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SOLUTIONS LTD**

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

# BURLINGTON PROPERTY GROUP

Land at Carpenders Park

Phase I Geo-Environmental Assessment Report

TH/C5872/13882/Rev A

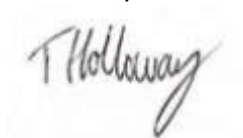
March 2025

## PROJECT QUALITY CONTROL DATA SHEET

|                       |                                             |            |                          |
|-----------------------|---------------------------------------------|------------|--------------------------|
| <b>Site Name:</b>     | Land at Carpenders Park                     |            |                          |
| <b>Document Name:</b> | Phase I Geo-Environmental Assessment Report |            |                          |
| <b>Reference:</b>     | TH/C5872/13882/Rev A                        |            |                          |
| <b>Status:</b>        | -                                           | 28/02/2025 | Final.                   |
|                       | Rev A                                       | 19/03/2025 | Update to site boundary. |
|                       |                                             |            |                          |

| <b>Issued By:</b>                                                                                                                                                    | <b>Client:</b>                                                                                            | <b>Engineer / Project Manager / Architect</b>                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Brownfield Solutions Ltd<br>William Smith House<br>173 – 183 Witton Street<br>Northwich<br>Cheshire<br>CW9 5LP<br><br>Tel: 01606 334 844<br>brownfield-solutions.com | Burlington Property Group<br>Foresters Hall<br>25-27 Westow Street<br>Upper Norwood<br>London<br>SE19 3RY | Boyer Planning<br>120 Bermondsey Street<br>London<br>SE1 3TX |
|                                                                                                                                                                      | Contact: Nathan Stevenson                                                                                 | Contact: Arjun Lal                                           |

Written by:



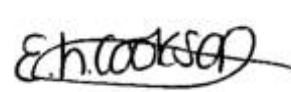
T Holloway  
BSc (Hons) FGS  
Project Engineer

Checked by:



A Dean  
BSc (Hons) FGS  
Principal Project Engineer

Approved by:



L Cookson  
BSc Ind (Hons) CSci MEnvSc FGS  
Senior Project Engineer

**CSci**  
Chartered  
Scientist



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## DRAWINGS

| Drawing Number     | Rev | Title                 |
|--------------------|-----|-----------------------|
| P24-2204_DE_001_01 | -   | Updated Site Boundary |
| C5872/01           | -   | Site Location Plan    |
| C5872/02           | -   | Site Features Plan    |

| APPENDICES  |                               |
|-------------|-------------------------------|
| Appendix    | Title                         |
| Photographs | Site Walkover Photographs     |
| Appendix A  | BSL Methodology and Guidance  |
| Appendix B  | Historical Maps               |
| Appendix C  | Geo-Environmental Data Report |
| Appendix D  | BGS Exploratory Hole Records  |
| Appendix E  | Mining Search Report          |
| Appendix F  | UXO Screening Map             |

## 1.0 INTRODUCTION

### 1.1 Context

This report describes a desk-based Phase I Geo-Environmental Assessment Report carried out by Brownfield Solutions Limited (BSL) for Burlington Property Group as instructed by Nathan Stevenson on a site Land at Carpenders Park, Watford, WD19 5RJ and has been completed in general accordance with the following guidance:

- 
- Environment Agency guidance - Land Contamination: Risk Management (LCRM) 2023.
  - BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
  - BS5930: 2015+A1:2020 Code of Practice for Ground Investigations.
  - BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design. General rules plus UK National Annex.
  - BS EN 1997-2:2007 Eurocode 7 Geotechnical design. Ground investigation and testing plus UK National Annex.
  - NHBC Standards. Chapter 4.1: Land Quality - Managing Ground Conditions.
- 

Definitions of terms and acronyms used within this report is presented in Section 7.0.

### 1.2 Proposed Development

The proposed development comprises a residential led mixed use development. An Environmental Impact Assessment (EIA) Screening request was submitted to Three Rivers District Council in January 2025 (Planning reference 25/0021/EIA) which notes the development to be mix used up to 260 homes, with care home, associated parking, open space, landscaping and vehicular access.

Since the time of writing we have been provided a different site boundary, the proposed development boundary now comprises a smaller section to the north of the stream only. While this doesn't significantly change the conclusions of this report it should be noted that some of the distances within this report, the historical maps and the geo-environmental data report will be different.

### 1.3 Objectives and Scope

The objectives of this assessment is to determine the environmental setting and ground conditions of the site, highlighting potential areas of concern that may govern the redevelopment.

The scope of works comprises a Phase I Assessment and site walk-over, with a review of the site, surroundings, historical uses and environmental setting to develop a preliminary Conceptual Site Model (CSM).

This report is intended to meet the requirements of a Preliminary Investigation as defined in BS10175:2011+A2:2017 and has been produced in general accordance with the recommendations for a Tier 1 Preliminary Risk Assessment as described in LCRM guidance.

### 1.4 Limitations

This Phase 1 Geo-Environmental Assessment Report has been prepared in accordance with the relevant legislative framework, guidance and risk assessment methodology as outlined in Appendix A.

The findings and opinions conveyed via this assessment are based on information obtained from several sources as detailed within this report, BSL have assumed this information is correct and reliable.

Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

BSL have used reasonable skill, care and diligence in the production of this report. There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore have not been taken into account by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, Burlington Property Group. No other third party may rely upon or reproduce the contents of this report without the written permission of BSL; a charge may be levied against such approval. If any unauthorised third party comes into possession of this report, then they rely on it at their own risk and BSL do not owe them any Duty of Care. This report may not be relied upon by the client or submitted to a third party for their reliance for the purposes of valuation, mortgage, insurance and regulatory approval, until all invoices have been settled in full.

Any recommendations made in this report should be confirmed with the Regulatory Authorities prior to implementation to ensure compliance.

This assessment has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Notwithstanding site observations concerning the presence or otherwise of archaeological issues, asbestos-containing materials (ACM) or invasive weeds (e.g. Japanese knotweed), this report does not constitute a formal survey of these potential issues and specialist advice should be sought.

## 2.0 THE SITE

### 2.1 Location

The site is located to the east of Oxhey Lane, Watford, WD19 5RJ, centred on National Grid Reference 512957, 193387 as shown on the Site Location Plan, Drawing No. C5872/01.

### 2.2 Site Description

A site reconnaissance survey was carried out at the site on 30<sup>th</sup> January 2025. The main site features and potential issues identified during this survey are detailed below and are shown on the Site Features Plan, Drawing No. C5872/02. A selection of photographs from the site walkover are presented to the rear of this report.

| Feature                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Area                                | Approximately 12.7ha.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Site Access                              | Access to the site is gained off Oxhey Lane to the west via a public footpath in the north-western corner of the site.                                                                                                                                                                                                                                                                                                                               |
| Site Overview Imagery                    |  <p>Orientated north-northwest</p> <p>Update from Google: All images: Imagery Google©2023, Imagery ©2023 Airbus, CNES / Airbus, Getmapping plc, Infoterra Ltd &amp; Bluesky, Maxar Technologies, The Geoinformation Group, Map data ©2023.</p>                                                                                                                     |
| Current Land Use and Site Features       | The site comprises five fields numbered on drawing C5872/02, demarcated by hedgerows and connected via various footpaths. There is no evidence of previous development or any structures across the site. There is a shallow stream which borders the southeast corner flowing towards the northwest before turning west and cutting across the centre of the site.                                                                                  |
| Potential Sources of Gross Contamination | None observed.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Vegetation / Ecology                     | There are sporadic mature and semi-mature oak trees across the site. Hawthorne hedgerows border the majority of the site and sporadic bramble bushes are also present across the site.                                                                                                                                                                                                                                                               |
| Topography                               | The site has a variable topography with numerous sloped areas present. Going from northwest to southeast through the site the topography rises through Field 1. The topography reduces through Fields 2 and 3. Utilising LiDAR layer <i>TQ19sw DTM 1m</i> the approximate gradients are 1:10 in Field 1, 1:24 in Fields 2 and 3. The maximum level on site is approximately 103m AOD in Field 1 with the lowest level on site approximately 79m AOD. |
| Site Boundaries                          | The site is bound predominantly by hawthorns hedgerows, mature and semi-mature oak trees and deciduous woodland (southern boundary)                                                                                                                                                                                                                                                                                                                  |
| Surrounding Area                         | The site is set within a mixed commercial, agricultural and residential area, bordered by an Environment Agency flood defence compound and a care home immediately west with a garden centre, cemetery and residential properties beyond. To the north and east there are open fields. Immediately south and east is a mix of deciduous woodland and open fields with a golf course beyond.                                                          |

### 3.0 GEO-ENVIRONMENTAL SETTING

#### 3.1 Historical Setting

A review of the available historical Ordnance Survey Maps and satellite imagery has been conducted, with the pertinent issues that may have affected the site, or its environs, summarised below. The Historical Maps are presented in Appendix B. A review of the historical industrial data within the geo-environmental data report has also been undertaken below, the report is presented in Appendix C.

Notable features on site, and potentially contaminative or geotechnically relevant features within 100m of the site boundary have been presented. Any features that have potentially been infilled will be considered up to 250m from the site boundary.

| Feature                        | Distance (m) & Direction | Years Present | Description                                                                                                                                                                      |
|--------------------------------|--------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Farm building                  | On site – Central field  | 1898          | A small structure is located in the central field likely associated with Carpenders Park Farm with an unknown use and is later not recorded so may have been demolished in situ. |
| Carpenders Park Farm           | Immediately W            | 1871-2010     | A farm is indicated to be present immediately west on the 1871 mapping and is no longer present on the 2010 mapping.                                                             |
| Pump House                     | 39m W                    | 1871-1898     | A Pump House is indicated to be present in the surrounding area on the 1871 mapping and is no longer present on the 1898 mapping.                                                |
| Unspecified Tanks              | 74-104m W                | 1913-1975     | Unspecified tanks are indicated to be present in the surrounding area between 1913-1975.                                                                                         |
| Gasometer                      | 81m W                    | 1895-1935     | A gasometer is indicated to be present 81m west of the site on the 1895 mapping and is no longer present on the 1935 mapping.                                                    |
| Potentially Infilled Reservoir | 120m W                   | 1895-1959     | A reservoir is indicated to be present on the 1895 mapping and is no longer present on the 1959 mapping, believed to have been infilled prior to this date.                      |

In summary, the map evidence indicates that the site has remained as open fields, assumed to be agricultural associated with Carpenders Park Farm, from 1865 up until the present day. There is a stream on site flowing across the central area from east to west.

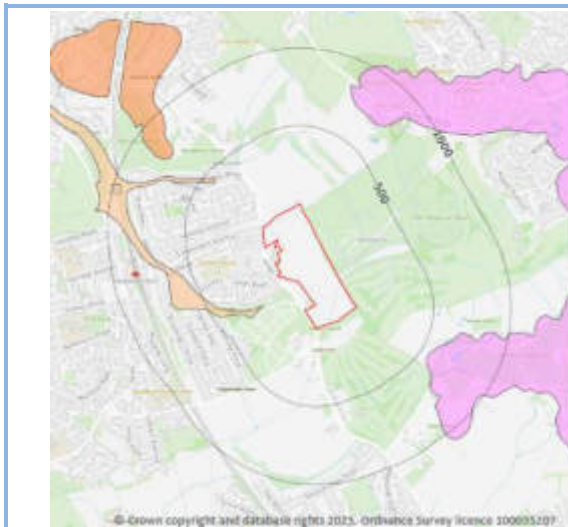
Historical land use in the surrounding area has been a mixture of commercial, agricultural and residential land uses.

#### 3.2 Published Geology

The following publications of the British Geological Survey (BGS) were examined in respect of the geology underlying the site:

- British Geological Survey (BGS) 1:50,000 Scale Geological Map Sheet 256 North London. Bedrock and Superficial Edition.
- BGS Geology of Britain Map Viewer.
- BGS GeoIndex Onshore.
- Geo-Environmental Data Report.

Extracts of the 1:10,000 geological mapping from the Geo-Environmental Data Report are presented below for reference:

**BGS 1:10 000 Superficial Geology**


Key:

 River Terrace Deposits

**BGS 1:10 000 Solid Geology**


Key:

 London Clay Formation

**Made Ground**

BGS mapping does not display any made ground deposits on site.

**Superficial Deposits**

The site is indicated to not be underlain by Superficial Deposits.

The closest mapped Superficial Deposits are River Terrace Deposits (Sand and Gravel) 212m southwest of the site. This appears to be associated with the watercourse which subsequently runs through the site.

**Solid Geology**

The deeper solid geology is indicated to be part of the London Clay Formation which typically comprises clay, silt and sand.

No faults are shown on or within an influencing distance of the site.

### 3.3 BGS Exploratory Hole Records

There is one BGS exploratory hole record within a relevant distance of the site (assumed as an approximate 50m radius). This record contains logs of four boreholes in close proximity to each other which are associated with Carpenders Park.

A summary of the ground conditions is presented in the table below.

| Reference    | Distance from Site (m) and Direction | Borehole Number | Depth Made Ground (m)                                                                                    | Depth Superficial Deposits (m) | Depth Solid Geology (m)                                    |
|--------------|--------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------|
| TQ19SW37/A-D | 20m W                                | 1               | GL-0.90 – silty clay with brick fragments and flint                                                      | N/A                            | 0.90-3.20 – firm becoming firm to stiff brown clay         |
|              |                                      | 2               | GL-0.90 – sandy silty clay with brick, coke, wood<br>0.90-1.20 – brick, concrete, slate with silty clay. |                                | 1.20-3.00 – soft to firm becoming firm to stiff brown clay |

| Reference | Distance from Site (m) and Direction | Borehole Number | Depth Made Ground (m)                                          | Depth Superficial Deposits (m) | Depth Solid Geology (m)                                    |
|-----------|--------------------------------------|-----------------|----------------------------------------------------------------|--------------------------------|------------------------------------------------------------|
|           |                                      | 3               | GL-1.00 – silty clay with brick, ash, coal, concrete and flint |                                | 1.00-3.20 - soft to firm becoming firm to stiff brown clay |
|           |                                      | 4               | GL-0.45 – clay with tile, coke and slate                       |                                | 0.45-3.20 – soft becoming firm clay                        |

The BGS Borehole Logs are presented in Appendix D.

### 3.4 Mining and Mineral Extraction

The site is outside the area of a designated coalfield or brine extraction area and no further consideration of coal mining/brine related risks is required.

### 3.5 Hydrogeology

Based on the inferred geology, a summary of the Environment Agency aquifer designations is presented in the table below:

| Stratum               | Coverage  | Aquifer Designation                                                                                                                                       |
|-----------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| London Clay Formation | Full Site | Unproductive Strata. These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. |

A summary of the pertinent hydrogeological features within the Geo-Environmental Data Report are provided below:

| Feature                                        | Distance (m) & Direction | Details                                          |
|------------------------------------------------|--------------------------|--------------------------------------------------|
| Nearest Active Groundwater Abstraction         | -                        | None within 2000m.                               |
| Nearest Active Potable Groundwater Abstraction | -                        | None within 2000m.                               |
| Source Protection Zones                        | On site                  | Zone 2 Outer Catchment<br>Zone 3 Total Catchment |

### 3.6 Hydrology

A summary of the pertinent hydrological aspects within the Geo-Environmental Data Report are provided below:

| Feature                                   | Distance (m) & Direction | Details                                |
|-------------------------------------------|--------------------------|----------------------------------------|
| Nearest Watercourse                       | 50m S                    | River Hartsbourne flowing east to west |
| Nearest Surface Water Abstraction         | -                        | None within 2000m.                     |
| Closest Active Licenced Discharge Consent | -                        | None within 2000m.                     |

Information obtained from the Environment Agency (EA) Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates that the risk of flooding across the entire site is a negligible risk of flooding from rivers and the sea.

The site does not lie within an EA designated Zone 2 / Zone 3 flood plain. The southern boundary of the site borders areas of land within an EA designated Zone 2 / Zone 3 flood plain.

To the south of the site adjacent to the north and south of the closest water course is noted to be used for flood storage, with flood defences noted to be present off site to the southwest.

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regards to drainage and flooding.

### 3.7 Landfill and Waste Management Sites

There is one recorded historic landfill within 500m, is recorded 447m northwest at Oxhey Lane registered to S J Simmons, stated to accept Inert wastes between 1939 to 1957.

There are no current waste management sites recorded within 250m of the site.

### 3.8 Environmental Regulatory Data

A summary of the relevant environmental aspects, both on site and within 250m of the site contained in the Geo-Environmental Data Report, are presented in the table below:

| Entry                                      | On-site | 0 – 50m | 50 – 250m | Details                                                                                             |
|--------------------------------------------|---------|---------|-----------|-----------------------------------------------------------------------------------------------------|
| Recent Industrial Land Uses                | 2       | 1       | 5         | The onsite entries are associated with pylons. A substation is listed as being 165m SW of the site. |
| Current or Recent Fuel Stations            | -       | -       | -         | None                                                                                                |
| Licensed Industrial Activities (Part A(1)) | -       | -       | -         | None                                                                                                |
| Licensed Pollutant Release (Part A(2)/B)   | -       | -       | -         | None                                                                                                |
| Radioactive Substances                     | -       | -       | -         | None                                                                                                |
| Pollution Incidents (EA/NRW)               | -       | -       | -         | None                                                                                                |

In regard to the entries identified above, based on the uses listed, alongside distances and ages, none are considered to be of significant relevance to be carried forward to the preliminary CSM and have not been considered further.

### 3.9 Radon

Information from the environmental database report indicates the property is in an area where <1% properties are above the Action Level for radon, and therefore radon protective measures are not required in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings'.

### 3.10 UXO Risk

In accordance with CIRIA Report C681, BSL have reviewed non-specialist UXO data for the site using the online Zetica Bomb Risk Mapping data.

There is no indication of former military use from the Phase I Assessment. The map indicates the site to be in an area where the bomb risk is moderate due to the site being located in London. A copy of the map is presented in Appendix E.

A preliminary risk assessment has been undertaken for the site. The preliminary assessment recommends a detailed risk assessment in accordance with CIRIA Report C681 is recommended due to a history of military use. The preliminary assessment is presented in Appendix F.

A summary of the relevant points from the detailed UXO Desk Study completed by 1<sup>st</sup> Line Defence (reference PA21381-00) is presented below:

- 
- Overall low bombing density during WWII.
  - Numerous bombing incidents recorded within this part of Watford.
  - The undeveloped nature of the site can increase the likelihood that UXO items go unnoticed.
  - Further research is recommended.
- 

Intrusive works on site may also require supervision by a UXO specialist.

### **3.11 Other Potential Development Constraints**

No invasive species have been noted during the walkover; however, it would be prudent to undertake a specialist survey prior to any works on site.

There are known services on site, these may need to be disconnected prior to any construction activities. A high voltage pylon is present in the southern area of the site, with the cables trending in a northeast to southwest direction.

## 4.0 PHASE 1 SUMMARY AND RISK ASSESSMENT

### 4.1 Introduction

The risk posed by any contaminants in soil or groundwater will depend on the nature and level of the source, the probability of exposure occurring, the potential pollution pathway and the likely effects on the receptors.

A contaminant is defined as a substance that has the potential to cause harm, a risk is considered to exist if such a substance is present at sufficient concentrations to cause harm and if a pathway is present through which a receptor could be exposed to the contaminant.

