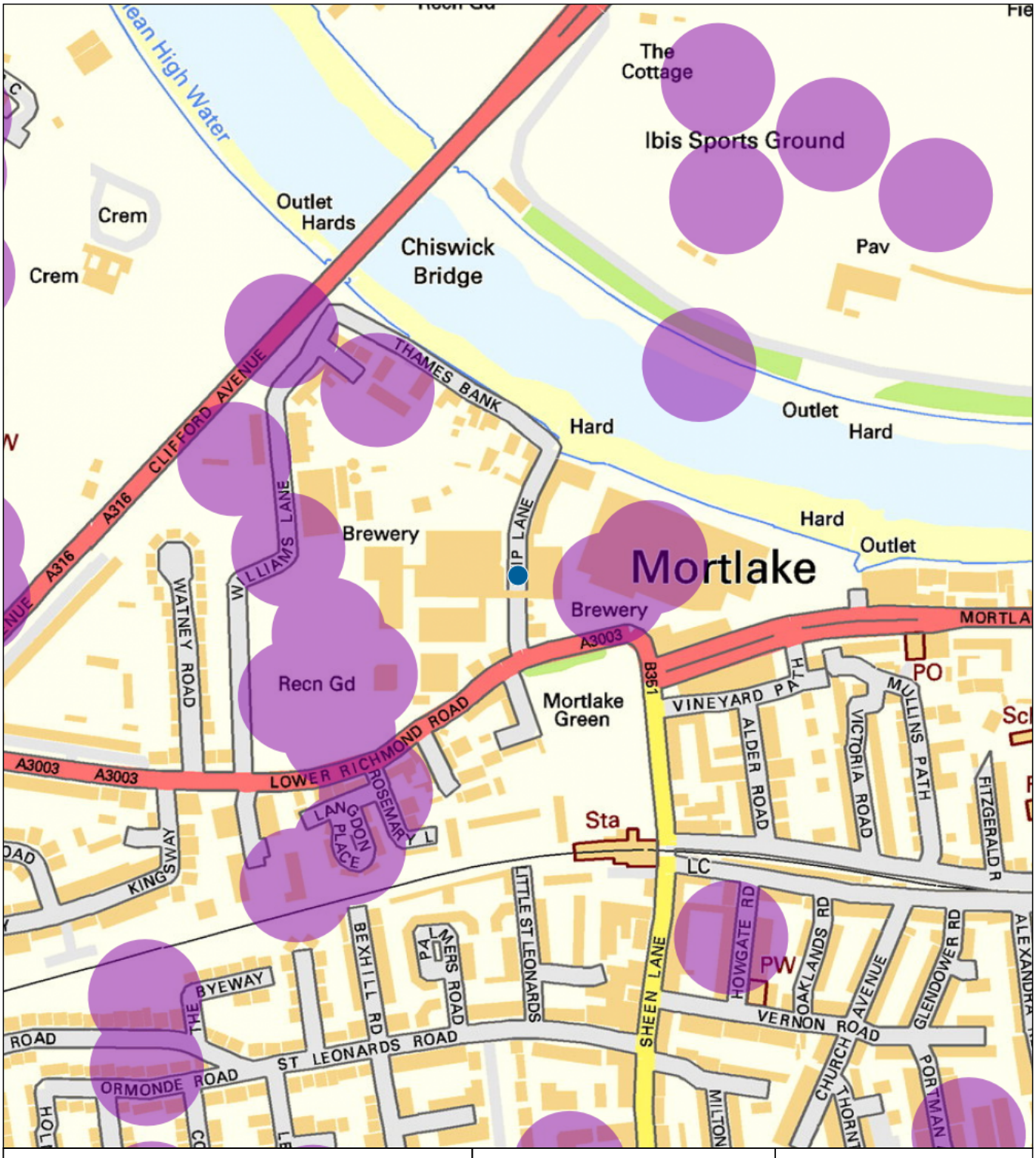
1:20000

N W E S

0 400 800

Metres

# 6 Risk of UXO based on WWII German bomb strikes



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**Dynasafe BACTEC Limited**

DYNASAFE Area Clearance

FIND PROFESSIONAL MAPPING INTELLIGENCE

Map data

BOMB STRIKES WITH BUFFER

1:5000

N W E S

0 100 200

Metres

# 7 Conclusions

## Risk Levels and Recommendation

### Indicative British / Allied UXO Risk

**LOW**

There are potential sources of British / Allied UXO recorded in Dynasafe BACTEC's historical database in the general area surrounding the site. However, they are not considered close enough to the site or significant enough to warrant further research. If there is any empirical evidence of actual or potential contamination, Dynasafe BACTEC should be contacted for advice. Otherwise, the risk on site from UXO is considered to be Low.

### Indicative German UXO Risk

**MEDIUM**

Historical records indicate that the borough within which the site was situated during WWII sustained an overall high density of bombing. However, no bomb strikes were recorded within 50m of the site on the London ARP Bomb Census Maps.