The following sections discuss the identified potential on-site and off-site sources, and any pollution that could impact receptors via the pathways associated with the proposed development. Pollution linkages are assessed which may represent a risk to human health and/or controlled water receptors from the information gained from the Phase I Assessment searches. The assessment has been carried out on a qualitative basis and aims to produce a complete and comprehensive Preliminary Conceptual Site Model.

Three potential impacts exist for any given site and all three need to be considered in the qualitative risk assessment, these are:

- 
- On-site impacts.
  - The site impacting its surroundings.
  - Off-site sources impacting the subject site.
- 

### 4.2 Potential Contaminative Sources

#### *On-Site*

From the information obtained, the following sources have been identified which may affect the redevelopment of the site for residential end use:

- 
- Made ground associated with demolition of single farm building present circa 1898
  - Herbicides and pesticides associated with the former Carpenders Park Farm.
- 

#### *Off-Site*

The following off-site sources have been identified which may affect the redevelopment of the site:

- 
- Pump House (39m W) – 1871-1898
  - Unspecified Tanks (71-104m W) – 1913-1975
  - Gasometer (81m W) – 1895-1935
  - Potentially Infilled Reservoir (120m W) – 1895-1959
- 

Given the ages of the Pump House and Gasometer neither source is considered to pose a potential risk to the subject site and therefore have not been considered further.

The potentially infilled reservoir not considered to pose a potential risk due to the distance from the site, the time since its potentially infilling and the likely impermeable nature of the geology in the area which would prevent ground gas migration. It also appears to be a small reservoir and likely to have a very low gas generation potential.

With an anticipated groundwater flow to the west the unspecified tanks located to the west of the site are not considered to pose a potential risk to the subject site as they are located down the hydraulic gradient and; therefore, have not been considered further.

#### *Associated Contaminants*

The contaminants commonly associated with the potential sources of contamination identified are tabulated below:

| Contaminative Sources | Department of the Environment Industry Profile or Other Source | Commonly Associated Contaminants                                                                            |
|-----------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>On Site</b>        |                                                                |                                                                                                             |
| Made Ground           | AGS Guides BS8485 and BS8576                                   | Heavy metals, polycyclic aromatic hydrocarbons (PAHs), asbestos, ground gases (carbon dioxide and methane). |
| Farm use of land      | -                                                              | Herbicides and Pesticides.                                                                                  |

### 4.3 Pathways

A pathway is defined as a medium by which a contaminant comes into contact with or otherwise impacts a receptor.

At this stage the potential contaminants identified above are considered to present potential risks to site end users and controlled waters through the following pathways:

| Potential Pathways                                       |                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pathways in respect to Human Health                      | <ul style="list-style-type: none"> <li>• Ingestion of contaminated soils.</li> <li>• Dermal contact with contamination.</li> <li>• Inhalation of dusts.</li> <li>• Root uptake from produce.</li> <li>• Inhalation of gases or vapours in both indoor and outdoor air.</li> </ul> |
| Pathways in respect to Controlled Waters – Surface water | <ul style="list-style-type: none"> <li>• Surface run-off /over land flow.</li> <li>• Drainage discharge.</li> <li>• Base flow from groundwater.</li> </ul>                                                                                                                        |
| Pathways in respect to Property/structures/water pipes   | <ul style="list-style-type: none"> <li>• Direct contact with substances deleterious to building materials and potable water supply pipelines.</li> <li>• Migration of ground gases (methane) into confined spaces (explosion and damage to property).</li> </ul>                  |

### 4.4 Receptors

The identified receptors are listed below:

- Residential end users (human health).
- Structures/Property/Potable water supply pipes.
- Nearest watercourse. River Hartsbourne, present 50m S (Controlled waters).
- Bedrock Aquifer. Unproductive Strata, London Clay Formation (Controlled waters).

Under current UK health and safety legislation, employers are required to carry out their own appropriate site-specific risk assessments and mitigation to protect employees. It has been assumed that any future construction works onsite will be undertaken in compliance with these requirements. Therefore, construction workers have not been specifically considered as part of this assessment.

#### 4.5 Preliminary Conceptual Site Model (CSM)

The information obtained in the previous sections has been used to compile a Preliminary CSM. The identified potential contaminants and receptors have been assessed in the table below as to whether a plausible source-pathway-receptor pollutant linkage for the proposed end use of the site exists. The risk classification has been estimated in accordance with information in the BSL Guidance and Methodology in Appendix A.

The Preliminary CSM's are presented in the tables overleaf, any assessed risk above moderate will possibly require further action:

| Initial Conceptual Site Model                                                                              |                                                                       |                                   |                |          |                |                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------|----------------|----------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential Source                                                                                           | Potential Pathway                                                     | Potential Receptor                | Likelihood     | Severity | Level of Risk  | Justification                                                                                                                                                                                                                                                                                                                                                                                |
| <b>On site<br/>Made Ground<br/>from Former<br/>Buildings</b><br>Metals, PAHs,<br>asbestos                  | Root uptake, ingestion, direct contact, inhalation of dusts           | End-users                         | Low Likelihood | Medium   | Moderate / Low | Gross contamination is not anticipated to be present at the site, however could be present locally in the area of former farm buildings.<br>If present, contamination could come into direct contact with future site users. Risks are considered to be moderate / low and further investigation and assessment will be required to confirm.                                                 |
|                                                                                                            | Migration into/chemical attack of water supply pipelines              | Water Pipelines / End users       | Unlikely       | Medium   | Low            | Gross contamination is not anticipated to be present at the site, however could be present locally in the area of former farm buildings.<br>If present, contaminants within the soil/groundwater could potentially attack the clean potable water supply pipe, contaminants should be assessed to determine the correct pipe material and level of precautions required.                     |
| <b>On site<br/>Made Ground<br/>from Former<br/>Buildings</b><br>Ground Gas<br>(carbon dioxide and methane) | Migration into confined spaces, inhalation and asphyxiation/explosion | End-users / property / structures | Unlikely       | Medium   | Low            | Potential made ground associated with the former farm could have the potential to generate ground gas. However, this has been considered unlikely as the generation of hazardous ground gases would require significant thicknesses of organic rich material. Ground investigation will confirm the presence and nature of made ground at the site to allow further assessment of this risk. |
| <b>On site<br/>Farm Land Use</b><br>Herbicides and Pesticides                                              | Root uptake, ingestion, direct contact, inhalation of dusts           | End-users                         | Unlikely       | Medium   | Low            | The use of herbicides and pesticides for agricultural use is likely to be limited and in line with current best practice. Contamination associated with these sources are unlikely to be present in significant volumes. Risks are assessed as being low.                                                                                                                                    |

| Controlled Waters                                             |                                                                      |                                            |            |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------|------------|----------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential Source                                              | Potential Pathway                                                    | Potential Receptor                         | Likelihood | Severity | Level of Risk | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>On site<br/>Made ground<br/>Metals, PAHs,<br/>asbestos</b> | Surface run-off /over land flow                                      | River Hartsbourne                          | Unlikely   | Medium   | Low           | Contaminants within any shallow made ground have the potential to create run off which may impact the River Hartsbourne. It is considered this is unlikely, the site unlikely has widespread made ground, and gross contamination if present is likely localised.                                                                                                                                                                                                                    |
|                                                               | Leaching through unsaturated zone / Migration through saturated zone | Bedrock Unproductive Aquifer (Groundwater) | Unlikely   | Medium   | Low           | There are no groundwater abstraction licences near the site and the London Clay Formation is classified as unproductive strata indicating that groundwater here is not sensitive.<br>The nature of the proposed development will include hardstanding and new drainage systems which will reduce infiltration potential of any residual contamination at the site, though it is noted that gross contamination is not anticipated to be present.<br>Risks are assessed as being low. |

*Human Health Risk – Soils Contamination Summary*

Based on the preliminary CSM and the current use of the site, the overall risk from land contamination at the site is considered to be **moderate to low** for a redeveloped site. This would need to be confirmed by appropriate intrusive investigation, testing and assessment.

*Human Health Risk – Ground Gas Summary*

A potential on site gas source has been identified associated with made ground on site. Potentially viable linkages are considered to exist, however, these are considered to be unlikely and the preliminary CSM considers these sources to be of **low** risk.

In accordance with BS8576 and CIRIA C665 as set out in Appendix A of this report, the gas generation potential is considered to be very low. The sensitivity of the development is high on account of the proposed residential use.

Adopting the CL:AIRE RB17 approach, where natural soils with low organic content are present and there is generally less than 1m of made ground with no significant putrescible material, this is not considered to represent a significant ground gas source, therefore no gas monitoring is required and the site would fall into the definition of Characteristic Situation 1 (CS1), with no protection measures required.

Aside from the made ground, there are no other viable sources of permanent ground gases. Should significant depths of made ground or putrescible material be encountered during any site investigations then this assessment should be revised and ground gas monitoring may be required.

The above assessed level of risk will need to be confirmed by intrusive investigation and quantitative risk assessment.

*Controlled Waters Risk Summary*

A potential source of contamination within made ground that may be present on site was noted to pose a possible risk to the nearby River Hartsbourne via a surface water run off pathway. It is considered unlikely that any gross contamination of made ground would be widespread at the site and therefore this source is considered to be of **low** risk.

The above assessed level of risk will need to be confirmed by intrusive investigation and quantitative risk assessment.

## **5.0 PRELIMINARY GEOTECHNICAL ASSESSMENT**

### **5.1 Hazard Identification**

A preliminary geotechnical hazard identification exercise has been undertaken in general accordance with the Highways England document CD 622, 'Managing geotechnical risk'. Potential geotechnical hazards based on the expected ground conditions are listed below:

- Made ground of unknown nature; if placed in a non-engineered manner may cause excessive settlement of foundations, highways and infrastructure.
- Low strength, compressible ground (peat and soft organic clays); may cause excessive settlement of foundations, highways and infrastructure.
- Attack of buried concrete by aggressive ground conditions; the site likely contains potentially sulphate bearing soils in relation to the London Clay Formation.
- Shrink / swell of clay; settlement / heave of foundations and floor slabs when located within the influence of trees and vegetation.
- Shallow groundwater/groundwater rise causing resulting in difficulties with excavations due to trench collapse.
- Slope instability; the site has various areas of sloping ground which may be unstable when cut.
- Flooding; the centre of the site where a stream cuts across the site lies within an EA designated Zone 2 and Zone 3 flood plain.
- UXO; the site lies within an area at moderate risk from unexploded ordnance.

The above identified geotechnical hazards will need to be considered as part of further investigations and assessments.

### **5.2 Foundation and Geotechnical Design**

The proposed development will comprise residential housing and other mixed use buildings of unknown sizes and heights. The type of foundation solution should be informed by an onsite intrusive investigation to confirm ground conditions and obtain geotechnical parameters for to assist with foundation and floor slab design. Intrusive investigation should also obtain data to allow appropriate concrete classification in accordance with BRE SD1 and for preliminary highways/pavement design.

### **5.3 Drainage**

Given the site is underlain by low permeability clays and within flood zones, it is unlikely that drainage to SuDS such as traditional soakaways will be suitable.

### **5.4 Recommendations**

To confirm the ground conditions in respect to the identified potential geotechnical hazards and risks, an appropriate intrusive investigation will need to be undertaken.

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Geo-Environmental Summary**

The site has remained open fields since the date of earliest mapping available, the overall risk to human health from on site soils contamination is considered to be low to moderate.

The risk from permanent ground gases is considered to be low/moderate.

Radon is not considered to pose a risk and protection will not be required.

The overall risk to controlled waters is considered to be low.

Intrusive investigations will be required to confirm the above assessed levels of risks and determine remedial requirements, if any.

### **6.2 Geotechnical Summary**

Intrusive investigations will be required to confirm the most suitable foundation solution and to obtain parameters for concrete classification, floor slab and highways design.

Drainage to SuDS is unlikely to be a viable option for the site, subject to intrusive investigation and testing.

### **6.3 Further Work**

To confirm the risks to the identified receptors and confirm the ground conditions in respect to the identified geotechnical and geo-environmental risks, an appropriate intrusive investigation will need to be undertaken. The following further works are recommended, although this list is not exhaustive and should be read in conjunction with any planning conditions that are applicable to the site:

- 
- Topographical survey / utility mapping.
  - Obtain Detailed UXO Desk Study.
  - Intrusive ground investigation comprising:
    - Trial pitting and boreholes (depth of boreholes to depend on development scale)
    - Installation of standpipes in boreholes to allow ground gas monitoring if required.
    - The undertaking of soil infiltration rate testing.
    - Geotechnical testing of soils.
    - Contamination analyses of soil.
  - Assessment and recommendations based on the above, including requirements for further work, if necessary.
-

## 7.0 ABBREVIATIONS AND DEFINITIONS

| GLOSSARY            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Term / Abbreviation | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| AST                 | Above Ground Storage Tank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| B(a)P               | Benzo (a) Pyrene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| BGS                 | British Geological Survey.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| BRE                 | Building Research Establishment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| BS                  | British Standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| BSL                 | Brownfield Solutions Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| BTEX                | Benzene, Toluene, Ethylbenzene, Xylenes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| CBR                 | California Bearing Ratio (used in pavement/highways design).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| CAR 2012            | Control of Asbestos Regulations (2012).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CBCB                | Cheshire Brine Compensation Board.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| CBCD                | Cheshire Brine Compensation District.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CBR                 | California Bearing Ratio.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| CIEH                | Chartered Institute of Environmental Health.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| CIRIA               | Construction Industry Research Association.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CL:AIRE             | Contaminated Land: Applications in Real Environments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CLEA                | Contaminated Land Exposure Assessment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| CLO                 | Contaminated Land Officer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| COMAH               | Control of Major Accident Hazards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Contamination       | <p>Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. There is no assumption in this definition that harm results from the presence of the contamination.</p> <p>Naturally enhanced concentrations of harmful substances can fall within this definition of contamination.</p> <p>Contamination may relate to soils, surface water, groundwater or ground gas.</p>                                                                                                                                                                                                                                                                                                                                                                                                         |
| Controlled Waters   | Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three-mile limit of territorial waters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CPT                 | Cone Penetration Test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| CSM                 | Conceptual Site Model. A schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. The conceptual site model is initially derived from the information obtained by the preliminary investigation (i.e. the Phase I Phase I Assessment). This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of intrusive investigations can provide additional data that can be used to further refine the conceptual site model. |
| DCP                 | Dynamic Cone Penetrometer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DNAPL               | Dense Non-Aqueous Phase Liquid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| DoWCoP              | Definition of Waste Code of Practice.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| DWS                 | Drinking Water Standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| EA                  | Environment Agency.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| EHO                 | Environmental health Officer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| EQS                 | Environmental Quality Standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| GAC                 | Generic Assessment Criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| GLOSSARY               |                                                                                                                                                                                                                              |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Term / Abbreviation    | Definition                                                                                                                                                                                                                   |
| <b>GDR</b>             | Geotechnical Design Report.                                                                                                                                                                                                  |
| <b>GFR</b>             | Geotechnical Feedback Report.                                                                                                                                                                                                |
| <b>GIR</b>             | Ground Investigation Report.                                                                                                                                                                                                 |
| <b>GSV</b>             | Gas Screening Value.                                                                                                                                                                                                         |
| <b>Harm</b>            | Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case of human health, including property/structures and water supply pipelines.         |
| <b>Hazard</b>          | Inherently dangerous quality of a substance, procedure or event.                                                                                                                                                             |
| <b>HDPE</b>            | High Density Polyethylene.                                                                                                                                                                                                   |
| <b>HSV</b>             | Hand Shear Vane.                                                                                                                                                                                                             |
| <b>K</b>               | Modulus of Subgrade Reaction.                                                                                                                                                                                                |
| <b>LCRM</b>            | Land Contamination: Risk Management (EA guidance).                                                                                                                                                                           |
| <b>LNAPL</b>           | Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene).                                                                                                                                                                   |
| <b>LOD</b>             | Limit of Detection (for particular method adopted).                                                                                                                                                                          |
| <b>MMP</b>             | Materials Management Plan.                                                                                                                                                                                                   |
| <b>Mv</b>              | Modulus of Volume of Compressibility.                                                                                                                                                                                        |
| <b>ND</b>              | Not Detected.                                                                                                                                                                                                                |
| <b>NHBC</b>            | National House Building Council.                                                                                                                                                                                             |
| <b>NR</b>              | Not Recorded.                                                                                                                                                                                                                |
| <b>OS</b>              | Ordnance Survey.                                                                                                                                                                                                             |
| <b>PAH</b>             | Polycyclic Aromatic Hydrocarbon.                                                                                                                                                                                             |
| <b>Pathway</b>         | Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.                                                                                                                         |
| <b>PCB</b>             | Poly-Chlorinated Biphenyl.                                                                                                                                                                                                   |
| <b>PCSM</b>            | Preliminary Conceptual Site Model.                                                                                                                                                                                           |
| <b>pH</b>              | Scale used to specify how acidic or basic a water-based solution is.                                                                                                                                                         |
| <b>PHC</b>             | Petroleum Hydrocarbons.                                                                                                                                                                                                      |
| <b>PID</b>             | Photo Ionisation Detector.                                                                                                                                                                                                   |
| <b>PNEC</b>            | Predicted No-Effect Concentration.                                                                                                                                                                                           |
| <b>Precision</b>       | Level of agreement within a series of measurements of a parameter.                                                                                                                                                           |
| <b>PSD</b>             | Particle Size Distribution.                                                                                                                                                                                                  |
| <b>PVC</b>             | Polyvinyl Chloride.                                                                                                                                                                                                          |
| <b>Receptor</b>        | Human health, living organisms, ecological systems, controlled waters (surface waters and groundwater within aquifers), atmosphere, structures and utilities that could potentially be adversely affected by contaminant(s). |
| <b>Risk</b>            | Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.                                                                                                                       |
| <b>Risk Assessment</b> | Process of establishing, to the extent possible, the existence, nature and significance of risk.                                                                                                                             |
| <b>Sampling</b>        | Methods and techniques used to obtain a representative sample of the material under investigation.                                                                                                                           |
| <b>SOM</b>             | Soil Organic Matter.                                                                                                                                                                                                         |
| <b>Source</b>          | Location from which contamination is, or was, derived. This could possibly be the location of the highest soil, groundwater or gas concentration of the contaminant(s).                                                      |
| <b>SPT</b>             | Standard Penetration Test.                                                                                                                                                                                                   |
| <b>SVOCs</b>           | Semi Volatile Organic Compounds.                                                                                                                                                                                             |
| <b>TOC</b>             | Total Organic Carbon.                                                                                                                                                                                                        |
| <b>TPH CWG</b>         | Total Petroleum Hydrocarbon (Criteria Working Group).                                                                                                                                                                        |

| GLOSSARY               |                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Term / Abbreviation    | Definition                                                                                                                                                     |
| TVOCs                  | Total volatile organic compounds.                                                                                                                              |
| UCS                    | Unconfined Compressive Strength.                                                                                                                               |
| Uncertainty            | Parameter, associated with the result of a measurement that characterises the dispersion of the values that could reasonably be attributed to the measurement. |
| UST                    | Underground Storage Tank.                                                                                                                                      |
| UXO                    | Unexploded Ordnance.                                                                                                                                           |
| VCCs                   | Vibro Concrete Columns.                                                                                                                                        |
| VSCs                   | Vibro Stone Columns                                                                                                                                            |
| VOCs                   | Volatile Organic Compounds.                                                                                                                                    |
| WAC                    | Waste Assessment Criteria.                                                                                                                                     |
| WFD (in waste context) | Waste Framework Directive.                                                                                                                                     |
| WFD (in water context) | Water Framework Directive.                                                                                                                                     |
| Units                  | Definition                                                                                                                                                     |
| °                      | Degrees                                                                                                                                                        |
| Φ                      | Phi angle (in degrees)                                                                                                                                         |
| g/l                    | Grams per Litre                                                                                                                                                |
| Km                     | Kilometres                                                                                                                                                     |
| kPa                    | Kilo Pascal (Equivalent to kN/m <sup>2</sup> )                                                                                                                 |
| KN/m <sup>2</sup> /mm  | Kilo Newton per metered squared per millimeter                                                                                                                 |
| kN/m <sup>2</sup>      | Kilo Newtons per metre squared                                                                                                                                 |
| kPa                    | Kilo Pascal (Equivalent to kN/m <sup>2</sup> )                                                                                                                 |
| l/hr                   | Litres per hour                                                                                                                                                |
| MJ/kg                  | Mega joule per kilogram                                                                                                                                        |
| MN                     | Mega Newton                                                                                                                                                    |
| M <sup>2</sup> /MN     | Mega Newton per metre squared                                                                                                                                  |
| M                      | Metres                                                                                                                                                         |
| m bgl                  | Metres Below Ground Level                                                                                                                                      |
| m OD                   | Metres Ordnance Datum (sea level)                                                                                                                              |
| µg/l                   | Micrograms per Litre (parts per billion)                                                                                                                       |
| µm                     | Micrometre                                                                                                                                                     |
| mb                     | Millibars (atmospheric pressure)                                                                                                                               |
| mg/kg                  | Milligrams per kilogram (parts per million)                                                                                                                    |
| mg/m <sup>3</sup>      | Milligram per metre cubed                                                                                                                                      |
| mm                     | Millimetre                                                                                                                                                     |
| ppb                    | Parts Per Billion                                                                                                                                              |
| Ppm                    | Parts Per Million                                                                                                                                              |

## 8.0 REFERENCES

References used in the production of this report are listed below; note not all of the below are relevant to the subject site and may not have been utilised.

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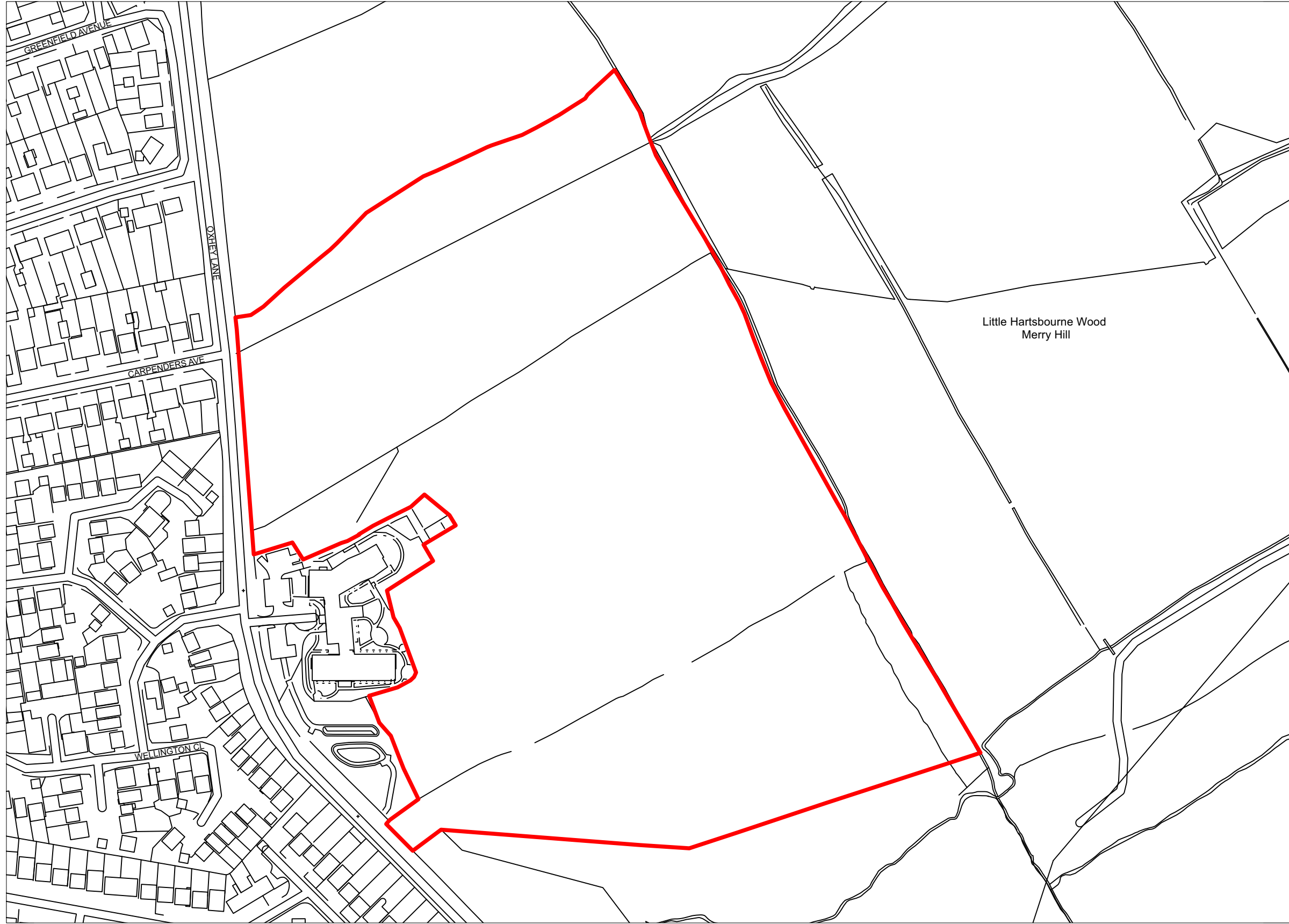
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## DRAWINGS

ISSUE:

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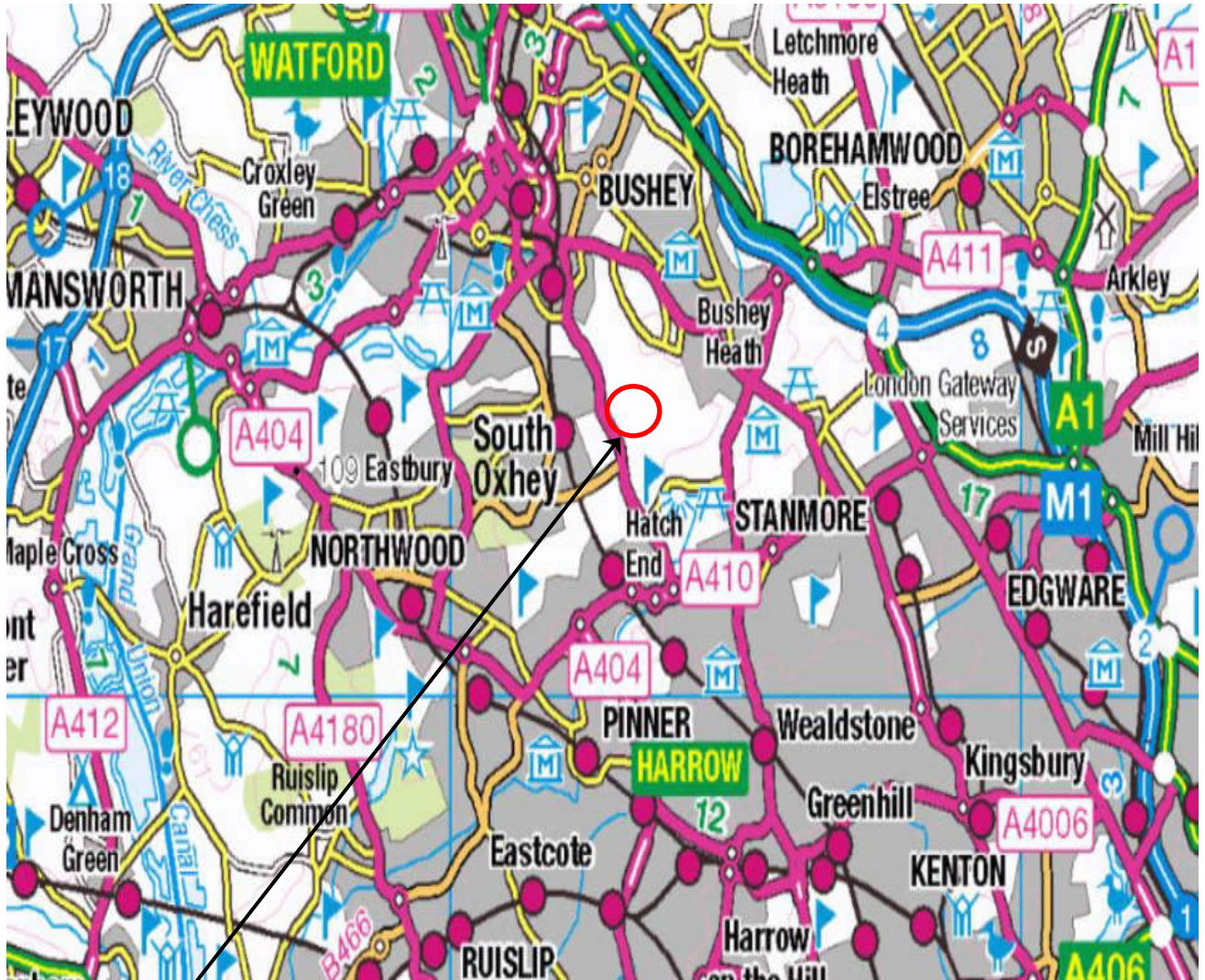
KEY: SITE LOCATION PLAN

 SITE BOUNDARY

ISSUED FOR DISCUSSION PURPOSES

LAND AT CARPENDERS PARK FARM - NORTHERN PARCEL - SITE LOCATION PLAN





SITE LOCATION

NEAREST POSTCODE: WD19 5RJ

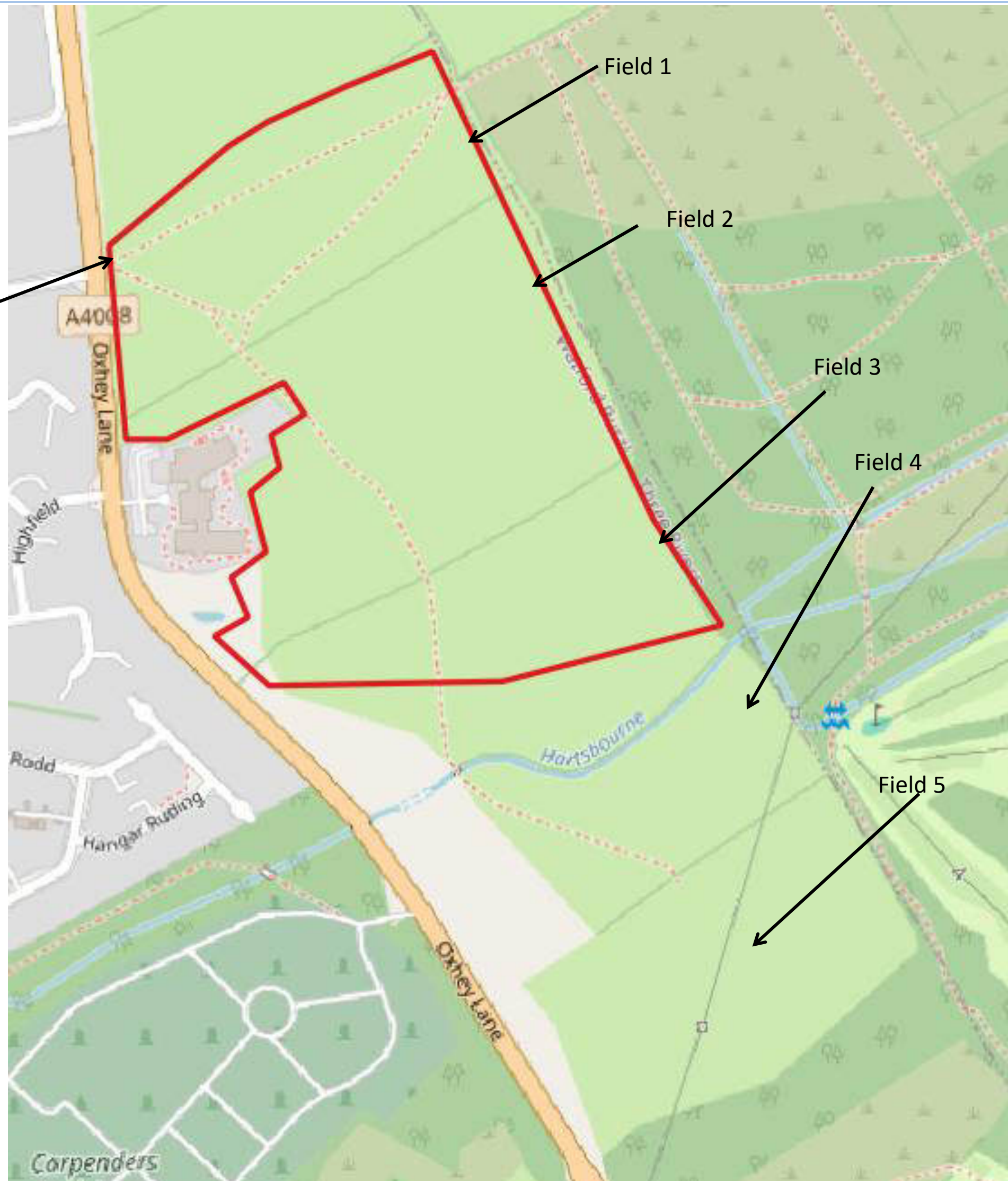
SITE ENTRANCE. WHAT THREE WORDS /// dips.free.metro



| REV                                                                                                                                                                                                     | DATE | DESCRIPTION | BY         | CKD      |
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| CLIENT                                                                                                                                                                                                  |      |             |            |          |
| BOYER PLANNING                                                                                                                                                                                          |      |             |            |          |
| PROJECT TITLE                                                                                                                                                                                           |      |             |            |          |
| LAND AT CARPENDERS PARK                                                                                                                                                                                 |      |             |            |          |
| DRAWING TITLE                                                                                                                                                                                           |      |             |            |          |
| SITE LOCATION PLAN                                                                                                                                                                                      |      |             |            |          |
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| C5872/01                                                                                                                                                                                                |      | A           | NTS        | 20/03/25 |
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| TH                                                                                                                                                                                                      |      |             | AD         |          |



PEDESTRIAN SITE  
ACCESS



## KEY

— APPROXIMATE SITE BOUNDARY

## NOTES

1. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
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PROJECT TITLE

LAND AT CARPENDERS PARK

DRAWING TITLE

SITE FEATURES PLAN

| DRAWING No. | REVISION | SCALE      | DATE     |
|-------------|----------|------------|----------|
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| TH          |          | AD         |          |

## PHOTOGRAPHS



**Photograph 1: Site Entrance**



**Photograph 2: View of northern field from entrance**



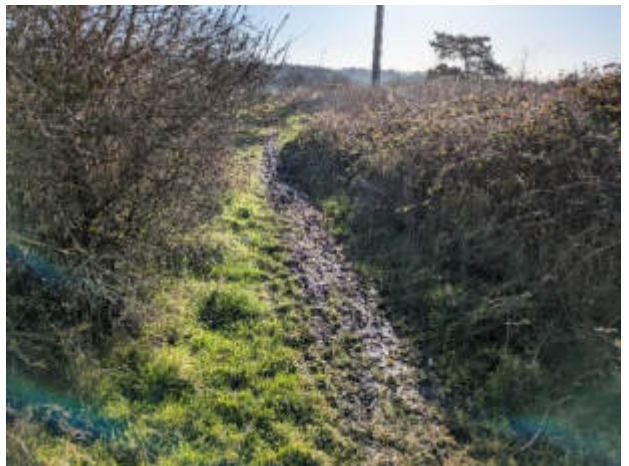
**Photograph 3: Northern border looking northeast**



**Photograph 4: Field 1 overview looking northwest**



**Photograph 5: General view of Field 1 looking east**



**Photograph 6: Access from Field 1 to Field 2**



**Photograph 7: View of the care home looking west**



**Photograph 8: General view of Field 2 looking east**



**Photograph 9: Mature oak trees in Field 2 looking south**



**Photograph 10: General view of Field 2 looking west**



**Photograph 11: Young trees and hedgerows in Field 3**



**Photograph 12: General view of Field 3 looking south**



**Photograph 13: General view of Field 3 looking west**



**Photograph 14: Off site flood defenses immediately west**



**Photograph 15: On site stream**



**Photograph 16: Access between Field 3 and Field 4 over the stream**



**Photograph 17: General view of Field 4 looking northwest**



**Photograph 18: Access between Field 4 and Field 5**



Photograph 19: General view of Field 5 looking east with overhead cables



Photograph 20: Woodland to the south of site

## **APPENDIX A**

### **BSL Methodology and Guidance**

## **BSL Phase I & II Geo-Environmental Assessment Reports - Methodology and Guidance**

### **Background**

This Appendix provides information on the approaches, methods and guidance used by Brownfield Solutions Ltd in the preparation of this report.

The term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential soils and groundwater contamination). The term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements). It should be noted that this is an integrated investigation and these two main aspects are related, unless otherwise specified within the report.

Phase I reports are written in general accordance with the description of a Preliminary Investigation as defined in BS10175:2011+A2:2017 and are also produced in general accordance with the recommendations for a Tier 1 Preliminary Risk Assessment as described in LCRM guidance.

The first stage of the investigation and assessment of a site is the Preliminary Investigation/Tier 1 Preliminary Risk Assessment, often referred to as a Phase 1 Desk Study, comprising a desk study and walk-over survey and collation of desk-based searches, which culminates in the Preliminary Risk Assessment and the development of a preliminary/initial **Conceptual Site Model (CSM)**. From this are identified any potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. In the case of the geotechnical hazard identification, this is referred to as the **Ground Model**.

From the geo-environmental perspective, the hazard Identification process uses professional judgement to evaluate all the hazards in terms of possible contaminant linkages (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment as part of Phase II investigations and reports.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include an exploratory, a detailed or/and supplementary Investigations as described in BS 10175:2011+A2:2017. Phase II Assessments are produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance and are also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

## Contaminated Land - Legislative Background

Land contamination can be addressed in several ways, e.g. during planning, under Part 2A, following an incident, during an investigation into environmental damages, or during the application of an environmental permit, or its surrender.

For the planning process the key test is **as a minimum the site cannot be determined as contaminated land**, e.g. there is not significant harm, significant possibility of significant harm to human health or that there is not significant harm to, or the significant possibility that the pollution of controlled waters will occur.

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

-  The 1995 Environment Act.
-  The Contaminated Land Statutory Guidance, DEFRA – April 2012.
-  The Contaminated Land (England) Regulations 2006.
-  The Contaminated Land (England) Amendment Regulations 2012.
-  Water Resources Act.
-  Water Framework Directive.
-  Environmental Damage Regulations.
-  Environment Agency (EA) - Land Contamination Risk Management (LCRM) 2019.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

- 1) Significant harm is being caused or there is a significant possibility of such harm being caused.
- 2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

**Source** - substances that are potential contaminants or pollutants that may cause harm.

**Pathway** - a potential route by which contaminants can move from the source to the receptor, and the impact of that migration on the source e.g. attenuation.