It is possible that bombs fell in the area after the main Blitz period, given the high density of bombing recorded over the region. It is recommended that further research is undertaken to ascertain historical land use on site and whether or not any damage was sustained.

This preliminary assessment has identified a Medium risk from German unexploded bombs at this site.

## Conclusion

This preliminary assessment has resulted in an overall Medium risk from UXO. Dynasafe BACTEC would recommend that a Detailed UXO Threat Assessment Desk Top Study is undertaken for this site.

Detailed assessments are conducted offline by Dynasafe BACTEC's researchers and use information such as historical mapping, WWII-era aerial photography, written air-raid precaution records and where necessary local archive research to fully qualify the risk on site. Land use, changes to building layout during WWII and post war redevelopment will also have an impact on any remaining level of risk from UXO. It is often possible to 'zone' sites into different risk categories. The lead time for a detailed assessment will vary between 3-10 working days dependent upon the complexity of the site and the additional site specific information required.

For a quotation, or more information, please contact Dynasafe BACTEC on 01322 284 550.

www.bombrisk.com

DYNASAFE
Area Clearance

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## Appendix D Risk Rating Matrix

Table D.1: Risk rating for contaminated land qualitative risk assessment

| Level of Severity | Likelihood | | |
|---|---|---|---|
| | Most Likely | Reasonably Foreseeable | Unlikely |
| Acute harm or severe chronic harm.<br>Direct pollution of sensitive water receptors or serious pollution of other water bodies. | High | High | Low |
| Harm from long-term exposure.<br>Slight pollution of sensitive receptors or pollution of other water bodies. | Medium | Medium | Low |
| No significant harm in either short or long term.<br>No pollution of water that is likely to affect sensitive receptors.<br>No more than slight pollution of other water bodies. | Low | Low | Low |

## Appendix E Environmental Receptors

The Contaminated Land Statutory Guidance has a four category system that considers harm to human health, controlled waters, flora and fauna, property, livestock and crops. The Categories are broadly defined as follows:

1 Contaminated Land – similar to land where it is known that significant harm has been caused or significant harm is being caused

2 Contaminated Land – no significant harm being caused but there is a significant possibility for significant harm to be caused in the future

3 Not Contaminated Land – there may be harm being caused but no significant possibility for significant harm to be caused in the future

4 Not Contaminated Land – no pollutant linkage, normal levels of contaminants and no significant harm being caused and no significant possibility for significant harm to be caused in the future.

Table E.1: Significant pollution to controlled waters

| |
|---|
| **Pollution of controlled waters** |
| Under Section 78A(9) of Part 2A the term "pollution of controlled waters means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term "controlled waters" in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that "ground waters" does not include water contained in underground strata but above the saturation zones. (Paragraph 4.36) |
| Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment. (Paragraph 4.37) |
| **Significant pollution of controlled waters** |
| Paragraph 4.38 states that "The following types of pollution should be considered to constitute significant pollution of controlled waters: |
| (a) Pollution equivalent to "environmental damage" to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations. |
| (b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use. |
| (c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway. |
| (d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)5)". |
| Paragraph 4.39 states that "In some circumstances, the local authority may consider that the following types of pollution may constitute significant pollution: (a) significant concentrations6 of hazardous substances or non-hazardous pollutants in groundwater; or (b) significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water; at an appropriate, risk based compliance point. The local authority should only conclude that pollution is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 (of the Contaminated Land Statutory Guidance). This would normally mean that the authority should conclude that less serious forms of pollution are not significant. In such cases the authority should consult the Environment Agency". |
| The following types of circumstance should not be considered to be contaminated land on water pollution grounds: |
| (a) The fact that substances are merely entering water and none of the conditions for considering that significant |

pollution is being caused set out in paragraphs 4.38 and 4.39 above are being met.

(b) The fact that land is causing a discharge that is not discernible at a location immediately downstream or down-gradient of the land (when compared to upstream or up-gradient concentrations).

(c) Substances entering water in compliance with a discharge authorised under the Environmental Permitting Regulations.

**Significant pollution of controlled waters is being caused**

In deciding whether significant pollution of controlled waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes ongoing pollution. For these purposes, the local authority should:

(a) Regard substances as having entered controlled waters where they are dissolved or suspended in those waters, or (if they are immiscible with water) they have direct contact with those waters on or beneath the surface of the water.

(b) Take the term “continuing to enter” to mean any measurable entry of the substance(s) into controlled waters additional to any which has already occurred.

(c) Take the term “likely to do so again” to mean more likely than not to occur again.

Land should not be determined as contaminated land on grounds that significant pollution of controlled waters is being caused where: (a) the relevant substance(s) are already present in controlled waters; (b) entry into controlled waters of the substance(s) from land has ceased; and (c) it is not likely that further entry will take place.