**Receptor** - a receptor that may be harmed, for example the water environment, humans and water, considering the sensitivity of the receptor.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused.



Where any one of the “pollution linkages” between the above is absent there is deemed to be no risk.

The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the S-P-R approach is ‘suitable for use’ criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

### Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below, however the list is not exhaustive:

- DETR: Circular 02/2000: Environmental Protection Act 1990: Part IIA: Contaminated land. 2012.
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
- BS 10175:2011+A2:2017.
- Environment Agency (EA) - Land Contamination Risk Management (LCRM). 2019.
- Groundwater Protection <https://www.gov.uk/government/collections/groundwater-protection>
- UK Technical Advisory Group (UKTAG) - Water Framework Directive
- Incidents and their classification: the Common Incident Classification Scheme (CICS) – Used by the Environment Agency to classify pollution incidents.

### Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
- The Environment Protection Act (1990).
- The Water Resources Act (1991).
- The Environment Act (1995).
- The Contaminated Land (England) Act (2000).
- The Pollution Prevention and Control (England and Wales) Regulations (2000).
- The Landfill Regulations (England and Wales) Regulations (2002).
- The Landfill (England and Wales) (Amendment) Regulations (2004).
- Contaminated Land (England) Regulations (2012).
- The Environmental Damage (Prevention and Remediation) Regulations (2009).
- Environmental Permitting Regulations (England and Wales) Regulations (2010).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017).
- Health and Safety at Work Act.
- National Planning Policy Framework (NPPF) – latest version.

### Contaminated Land Risk Assessment Approach

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:



LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under LCRM, three tiers of risk assessment exist – Stage/Tier Preliminary Risk Assessment, Stage 2 Generic Quantitative and Stage 3 Detailed Quantitative.

Further information can be found at the below site:

<https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report if applied.

The likelihood of a given receptor being impacted is related to a number of factors, e.g. the geology which could inhibit contaminant migration. For example, a site with a significant thickness of clay between it and a receptor may reduce migration of contamination via the subsurface, which will reduce the likelihood of a given receptor being impacted. The geology or drainage for example could offer a preferential pathway e.g. mines shafts/faults increasing the likelihood and potential magnitude of an impact. The depth of contamination will also affect the exposure pathway, for example petroleum hydrocarbons at depth are unlikely to reach a receptor via dermal contact but could via vapour pathways which will influence the likelihood of an impact being felt e.g. if there are no buildings on site.

The terms and definitions used for the assessment of the likelihood are provided below:

**High likelihood:** There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.

*Examples - Extensive areas with concentrations above saturation limits for mobile contamination e.g. petroleum hydrocarbons within the water table.*

**Likely:** There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term.

*Examples – Localised areas of contaminants with concentrations above saturation limits for mobile contamination e.g. localised petroleum hydrocarbons within the water table; shallow contamination above relevant human health generic assessment criteria is present with little or no hardstanding,*

**Low likelihood:** There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term.

*Examples - A thickness/distance of low permeability deposits preventing contaminant migration to a receptor is present; a site is mostly covered hard standing preventing exposure to soil contamination.*

**Unlikely:** There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

*Examples – A site is underlain by a substantial thickness of low permeability clays, between the source and potential receptors which will inhibit significantly, but not completely rule out migration to sensitive receptors.*

The severity is also classified using a system based on CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report, if applied. The terms and definitions are:

**Severe:** Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

*Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse.*

**Medium:** Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

*Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve.*

**Mild:** Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment.

*Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.*

**Minor:** harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

*Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.*

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

|             |                | Consequences                 |              |              |              |
|-------------|----------------|------------------------------|--------------|--------------|--------------|
|             |                | Severe                       | Medium       | Mild         | Minor        |
| Probability | Highly likely  | Very high                    | High         | Moderate     | Moderate/low |
|             | Likely         | High                         | Moderate     | Moderate/low | Low          |
|             | Low likelihood | Moderate                     | Moderate/low | Low          | Very low     |
|             | Unlikely       | Moderate/low                 | Low          | Very Low     | Very low     |
|             | Negligible     | Negligible Risk / No Linkage |              |              |              |

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

**Very high:** There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required.

**High:** Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term.

**Moderate:** It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.

**Low:** It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

**Very Low:** There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Some linkages may be identified which constitutes a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'negligible risk' and 'no linkage' in the summary table, which give rise to an overall **negligible** risk category and no further action is required.

### **Contaminated Land Screening Values**

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

#### **General**

The purpose of using generic Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake remedial action based on the data to hand is cost effective.

#### **Human Health**

Current UK guidance on risks to human health is provided by DEFRA and the Environment Agency (EA). Under the land use planning system where the aim is to demonstrate 'suitability for use' the key will usually be to confidently determine that the level of contamination of the land is low relative to some appropriate measure of risk at a particular critical connection.

Publications forming part of the guidance include the CLEA Model and toxicological reports collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values or Generic Assessment Criteria (GACs) for soils contamination based on standard land uses and soil assumptions. The critical concentrations referred to above can be the relevant GAC.

CLEA guidance has gone through a number of revisions over time. Tier 1 generic S4UL values (or GACs) have been published using the CLEA 1.06 Model by CIEH/LQM. These are the third set of generic assessment criteria generated by CIEH and replace the previous two sets of GACs. The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

C4SL values for six determinands including lead were published by DEFRA/CL:AIRE in December 2014. Additional determinands were added in 2021. They represent a low risk as opposed to minimal risk, however they are still strongly precautionary. These screening values were published by DEFRA for Part 2A use, although DEFRA have also confirmed acceptability for use under planning. However, S4ULs remain the first reference point for BSL due to the broader range of end uses scenarios and the availability of a wide array of determinands with various soil organic contents.

As part of Tier 1 assessments, the following data sources are used in the order of preference given below, unless further justification is provided to adopt less conservative criteria:

-  CIEH S4UL values (derived by CIEH/LQM).
-  DEFRA/CL:AIRE C4SL's <https://www.claire.co.uk/projects-and-initiatives/category-4-screening-levels>
-  CL:AIRE GAC values.
-  Guidance from other European countries.
-  Guidance from the outside Europe.

Dependent on requirements, test results may be divided into representative data sets for assessment against the above referenced screening criteria, based on the conceptual model and taking into account such characteristics as variation in soil properties, historical, existing or proposed land uses. The soils in these areas are considered likely to form the ground cover in critical receptor areas (e.g. gardens, soft landscaping etc)

where pathways may exist. The critical part of the soil column is typically taken as the upper metre in terms of contact with end users of a development site for the purposes of initial assessment.

The screening criteria adopted by BSL are presented overleaf.

#### *Further Assessment*

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and assessment to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway. In some cases, dependant on the Conceptual Site Model (CSM), no action may be required.

#### *PAHs and B(a)P as a Surrogate Marker for Adoption of C4SLs*

As stated above, S4ULs remain the first reference point as screening levels unless further justification is provided. In order to determine if the C4SL can be adopted, benzo(a)pyrene (B(a)P), the following guidance within SP1010 Appendix E for B(a)P and Public Health England (PHE) may be adopted with our assessments where appropriate.

Guidance states that benzo(a)pyrene is considered to be one of the most potent PAHs, and it would be appropriate to assume the cancer risk in a mixture is proportional to the concentration of a surrogate marker PAH (benzo(a)pyrene) in the mixture. The ratio of PAHs within the mixture can be assessed to ensure that the profile is similar to that seen for the test material (coal tar mixtures) in the toxicological study by Culp et al. The International Programme on Chemical Safety (IPCS) considered that the PAH profile of the soil sample may deviate from the average profile by about an order of magnitude (up or down).

A more recent study by Bull et al (2013) which analysed PAH concentrations in soil samples from 274 sites, showed that the levels of PAH relative to B(a)P showed little variability and were similar to that recorded for the coal tar mix used in the Culp et al study. Given this, it was concluded that benzo(a)pyrene is a suitable surrogate marker to represent mixtures of PAH in soil.

In order to risk assess the PAH mixture for site specific soil samples using human health guideline values, notably the C4SLs, as detailed in SP10101 the ratio of the seven genotoxic PAHs as shown below, relative to B(a)P, should be calculated to ensure it is similar to the test material used in the Culp study (PHE 2010). To be considered sufficiently similar, the ratio relative to B(a)P should fit within the upper and lower limits (representing an order of magnitude above and below the mean ratio to B(a)P of test material used in the Culp et al study). In such cases B(a)P is considered an adequate surrogate marker and the Low Level of Toxicological concern (LLTC) for B(a)P (i.e., the C4SL) may be used in the risk assessment.

#### *Statistical Analysis on Soils*

Guidance on the use of statistics is taken from the CL:AIRE publication “Comparing Soil Contamination Data with a Critical Concentration” 2020, the basis of which in statistics is termed Central Limit Theorem (CLT), which says “*The distribution of sample means converges to a normal distribution as the sample size increases*”.

If the critical concentrations have been exceeded, as part of a further assessment, statistical analysis may be undertaken on a dataset to demonstrate that the mean concentration on the site (or a particular area) is actually below the critical concentration. The true mean concentration of a contaminant is never known because all the site soil has not been tested. An estimation of the true mean can be obtained from the samples tested during the investigation. The greater the number of samples tested, the closer the mean of these values is to the true mean.

As discussed above, test results are typically divided into representative data sets for assessment and may be referred to as ‘averaging areas’ to which statistics can be applied, although several statements need to be satisfied before applying the guidance:

-  Averaging areas have been defined based on the CSM.
-  Sample locations – random/grid sampling adopted as opposed to targeted investigation.
-  Samples are evenly spread and not clustered.

- Analysis do not suggest a hotspot/outlier or cluster established by histogram or other means.
- Samples are of same/similar depth and taken from one population (e.g. just topsoil).
- Analyses do not show a spatial trend or other spatial pattern across that zone.
- The number of samples has been shown to be sufficient for statistical analysis.

Once the above have been satisfied, when undertaking statistical analysis, the question “*are mean soil concentrations within the averaging area equal to, or greater than, the GAC?*” is being asked. Typically, outliers or “hotspots” are treated as separate zones or averaging areas. The sampling strategy and assessment should also take into account uncertainty (for example, spatial heterogeneity) in contaminant concentrations. There is the assumption that sampling was random or stratified and systematic (e.g. on a grid) and not targeted at specific sources; data from such targeted areas should be omitted from the statistical analysis. Data should be from one population (i.e. the same materials).

The statistical test that is carried out is used to demonstrate that there is a certain probability that the true mean falls below the critical concentration (typically the GAC in a screening exercise). The main tool used to draw conclusions based on the 2020 guidance is a comparison of a 2-way confidence interval with the critical concentration. A confidence interval consists of two sets of numbers; an interval i.e. a range of values plus a pre-determined level of confidence e.g. 80%. A common interpretation of a confidence interval of say 80% is that “*there is an 80% chance that the true mean concentration level of the contaminant in a sampling zone lies between X concentration and Y concentration*”.

The current guidance for planning says that the site has to be “safe” which suggests we should use a large confidence interval such as 95% or higher to make a decision. This means that there is a 95% chance of the true mean concentration lying in this interval, there is also a 5% chance it lies outside this interval. One could then conclude that the requirements of planning have been met if the 95% confidence interval lies below the critical concentration.

The guidance recommends that at least two confidence levels are used such as 90% and 99% or 80% and 95%. By using two differing confidence intervals, we can use the smaller confidence interval (e.g. 80% confidence interval) to say “*we think the mean is most likely to be inside this range*” and the larger confidence interval (e.g. 95% confidence interval) to say “*we think the mean is most unlikely to be outside this range*”.

If the confidence interval extends to above the critical concentration, then further action may be required.

### **Controlled Waters**

The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards (Water Quality Targets – WQTs) for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 and The Private Water Supplies (England) Regulations 2016. SI 2016 / 618). In Scotland, the Public Water Supplies (Scotland) Regulations 2014 apply. The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

The chemical standards used in the UK to control impaction of contamination on controlled waters are Environmental Quality Standards (EQS). These cover a large number of compounds. EQS are available for inland surface waters (freshwater) and other surface waters (transitional and marine).

Several EQS are based on bioavailable metal proportions (i.e. copper, lead, manganese, nickel and zinc). A software tool (M-BAT) is available from the Water Framework Directive - UK TAG website for calculating the bioavailable fraction. Where this tool has been used, the bioavailability has been taken into account by calculating site-specific  $PNEC_{dissolved}$  (Predicted No Effect Concentration) values. These enable the dissolved concentration data to be compared with the PNEC as if it were an EQS.

UK Drinking Water Standards (DWS) apply to waters abstracted for human consumption. Where no UK or EU drinking water standard exists, reference is made to the World Health Organisation criteria (2011).

The DWS apply to groundwater or to surface water used for abstraction and the EQS apply to surface water where the aquatic ecosystem is the receptor. Where the most appropriate water quality target cannot be determined with certainty, the lowest one is adopted in line with the precautionary principle.

In some instances, the laboratory detection limits (LODs) may be greater than the water quality target it is being screened against, but it should be noted that these comparisons are an initial screening assessment. It may be the case that lower LODs could be obtained using a more specialised technique, but it would be disproportionately expensive to adopt the more costly specialist technique for initial screening exercises.

The preference of BSL is to have testing carried out on actual samples of ground/surface water rather than theoretical values obtained from leachate testing, which is considered to often be highly conservative. Data from water samples obtained or from leachate analysis is then compared against the screening criteria adopted by BSL, which are presented overleaf.

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and detailed quantitative risk assessment (DQRA) to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway.

### **Ground Gas Risk Assessment**

BS8485:2015+A1:2019, BS 8576:2013, CL:AIRE RB17, and NHBC 'Hazardous Ground Gas - An essential guide for housebuilders' 2023, are the current guidance which gives up-to-date advice on all aspects of permanent ground gas risk. BS8576 alongside CIRIA C682 also provides guidance on assessment of hydrocarbon vapour intrusion.

The CL:AIRE publication 'Good Practice for Coal Mine Gas Emissions' 2021 provides guidance on the assessment of risks from mine gas sources.

The above all outline good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to ground gas contamination. The aim of the guidance is for a consistent approach to decision making, particularly relating to the scope of protective design measures on a site-specific basis.

### ***Legislative Framework***

BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665 provides technical guidance, however they also recognise the context into which the guidance has to be employed. Government policy is based upon a "suitable for use approach", which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the "source" in a "pollutant linkage" which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be "contaminated land" under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land*.

### Generation Potential of Sources

BS 8576:2013 Figure 6 provides a basis for assessing the generation potential from sources identified as part of the Phase I Assessment. These are summarised below:

| Generation Potential | Typical Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very Low             | <ul style="list-style-type: none"> <li>Natural carbonate soil and strata, e.g. chalk and limestone.</li> <li>Natural soil strata with a low degradable organic content, e.g. alluvium, peat.</li> <li>In-filled pond less than 15 m diameter, in-filled before 1930s to 1940s.</li> <li>Made ground with low degradable organic content (e.g. up to 5% organic material such as pieces of wood, pieces of paper, rags, etc. with a high proportion of ash and no food or other easily degradable waste).</li> <li>Mine workings shallow or shaft (where there is clear evidence that they are flooded).</li> <li>Inert landfill sites (and pre -1945 landfills).</li> </ul> |
| Low                  | <ul style="list-style-type: none"> <li>Natural soil strata with a high degradable organic content (DOC).</li> <li>Made ground with total organic carbon (TOC) up to 6% (e.g. dock silt, no food or other easily degradable waste).</li> <li>Foundry sand (includes phenolic binders, rags and wood that decay, albeit at low rates).</li> <li>Landfill 1945 to mid 1960s (see also Moderate below).</li> </ul>                                                                                                                                                                                                                                                              |
| Moderate             | <ul style="list-style-type: none"> <li>Sewage sludge.</li> <li>Mine workings – unflooded, more than 50 years since last worked (gas is liberated from coal when mine workings are excavated; this continues for up to about 50 years).</li> <li>Landfill 1945 to mid 1960s (this could also be “low” or, if disturbed, “high”).</li> </ul>                                                                                                                                                                                                                                                                                                                                  |
| High                 | <ul style="list-style-type: none"> <li>Landfill mid 1960s to early 1990s.</li> <li>Mine workings – unflooded – less than 50 years since last worked.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very High            | <ul style="list-style-type: none"> <li>Municipal landfill sites.</li> <li>Landfill early 1990s onward.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### Frequency and Duration of Monitoring

BS8576 notes to determine where and how to monitor ground gases requires consideration of credible pathways of possible exposure of the receptors, taking into account what is known about the geology and hydrogeology, building construction and services layout, foreseeable events such as flooding, changes in groundwater level, climate change, extreme weather conditions, the closure of mines, and possible changes to the gas regime caused by future development.

The monitoring period for a specific site should cover the “worst case” scenario. A “worst case” scenario will typically occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with ground gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection. CL:AIRE publication TB17 “Ground Gas Monitoring and ‘Worst-Case’ Conditions” provides further guidance.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

### Typical/idealised periods of monitoring

|                            |                             | Generation of Potential Source |          |          |           |           |
|----------------------------|-----------------------------|--------------------------------|----------|----------|-----------|-----------|
|                            |                             | Very Low                       | Low      | Moderate | High      | Very High |
| Sensitivity of Development | Low (Commercial)            | 1 month                        | 2 months | 3 months | 6 months  | 12 months |
|                            | Moderate (Apartments)       | 2 months                       | 3 months | 6 months | 12 months | 24 months |
|                            | High (Low rise Residential) | 3 months                       | 6 months | 6 months | 12 months | 24 months |

### Typical/idealised frequency of monitoring/Number of Visits Required

|                            |                             | Gas Generation of Potential Source |     |          |      |           |
|----------------------------|-----------------------------|------------------------------------|-----|----------|------|-----------|
|                            |                             | Very Low                           | Low | Moderate | High | Very High |
| Sensitivity of Development | Low (Commercial)            | 4                                  | 6   | 6        | 12   | 12        |
|                            | Moderate (Apartments)       | 6                                  | 6   | 9        | 12   | 24        |
|                            | High (Low rise Residential) | 6                                  | 9   | 12       | 24   | 24        |

#### Notes

- 1 Generation potential of sources based on descriptions within BS 8576:2013.
- 2 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

#### Gas Risk Assessment

Within BS8485:2015+A1:2019 a semi-quantitative method is set out for the assessment of risk.

This method (Modified Wilson and Card) uses the concept of Gas Screening Values (GSVs) and typical threshold concentrations of carbon dioxide and methane to identify levels of risk. Sites are then classified into a 'Characteristic Situation' or 'CS' from CS1 where no mitigation is required and CS2 increasing up to CS6 where protection measures are required.

The NHBC guide 'Hazardous Ground Gas - An essential guide for housebuilders' 2023 provides further assessment tools for ground gas monitoring data, including the use of ternary plots to determine ground gas sources.

A separate approach to assessment without monitoring data is discussed under the RB17 header further below.

CIRIA C682 and BS 8576:2013 provide guidance on assessment of VOC intrusion risk.

#### Ground Gas Mitigation

Where a risk is determined to be present by assessment, BS8485:2015+A1:2019 provides guidance for the design of protection systems based on a points scoring system depending on the characteristic situation, structure type, structural barrier types, ventilation and a gas resistant membrane. Source removal can also be considered.

The design requires the structures to be categorised into one of four building types: Type A, Type B, Type C or Type D, related to the construction and end use of the building, together with the control of future structural changes and maintenance.

CIRIA C748 provides advice on the use of membranes as VOC vapour barriers.

CIRIA C735 sets out the approach for verification of installed mitigation measures. Note that if a membrane is installed it must be verified in accordance with CIRIA C735 or it will score zero points and assumed to not afford any protection.

#### *RB17 Approach*

CL:AIRE RB17 (Card et al 2012) is a pragmatic approach to ground gas risk assessment and was developed because gas concentration, pressure and flow rate measured in a well headspace may not be representative of the conditions in the surrounding formation.

In these low-risk situations, the approach is to use the conceptual site model and the estimation of the likely gas generation from a source to identify where or if gas monitoring is required to better define the risks.

Under this approach, for sites with natural soils only with no credible methane source, then no action is required (no monitoring or gas protection measures) as this represents Characteristic Situation 1 (CS1).

#### *Radon*

Advice on radon protection in England is provided by the UK Health Security Agency, <https://www.ukradon.org/information/ukmaps> and by the BRE (BR 211 (Scivyer 2023)).

Areas of the country can be categorised according to the percentage of existing homes where radon is present above the Action Level:

-  0-1% lower probability.
-  1-3% and 3-10% intermediate probability.
-  >10% higher probability.

Basic radon protection measures are required in new buildings and extensions in areas of England and Wales where 3-10% of properties exceed the Action Level and full radon protection measures where >10% exceed the Action Level.

#### **Unexploded Ordnance (UXO) Guidance**

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681.

BSL carry out non-specialist UXO screening exercises by considering any evidence of UK defence activities on or near the site evident from gathered desk study information and the unexploded aerial delivered bomb (UXB) online risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available online Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced and considered competent in the assessment of UXO.

#### **Geotechnical Guidance**

A preliminary risk assessment of geotechnical hazards is carried out at the desk study stage and confirmed (or amended) at the ground investigation stage.

The CD 622 'Managing Geotechnical Risk' guidance document defines the technical approval and certification procedures to be used to ensure that the risk associated with the geotechnical activities are appropriately managed.

The desk-based stage may also include the requirements for a Coal Mining Risk Assessment (CMRA) which specifically assesses the risks from mining induced instability and related issues in high risk development areas: <https://www.gov.uk/guidance/planning-applications-coal-mining-risk-assessments>.

In order to establish the requirements of a project, the Geotechnical Category which is based on a consideration of project complexity, proposed geotechnical activities, presence of geo-hazards and severity of geotechnical risks, shall also be considered. These range from Category 1 (small/simple structures) to Category 3 (very large, unusual or complex activities/structures, such as tunnels). It is envisaged most projects typically fall into Category 2, including conventional types of geotechnical structures, earthworks and activities.

In the case of the geotechnical hazard identification at the intrusive investigation stage, this is referred to as the **ground model**.

The geotechnical sections of the report contain the factual information on the geology and relevant site data, including both in situ and laboratory testing, with a geotechnical evaluation of the information stating the assumptions made in the interpretation of the data.

Derived values of geotechnical parameters are obtained from test results by theory (book values), correlation or empiricism in general accordance with BS EN 1997-2:2007 (EC7).

Where derived geotechnical parameters are to be used in designs in accordance with EC7, the selection of characteristic values for geotechnical parameters using the derived values is carried out by well-established experience.

The characteristic value is a cautious estimate of the value affecting the occurrence of the limit state. For any particular material type there may be more than one characteristic value for each parameter because there may be more than one limit state.

The second stage is the selection of design values. The design values are either derived from the characteristic value by applying the relevant partial factors or assessed directly. Similarly, there can be several design values for the same material type.

In the event that geotechnical designs are included in this report, selection of the characteristic and design values is included. Otherwise, it is the duty of the geotechnical designer to determine these within a separate design report (a GDR).

Where it has not been possible to reasonably use an EC7 compliant technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

In addition to the above:

-  Assessments for highways designs are based on CD 622 Managing Geotechnical Risk.
-  The assessment of sustainable drainage is based on BRE365 and CIRIA C753 'The SuDS Manual'.
-  Earthworks Assessments are based on SHW Series 600 and BS6031.
-  Risks from mining (both at the desk based and intrusive stages) are assessed adopting guidance from CIRIA C758.

## **Re-Use of Waste Soils Guidance**

### *Definition of Waste*

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” this includes any soil from drainage trenches, foundation arisings, site strips etc. It is no longer required in its original location, therefore it is considered to be waste. Without an appropriate materials management plan, permit or exemption in place, by law this material is defined as “illegally deposited waste”.

Landfill tax rules allow HM Revenue & Customs (HMRC) to recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a

person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site is also liable to pay Landfill Tax.

*CL:AIRE: Code of Practice*

Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP), also commonly referred to as a “Materials Management Plan”.

<https://www.claire.co.uk/projects-and-initiatives/dow-cop>

Developers and contractors are advised to complete all works under the DoWCoP where applicable.

To implement the DoWCoP (for Route A), there is a requirement to notify the Environment Agency and Local Authority of the intention to use the code of practice in principle, after which there is a 21-day notice period for their response.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

- The aims and objectives of the project meet the requirements of the Waste Framework Directive (does not harm human health or the environment).
- The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
- There is certainty of use (planning consents are in place alongside materials tracking, which should be in place as part of good site practice in any case).
- Quantity (the quantity of materials used should be known).

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment.
- Material capable of being used in another place on the same site following ex-situ treatment on site.
- Material capable of being used in another development site without treatment (Direct Transfer).
- Material capable of being used in another development site following ex-situ treatment on another site e.g. Hub site.

In order to satisfy these requirements, the following are required:

- i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
- ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
- iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
- iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
- v) Volume calculations.
- vi) Planning permission for the development.
- vii) Contractual details to be clear, regarding who steps in if a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (e.g. bioremediation, stabilisation etc) may require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties are not generally regarded as waste treatment operations and do not require a permit.

Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Any declared MMP should be amended as new import sources are added.

Regardless of implementing re-use under the code of practice or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs. Note that for re-use of landfilled materials or mining wastes, the DoWCoP may not apply and a Waste Recovery Permit (or others) may be required. Liaison with the Environment Agency would be needed on a case by case basis to determine the best option.

Once the project is complete, a verification report detailing soils re-use/import will need to be produced and submitted to CL:AIRE, which may be subject to a random audit process. Sites found to be non-complaint with the CoP can be referred to the EA for further investigation.

#### *Soils Re-use under Exemptions and Permits*

Other potential options to allow the re-use and/or import of soils and aggregates on site are provided in the table below. Applies to England/Wales only – Scotland differs.

| Re-use Mechanism                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| U1 Exemption                              | Can be applied to re-use/import of soils and stones, but only up to 1000 tonnes or for brick and concrete up to 5000 tonnes. This is usually an efficient way to re-use small volumes of waste materials. However, only one U1 can be filled in per site in any 3-year period. Quick and free via online registration.                                                                                                                                                                                                                                                                                                                                                                                                   |
| WRAP Quality Protocols                    | Describes how processed demolition arisings can be removed from regulatory waste regime. Requires a demonstration of appropriateness by: <ul style="list-style-type: none"> <li>• Factory Production Control Manual.</li> <li>• Facility Permit (or Exemption).</li> <li>• Grading Analysis.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Waste Framework Directive (WFD) exclusion | In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion which is an EA regulatory position statement. So long as the project can prove the four criteria listed above for the DoWCoP, then permits or the DoWCoP are not required. However, many projects still use the CoP to ensure compliance.                                                                                                                                                                                                                                                                                                           |
| T5 Screening and blending of waste        | The T5 exemption allows you to temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. The limit is 5,000 tonnes. This applies to: <ul style="list-style-type: none"> <li>• Screening soil on a demolition site to remove wood and rubble.</li> <li>• Blending soil and compost that has been produced under an exemption on a construction site to produce better soil for landscaping on that site (e.g. peaty deposits).</li> <li>• Crushing waste (except bricks, tiles and concrete) before screening or blending</li> <li>• Grading waste concrete after it has been crushed to produce a certain type of aggregate.</li> </ul> |
| T7 Exemption                              | The T7 allows treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size. This needs to be registered with the Local Authority.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Other Permitting Routes                   | Other options include use under an Environmental Permit (Standard or Bespoke Rules), however these may be a time consuming and costly route, where use of the other above options (if applicable) are likely to be more feasible in construction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

There are also potential non-enforcement positions for re-use e.g. a site has a large volume waste illegally deposited on it (not by landowner). The new owner is keen to re-use waste where possible to reprofile the site (planning condition granted). The DoWCoP could not be used as materials already excavated and deposited as a waste (illegally). The EA may agree that although the DoWCoP not applicable, they would take a non-enforcement position if the works were completed in accordance with the DoWCoP – this would need to be agreed in advance.

## **Waste Classification and Disposal Guidance for Soils**

### *Introduction*

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. Waste producers have a duty of care to classify the waste they are producing:

-  Before it is collected, disposed of or recovered.
-  To identify the controls that apply to the movement of the waste.
-  To complete waste documents and records.
-  To identify suitably authorised waste management options.
-  To prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

### *Background for Landfill Disposal*

The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

### **Key Points:**

-  Not all waste can be landfilled.
-  Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.
-  Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
-  Most wastes must be treated before you can send them to landfill.
-  There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

### Classification

Wastes are listed in the European Waste Catalogue and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e. the hazard assessment. The most common EWC waste codes related to soil are:

|           |                                                                                    |
|-----------|------------------------------------------------------------------------------------|
| 17 05     | Soil (including excavated soil from contaminated sites), stones and dredging spoil |
| 17 05 03* | soil and stones containing dangerous substances                                    |
| 17 05 04  | soil and stones other than those mentioned in 17 05 03                             |

Soils may contain certain contaminants (e.g. asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations** and classified as either hazardous or non-hazardous waste. WAC analysis must not be used for waste classification.

### Waste Definitions

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Inert</b>                                | <ul style="list-style-type: none"> <li>Will not undergo any significant physical, chemical or biological transformations.</li> <li>Will not dissolve.</li> <li>Will not burn.</li> <li>Will not physically or chemically react.</li> <li>Will not biodegrade.</li> <li>Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health.</li> <li>Has insignificant total leachability and pollutant content.</li> <li>Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).</li> </ul> |
| <b>Non-Hazardous</b>                        | Is not inert (see above).<br>Is not hazardous (see below).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hazardous</b>                            | Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance).                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Stable Non-reactive hazardous waste#</b> | Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).                                                                                                                                                                                       |

# This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

### WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) then WAC is not relevant. Furthermore, the WAC limits **cannot** be used to make an assessment of whether a waste is hazardous. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

| Classification based on Total Concentrations <sup>1</sup> | Non-Hazardous Waste           |                               | Hazardous Waste                  |                    |
|-----------------------------------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------|
|                                                           | Below inert WAC limit values: | Above inert WAC limit values: | Below hazardous WAC limit values | > WAC limit values |
| WAC testing                                               |                               |                               |                                  |                    |

| Landfill requirements | INERT landfill | NON-HAZARDOUS landfill <sup>2</sup> | HAZARDOUS landfill | PRE-TREATMENT <sup>3</sup> |
|-----------------------|----------------|-------------------------------------|--------------------|----------------------------|
|-----------------------|----------------|-------------------------------------|--------------------|----------------------------|

- 1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
- 2 Individual sites may have certain limit values pre-determined in their licence.
- 3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.
- 4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

Waste classified as non-hazardous can be accepted into a non-hazardous landfill without having to pass any numerical WAC.

Soils above hazardous WAC limit values require pre-treatment prior to disposal. The effective pre-treatment, typically involving separation, sorting and screening, can offer cost savings through reducing the hazardous nature and volumes of soil. Costs for disposal of non-hazardous/hazardous soils are significant compared to the disposal of inert material.

#### *Greenfield Sites and Inert Waste*

The possibility of automatic inert classification naturally occurring “clean” soils should be explored in accordance with the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005). This is the case if:

- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill (e.g. the waste producer can characterise the waste based on visual assessment and written description with supporting evidence such as a desk study, subject to agreement by the landfill operator).

#### *Hydrocarbons in Soils*

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However, hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

#### *Known Oils*

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer’s or supplier’s REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

#### *Unknown Oils*

Where hydrocarbons are contaminating soils, it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

For contaminated land specific consideration must be given to the following before proceeding:

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of marker compounds is optional; however, it is recommended that where possible the marker compounds should be used. WM3 states:

If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
- This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
- The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

| TPH Concentration<br>(mg/kg) | Petrol or Diesel | BaP<br>(mg/kg) | Classification |
|------------------------------|------------------|----------------|----------------|
| 10,000                       | No               | 0.9            | Non- Hazardous |
| 1,000                        | No               | Not available  | Hazardous      |
| 1,000                        | Yes              | Not relevant   | Hazardous      |

#### References

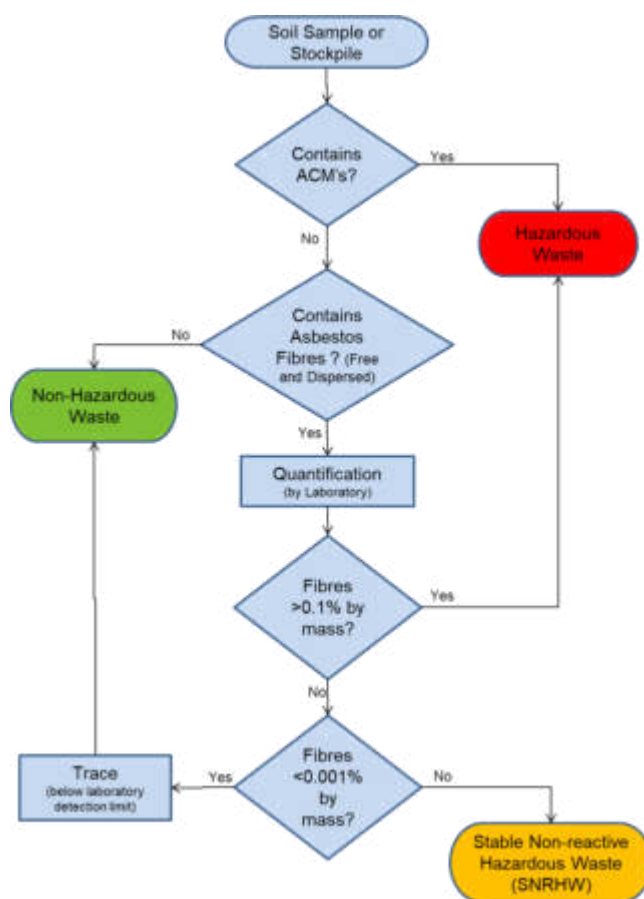
1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.
7. 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament.
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1.
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

### Waste Containing Asbestos

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's).

Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.



Should soils contain asbestos, the concentration and type of asbestos identified, in addition to the chemical composition (i.e. hazardous or non-hazardous detailed above), will determine which waste code is applicable to the soils and which landfill will accept it as summarised below:

| Waste                                          | Conc. by Weight (%) | EWG 2002 Catalogue Entry Code                                      | Waste Disposal Route                                                                                                                                            |
|------------------------------------------------|---------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-hazardous containing asbestos fibres       | <0.001 - <0.1%      | 17 05 04 (soil and stones other than those mentioned in 17 05 03*) | Non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.                                  |
| Hazardous containing asbestos fibres           | <0.001 - <0.1%      | 17 05 03* (soil and stones containing dangerous substances)        | Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.                                                          |
| Non-hazardous soils containing asbestos fibres | >0.1%               | 17 05 03* (soil and stones containing dangerous substances)        | Hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos. |

| Waste                                                       | Conc. by Weight (%) | EWIC 2002 Catalogue Entry Code                                                                                                 | Waste Disposal Route                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-hazardous Soils containing ACM (Mechanically separable) | >0.1%               | 17 06 05 (construction material containing asbestos)<br><br>17 05 04 (soil and stones other than those mentioned in 17 05 03*) | ACMs disposed of at a hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos.<br><br>Soils should be disposed of at a non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site. |
| Hazardous soils containing ACM                              | >0.1%               | 17 05 03* (soil and stones containing dangerous substances)                                                                    | Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.                                                                                                                                                                                                                                                       |

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site<sup>1</sup>. These levels are often termed “trace” by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)<sup>1</sup>. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

| 17 06    | Insulation materials and asbestos-containing construction materials         |
|----------|-----------------------------------------------------------------------------|
| 17 06 01 | Insulation materials containing asbestos                                    |
| 17 06 03 | Other insulation materials consisting of or containing hazardous substances |
| 17 06 04 | Insulation materials other than those mentioned in 17 06 01 and 17 06 03    |
| 17 06 05 | Construction material containing asbestos                                   |

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and “*other suitable materials*” may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

#### Construction

Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However, where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However, it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four-hour period. The control limit is not a 'safe' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 "the release of dispersed asbestos fibres from soil" 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m<sup>3</sup>.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (e.g. by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

#### *End Use*

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation.

Asbestos containing materials can remain in situ under a suitable cover system which may be hard surfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Publications from the JIWG provide guides for decision making in relation to construction.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk. There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However, the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required. Re-use of soils containing asbestos should be as per CARSOILS.

The re-use of soils containing asbestos at concentrations above hazardous waste levels may be met with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

## Asbestos in Soil as Free Fibres

| Concentration (by weight) | Waste Disposal |                |     |     | Construction Issues                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | End Use                                                                                                                                                                               |                                                                                                                                         |
|---------------------------|----------------|----------------|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|                           | Recycle        | Inert          | SNR | Haz |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Suitable for re-use on site                                                                                                                                                           | Precautions                                                                                                                             |
| Not detected              | ✓              | ✓              |     |     | No precautions necessary, however on a brownfield site asbestos not previously identified may be found during works and a statement within the contractor's method statement for how they will deal with this unforeseen asbestos would be good practice to ensure compliance with CAR2012.                                                                                                                                                                                                                                                                               | Yes.                                                                                                                                                                                  | None.                                                                                                                                   |
| Trace (<0.001%)           |                | ✓ <sup>2</sup> |     |     | Precautions are unlikely to be required, however a detailed method statement may be required to ensure compliance with CAR2012. Basic asbestos management good practice will be required. Typically precautions would include: <ul style="list-style-type: none"> <li>Ensuring soils do not dry out to become dusty.</li> <li>Site personnel have the risk communicated at induction stage.</li> </ul>                                                                                                                                                                    | Yes<br>Soils can be re-used under CL:AIRE CoP with the correct precautions in place.                                                                                                  | Generally clean cover or hardstanding cover required.                                                                                   |
| 0.001% – 0.099%           |                |                | ✓   |     | Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: <ul style="list-style-type: none"> <li>Site personnel have the risk communicated at induction stage.</li> <li>Ensuring personnel have suitable training.</li> <li>Task monitoring to inform PPE requirements.</li> <li>Ensuring soils do not dry out to become dusty and that misting is available during groundworks.</li> <li>Separate stockpiling.</li> <li>Clean haulage routes.</li> </ul>                  | Possibly.<br>Soils may be able to be re-used under CL:AIRE CoP, subject to a satisfactory Risk Assessment and regulatory agreement with the correct precautions in place.             | Clean cover with hard dig/demarcation layer or hardstanding cover required.                                                             |
| 0.1+%                     |                |                |     | ✓   | Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: <ul style="list-style-type: none"> <li>Site personnel have the risk communicated at induction stage.</li> <li>Ensuring personnel have suitable training.</li> <li>Task monitoring to inform PPE requirements.</li> <li>Site wide and or perimeter monitoring.</li> <li>Ensuring soils do not dry out to become dusty and that misting is available during groundworks.</li> <li>Separate stockpiling.</li> </ul> | Unlikely <sup>3</sup><br>Re-use of soils containing asbestos within an earthworks scheme will involve significant engineering and the risk for generating dusts will be significantly | Clean cover and a hard dig / demarcation layer. A plan should be in place for future excavations as part of the Health and Safety File. |

| Concentration (by weight) | Waste Disposal |       |     |     | Construction Issues                                                                                   | End Use                                          |             |
|---------------------------|----------------|-------|-----|-----|-------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------|
|                           | Recycle        | Inert | SNR | Haz |                                                                                                       | Suitable for re-use on site                      | Precautions |
|                           |                |       |     |     | <ul style="list-style-type: none"> <li>Clean haulage routes.</li> <li>Decontamination unit</li> </ul> | increased with repeated handling and compaction. |             |

1. The standard laboratory detection limit is normally 0.001%. Below 0.001% is trace and currently regarded as not containing asbestos for the purposes of disposal off site. However the waste producer has a duty to fully classify the waste and the presence of trace asbestos should be declared. Consequently it is unlikely that a waste treatment site will take this soil and an inert landfill may make a commercial decision to only take it under some circumstances.
2. The re-use of soils containing asbestos at concentrations above hazardous waste is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be warranted where there a long program for implementation.