**Significant Possibility of Significant Pollution of Controlled Waters**

In deciding whether or not a significant possibility of significant pollution of controlled waters exists, the local authority should first understand the possibility of significant pollution of controlled waters posed by the land, and the levels of certainty/uncertainty attached to that understanding, before it goes on to decide whether or not that possibility is significant. The term “possibility of significant pollution of controlled waters” means the estimated likelihood that significant pollution of controlled waters might occur. In assessing the possibility of significant pollution of controlled waters from land, the local authority should act in accordance with the advice on risk assessment in Section 3 and the guidance in this sub-section.

In deciding whether the possibility of significant pollution of controlled waters is significant the local authority should bear in mind that Part 2A makes the decision a positive legal test. In other words, for particular land to meet the test the authority needs reasonably to believe that there is a significant possibility of such pollution, rather than to demonstrate that there is not.

Before making its decision on whether a given possibility of significant pollution of controlled waters is significant, the local authority should consider:

(a) The estimated likelihood that the potential significant pollution of controlled waters would become manifest; the strength of evidence underlying the estimate; and the level of uncertainty underlying the estimate.

(b) The estimated impact of the potential significant pollution if it did occur. This should include consideration of whether the pollution would be likely to cause a breach of European water legislation, or make a major contribution to such a breach.

(c) The estimated timescale over which the significant pollution might become manifest.

(d) The authority’s initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would

be likely to bring; and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action.

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

Table E.2: Significant harm to human health, ecological systems and property

| Relevant types of receptor | Significant harm | Significant possibility of significant harm |
|---|---|---|
| Human beings | The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (eg cancers); other diseases likely to have serious impacts on health; serious injury; birth defects; and impairment of reproductive functions.<br>Other health effects may be considered by the local authority to constitute significant harm. For example, a wide range of conditions may or may not constitute significant harm (alone or in combination) including: physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. In deciding whether or not a particular form of harm is significant harm, the local authority should consider the seriousness of the harm in question: including the impact on the health, and quality of life, of any person suffering the harm; and the scale of the harm. The authority should only conclude that harm is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 of the Contaminated Land Statutory Guidance. | The risk posed by one or more relevant contaminant linkage(s) relating to the land comprises:<br>(a) The estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question.<br>(b) The estimated impact if the significant harm did occur – i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it.<br>In estimating the likelihood that a specific form of significant harm might occur the local authority should, among other things, consider:<br>(a) The estimated probability that the significant harm might occur: (i) if the land continues to be used as it is currently being used; and (ii) where relevant, if the land were to be used in a different way (or ways) in the future having regard to the guidance on “current use” in Section 3 of the Contaminated Land Statutory Guidance.<br>(b) The strength of evidence underlying the risk estimate. It should also consider the key assumptions on which the estimate of likelihood is based, and the level of uncertainty underlying the estimate. |

| Relevant types of receptor | Significant harm | Significant possibility of significant harm |
|---|---|---|
| Any ecological system, or living organism forming part of such a system, within a location which is:<br>• a site of special scientific interest (under section 28 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Part 4 of the Natural Environment and Rural Communitites Act 2006 (as amended));<br>• a national nature reserve (under Section 35 of the WCA 1981 (as amended));<br>• a marine nature reserve (under Section 36 of the WCA 1981 (as amended));<br>• an area of special protection for birds (under Section 3 of the WCA 1981 (as amended));<br>• a "European site" within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010 (as amended);<br>• any habitat or site afforded policy protection under Section 11 of The National Planning Policy Framework (NPPF) on conserving and enhancing the natural environment (i.e. possible Special Areas of Conservation, potential Special Protection Areas and listed or proposed Ramsar sites); or<br>• any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949. | The following types of harm should be considered to be significant harm:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which significantly affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location.<br>In the case of European sites, harm should also be considered to be significant harm if it endangers the favourable conservation status of natural habitats at such locations or species typically found there. In deciding what constitutes such harm, the local authority should have regard to the advice of Natural England and to the requirements of the Conservation of Habitats and Species Regulations 2010 (as amended). | Conditions would exist for considering that a significant possibility of significant harm exists to a relevant ecological receptor where the local authority considers that:<br>• significant harm of that description is more likely than not to result from the contaminant linkage in question; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration.<br>Any assessment made for these purposes should take into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant. |
| Property in the form of:<br>• crops, including timber<br>• produce grown domestically, or on allotments, for consumption<br>• livestock<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage.<br>The local authority should regard a substantial loss in value as occurring | Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question, taking into account relevant information for that type of contaminant linkage, particularly |

| Relevant types of receptor | Significant harm | Significant possibility of significant harm |
|---|---|---|
| | only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss. In the Guidance states that this description of significant harm is referred to as an “animal or crop effect”. | in relation to the ecotoxicological effects of the contaminant. |
| Property in the form of buildings. For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables. | Structural failure, substantial damage or substantial interference with any right of occupation. The local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended.<br>In the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled.<br>The Guidance states that this description of significant harm is referred to as a 'building effect'. | Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument the foreseeable future), taking into account relevant information for that type of contaminant linkage. |

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

# UK and Ireland Office Locations