## **APPENDIX B**

### **Historical Maps**

#### Site Details:

CARPENDERS PARK,  
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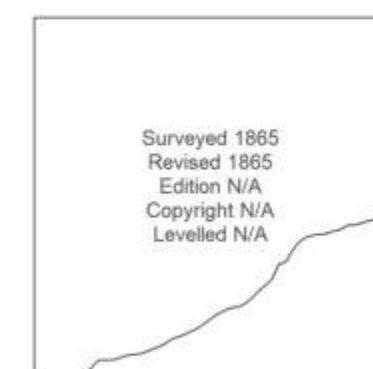
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**Grid Ref:** 512965, 193387

**Map Name:** County Series

**Map date:** 1865

**Scale:** 1:10,560

**Printed at:** 1:10,560

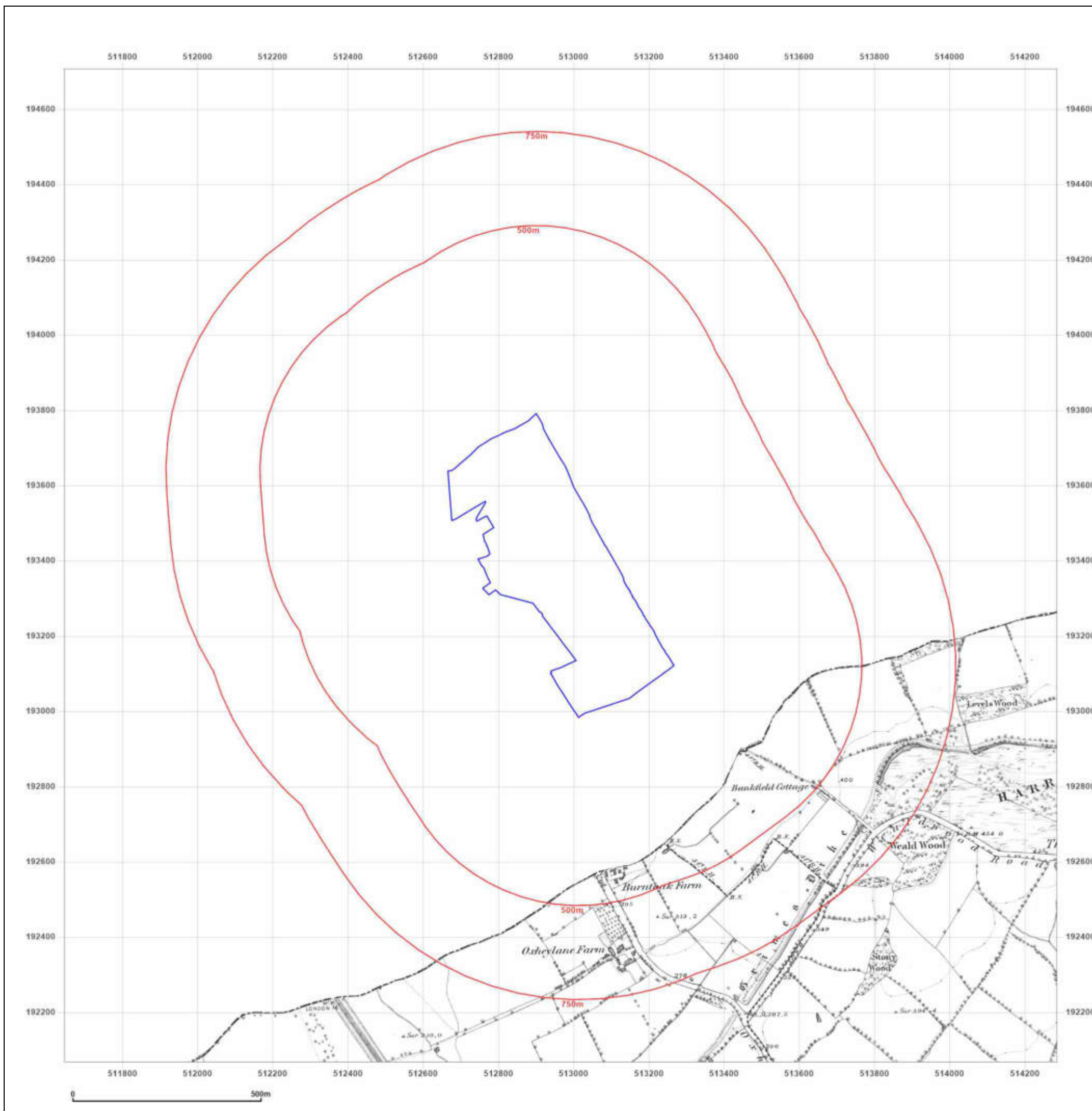


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**Map Name:** County Series

**Map date:** 1895

**Scale:** 1:10,560

**Printed at:** 1:10,560



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Revised 1895  
Edition N/A  
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Surveyed 1864  
Revised 1895  
Edition N/A  
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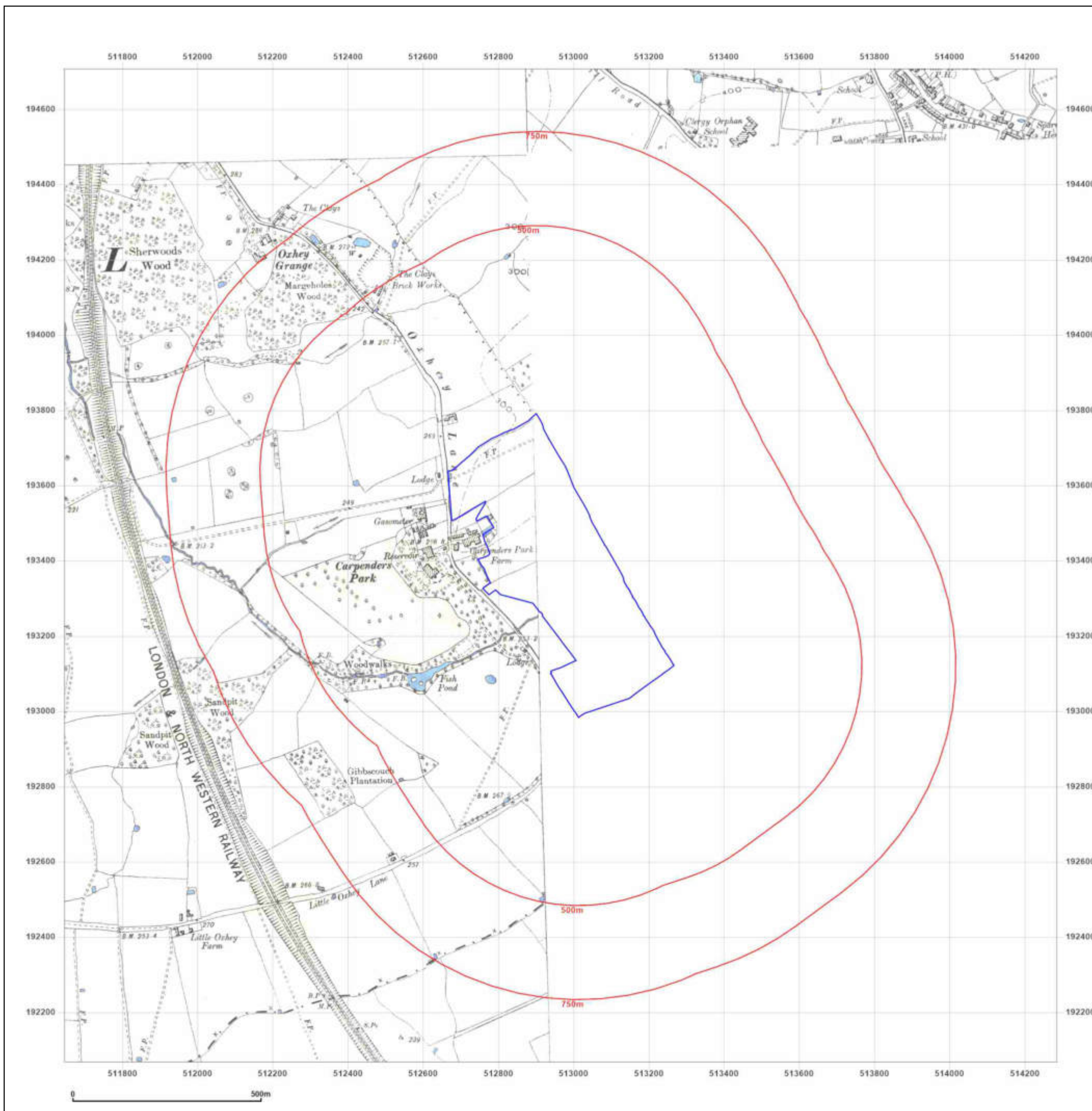


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**Report Ref:** GS-STB-X5T-CWD-GZL  
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**Map Name:** County Series

**Map date:** 1895-1896

**Scale:** 1:10,560

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Revised 1896  
Edition N/A  
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Revised 1895  
Edition N/A  
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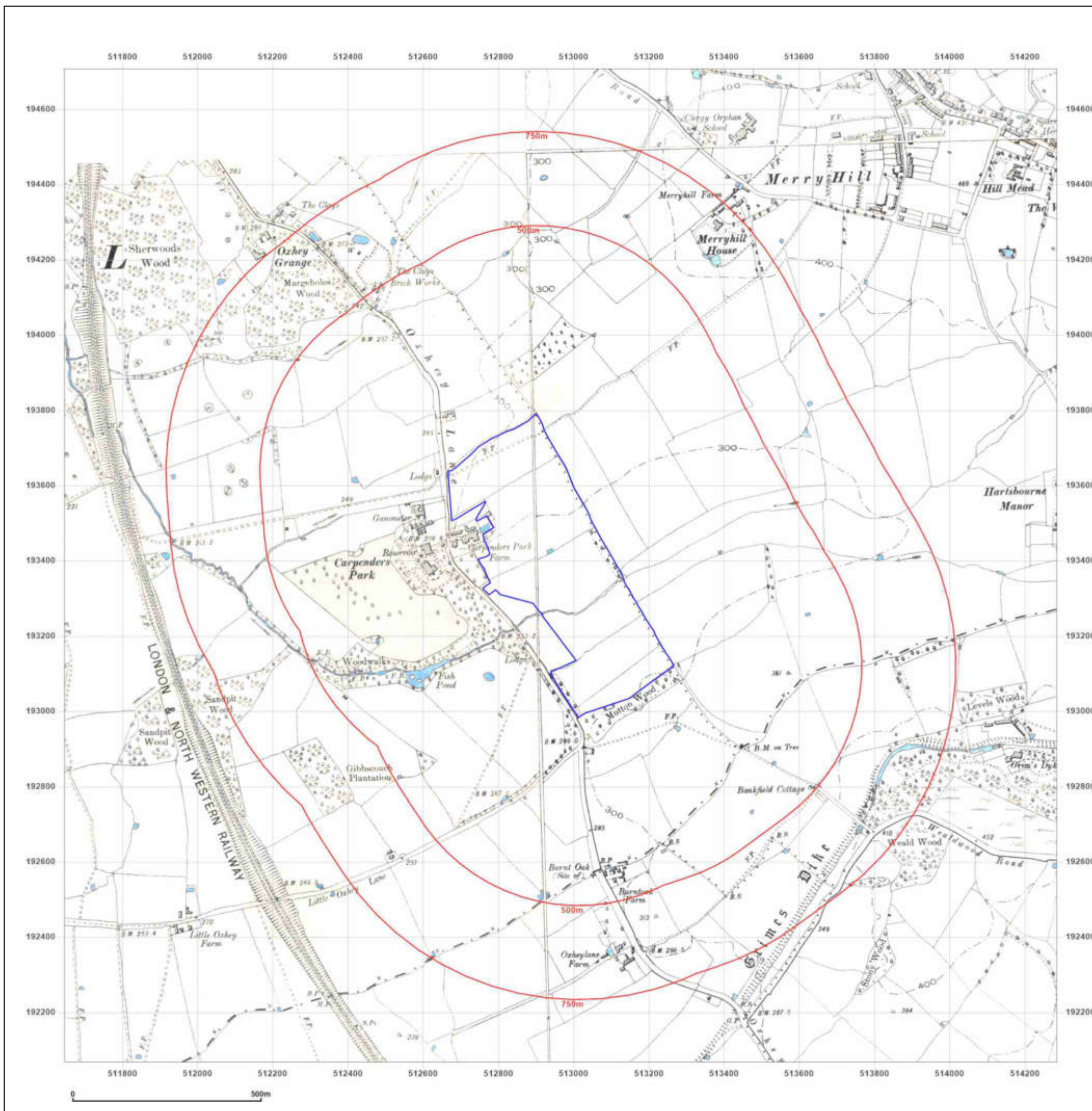


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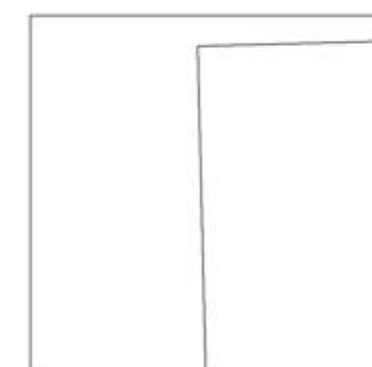
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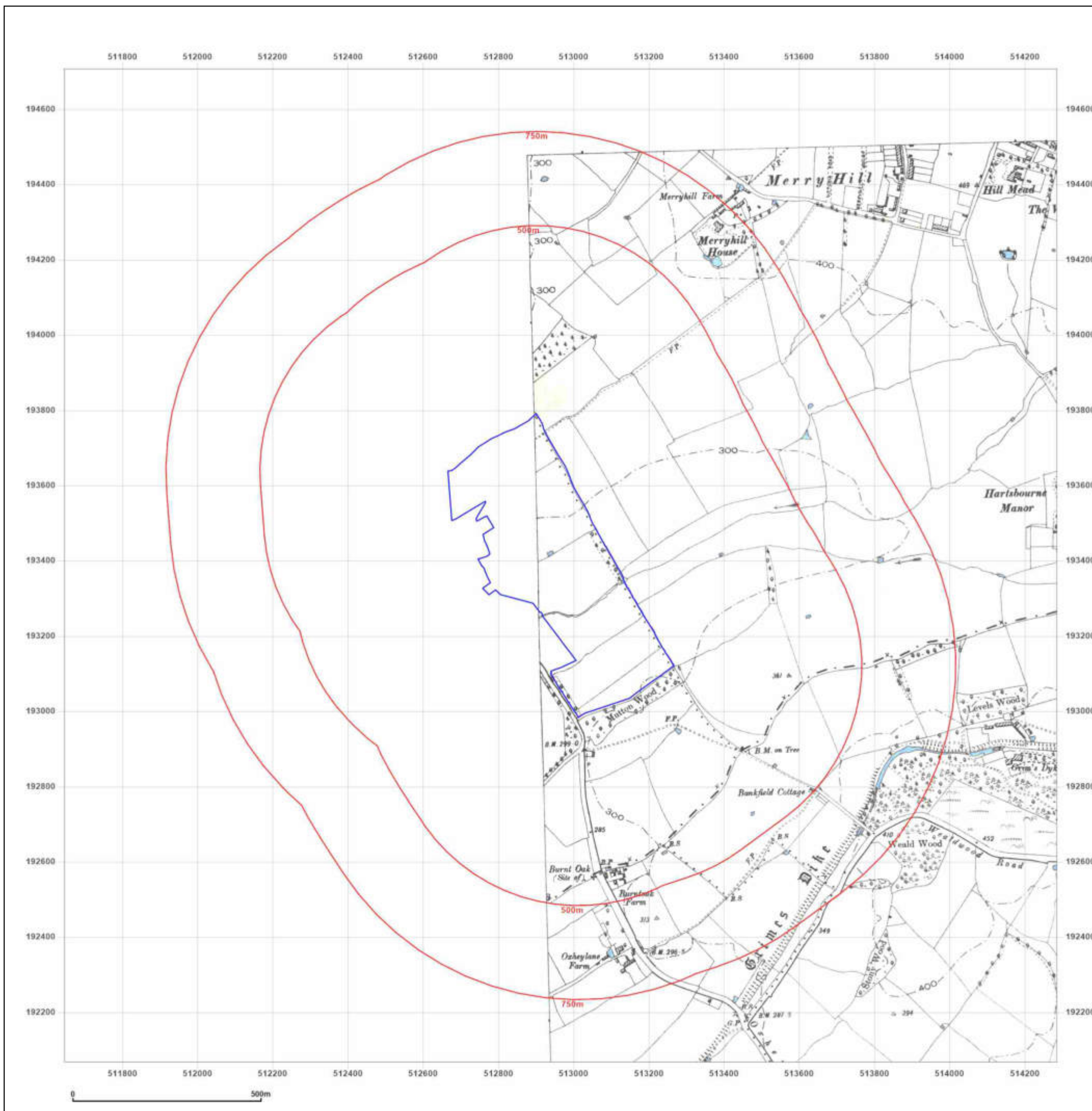


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Map Name: County Series

Map date: 1896-1899

Scale: 1:10,560

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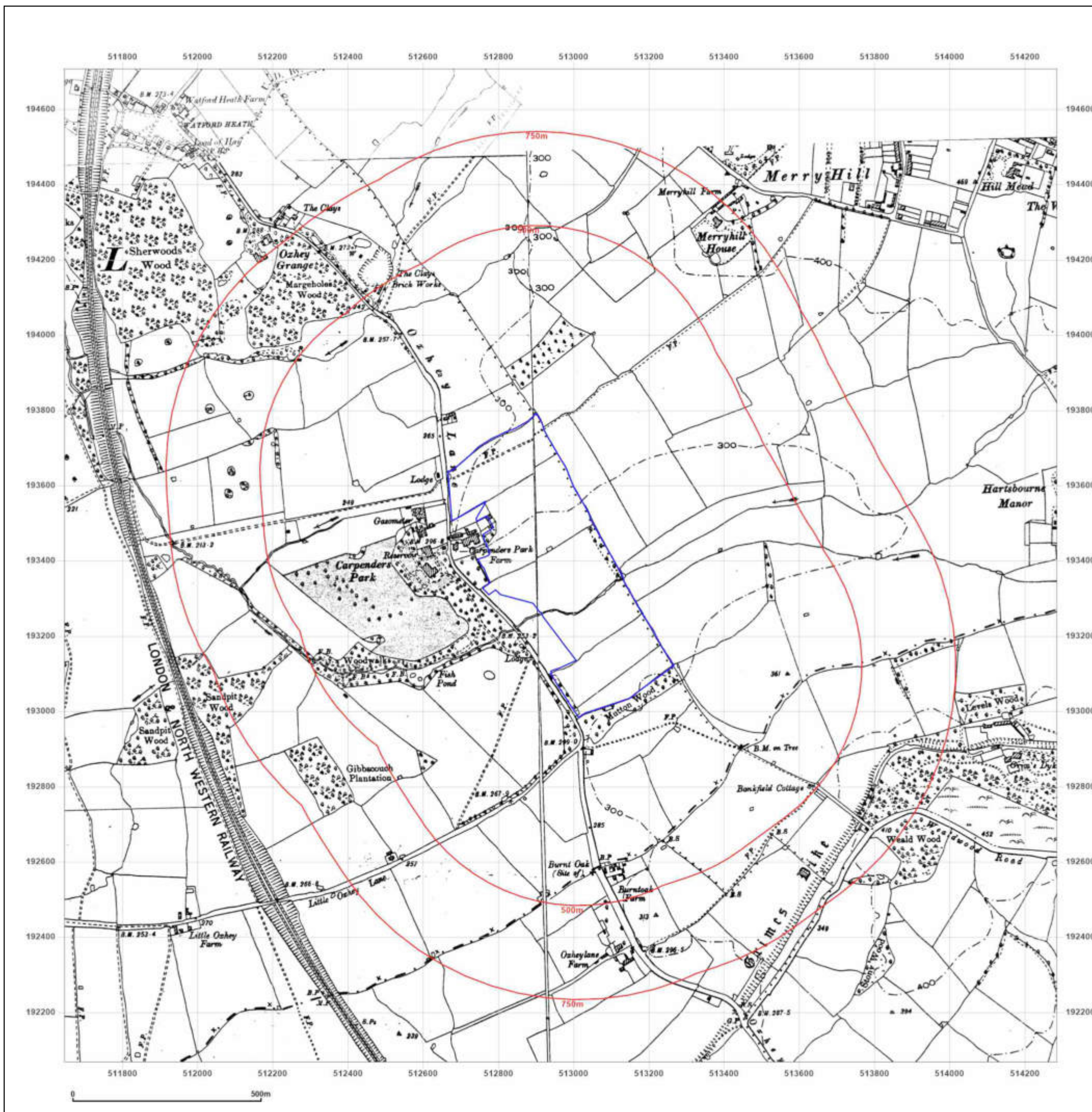


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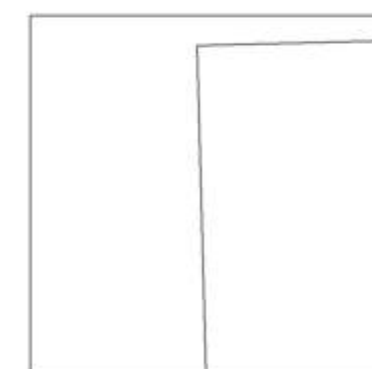
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Edition N/A  
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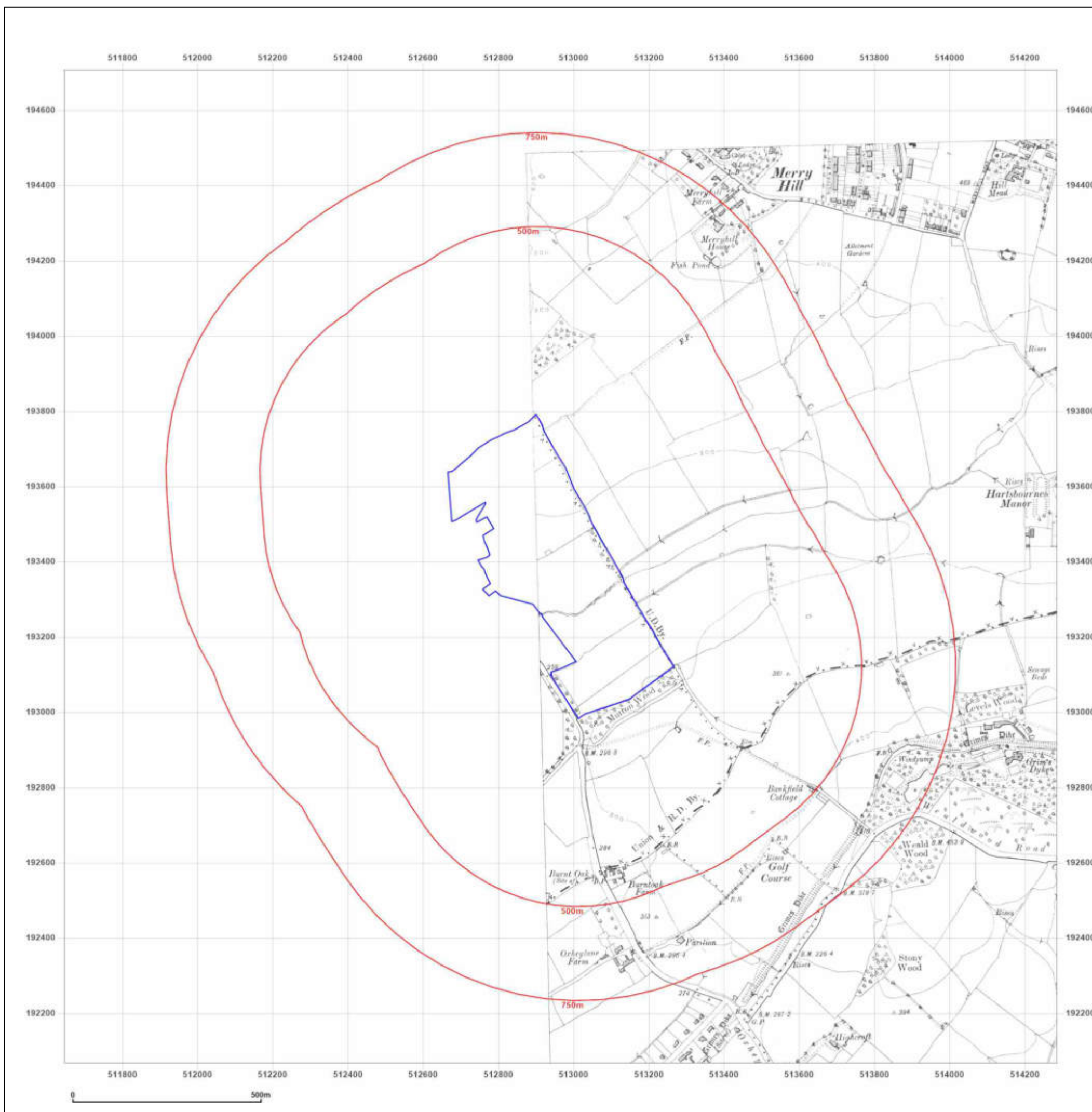


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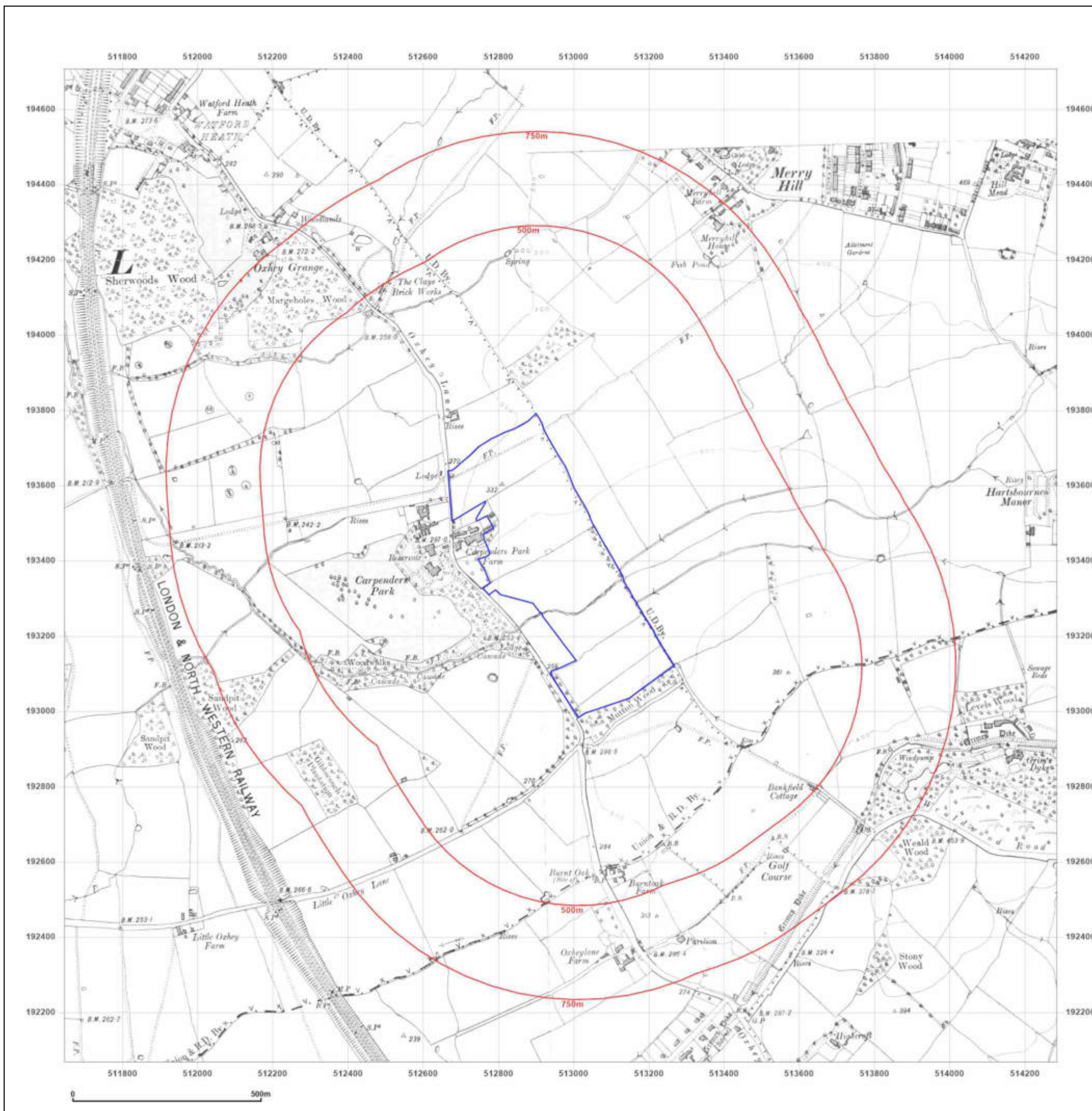


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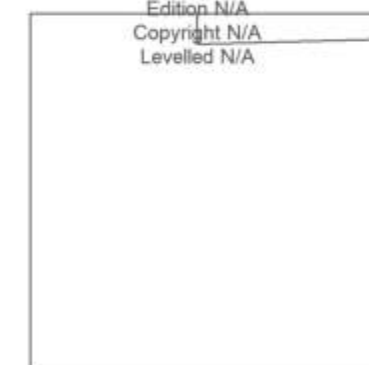
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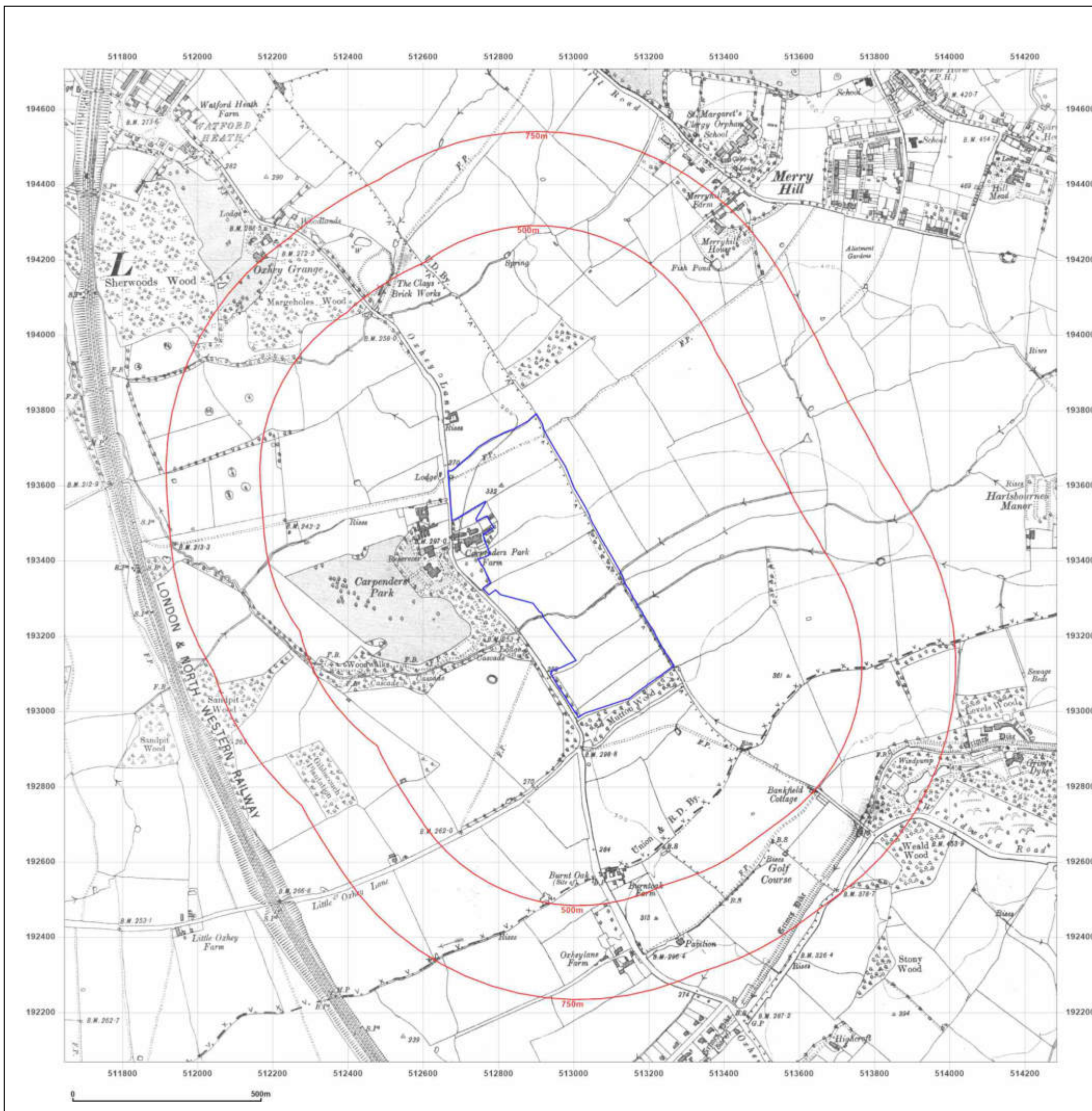


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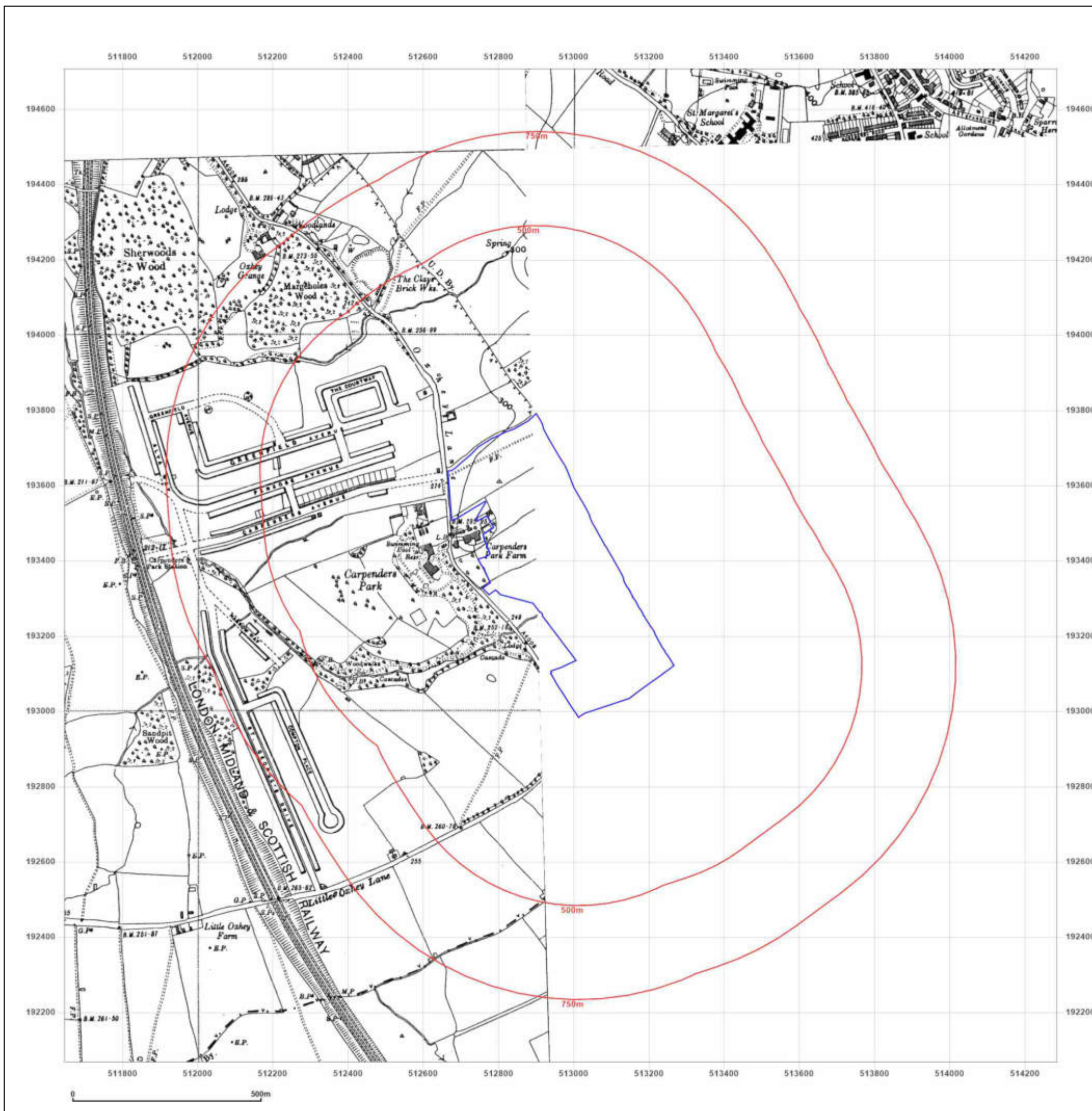


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Edition N/A  
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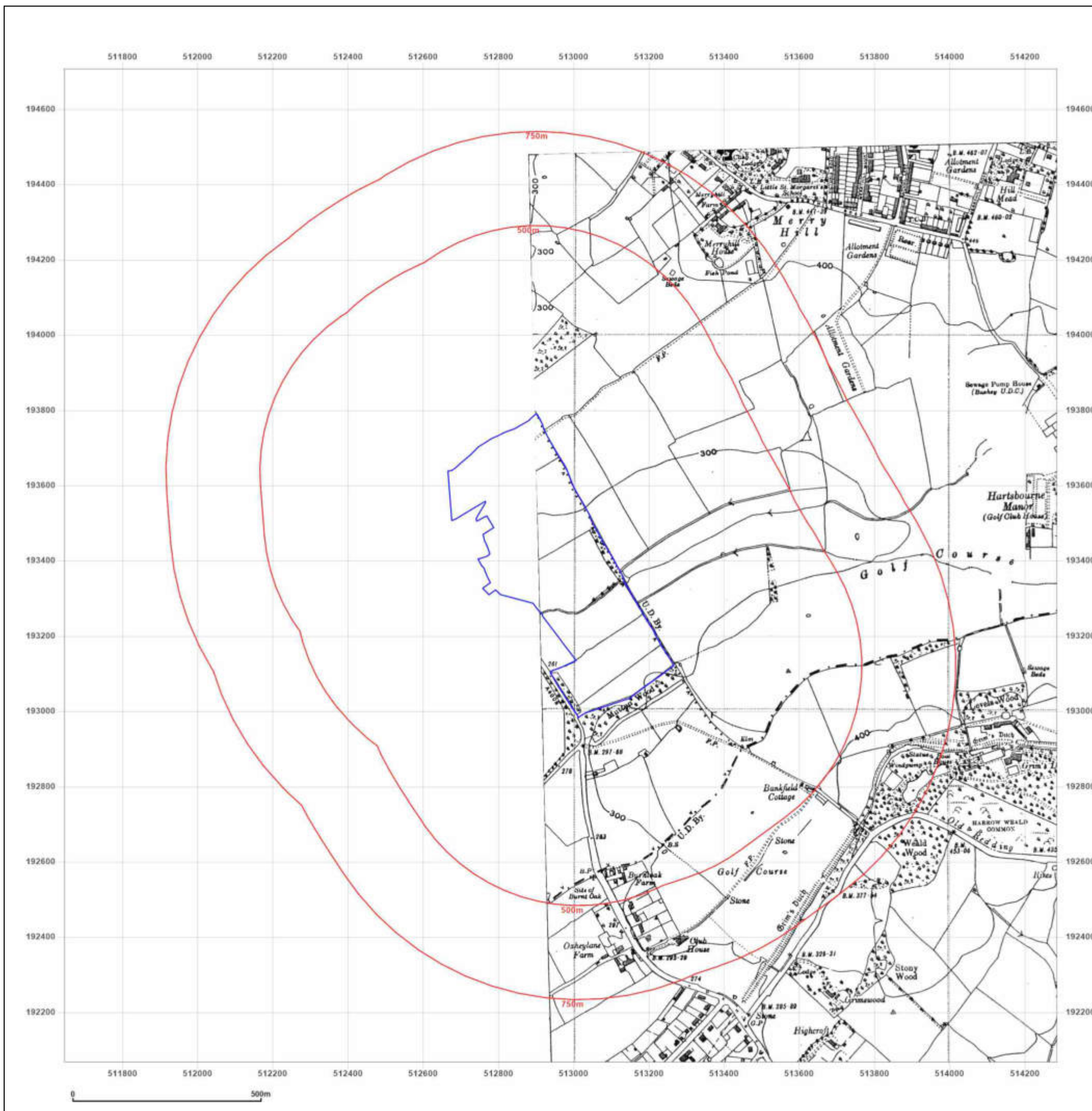


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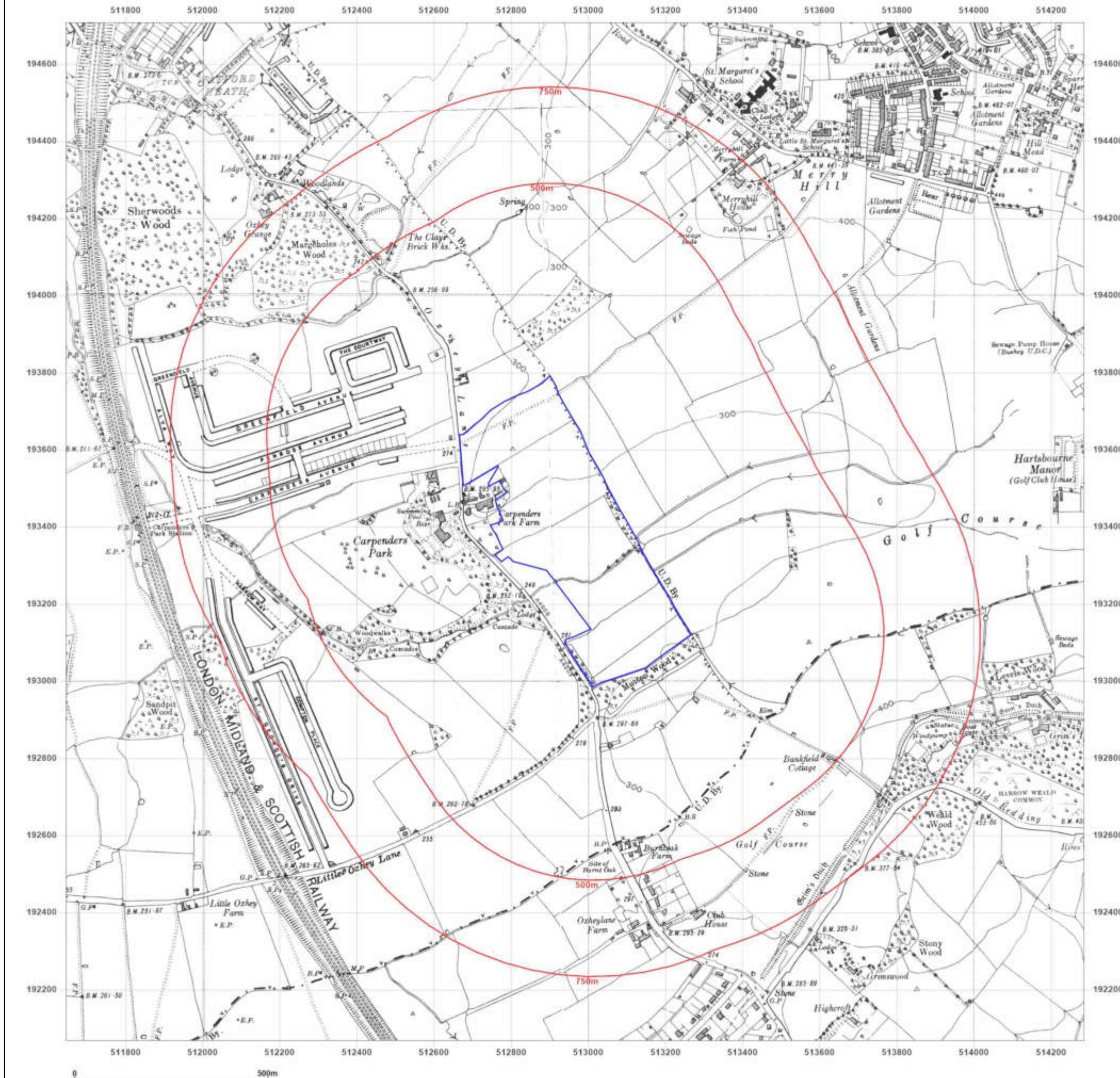


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**Map Name:** Provisional

**Map date:** 1959

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Edition N/A  
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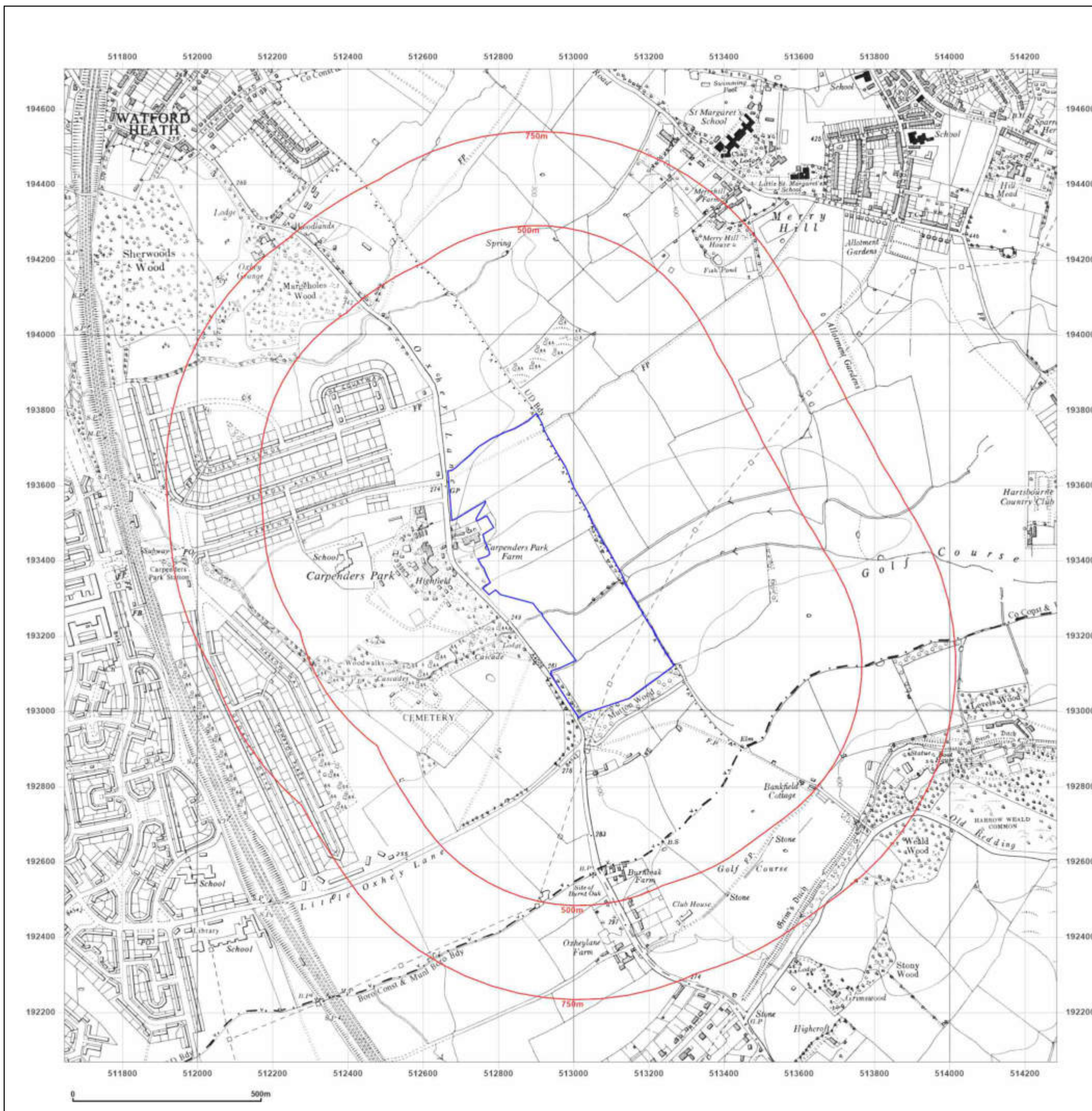


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**Map Name:** National Grid

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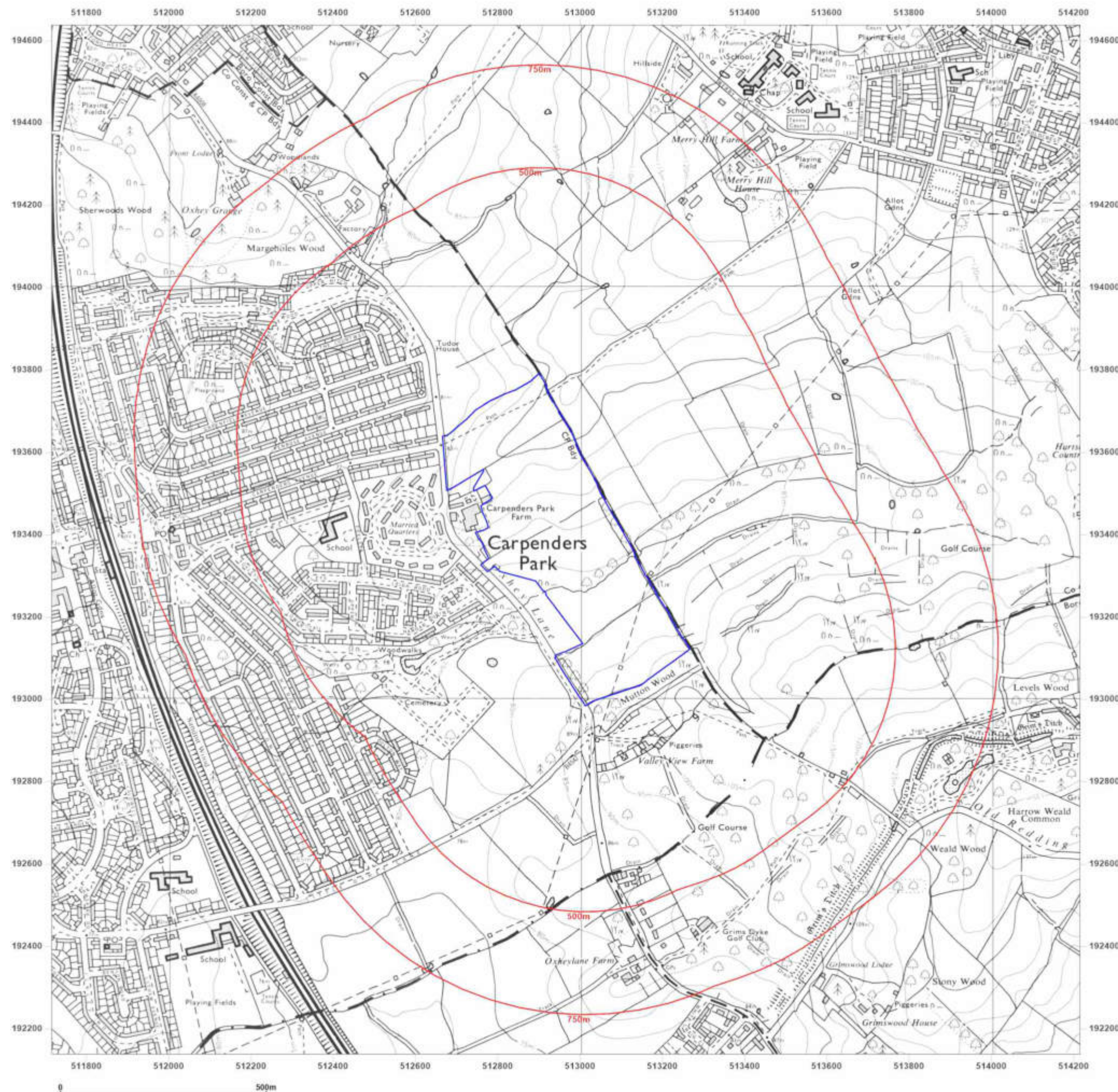


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**Scale:** 1:10,000

**Printed at:** 1:10,000

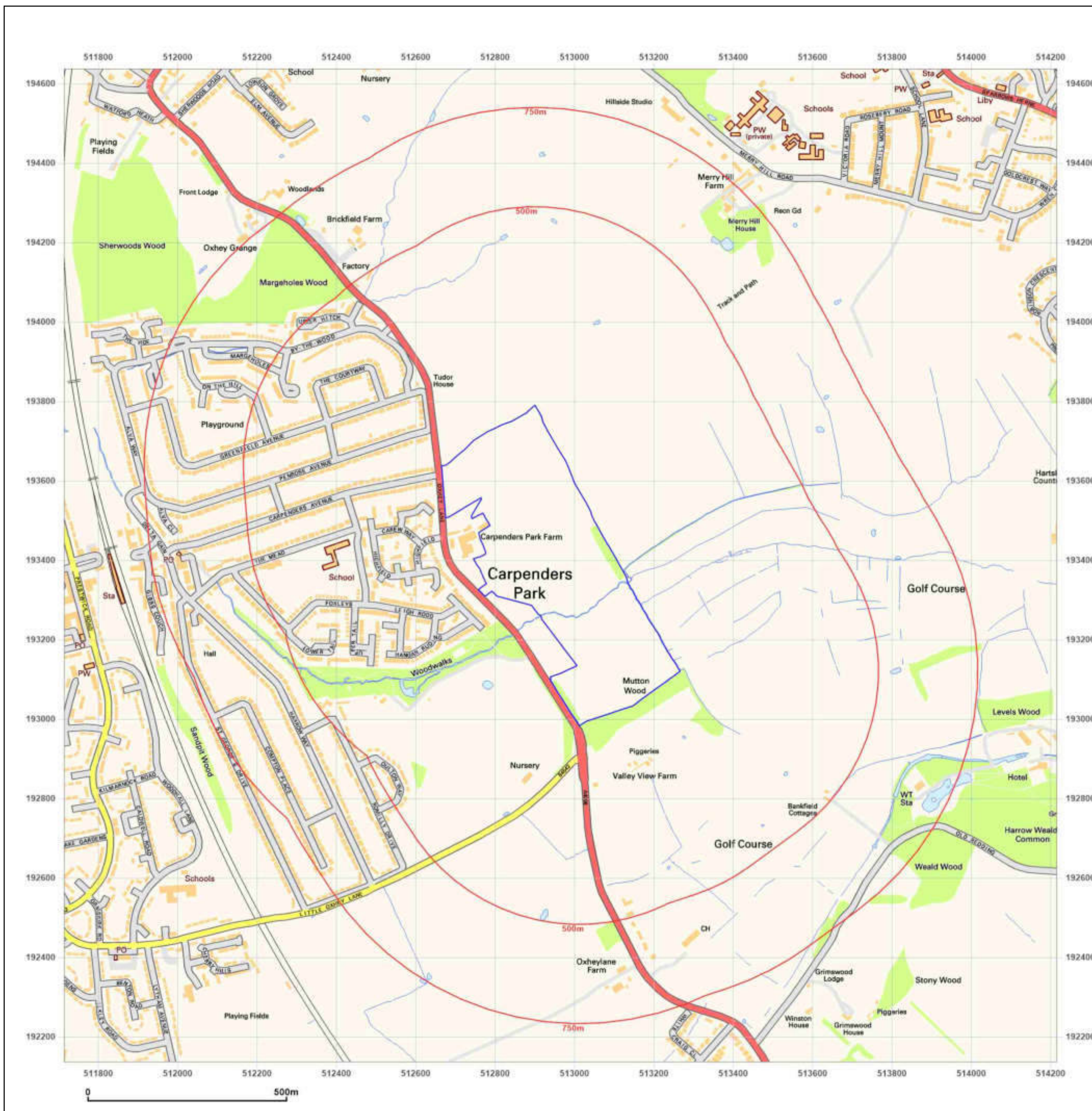


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E: [info@groundsure.com](mailto:info@groundsure.com)  
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Production date: 27 January 2025

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[www.groundsure.com/sites/default/files/groundsure\\_legend.pdf](http://www.groundsure.com/sites/default/files/groundsure_legend.pdf)



#### Site Details:

CARPENDERS PARK,  
HERTFORDSHIRE, WD19 5RJ

**Client Ref:** C5872-6096-SD  
**Report Ref:** GS-STB-X5T-CWD-GZL  
**Grid Ref:** 512965, 193387

**Map Name:** National Grid

**Map date:** 2010

**Scale:** 1:10,000

**Printed at:** 1:10,000

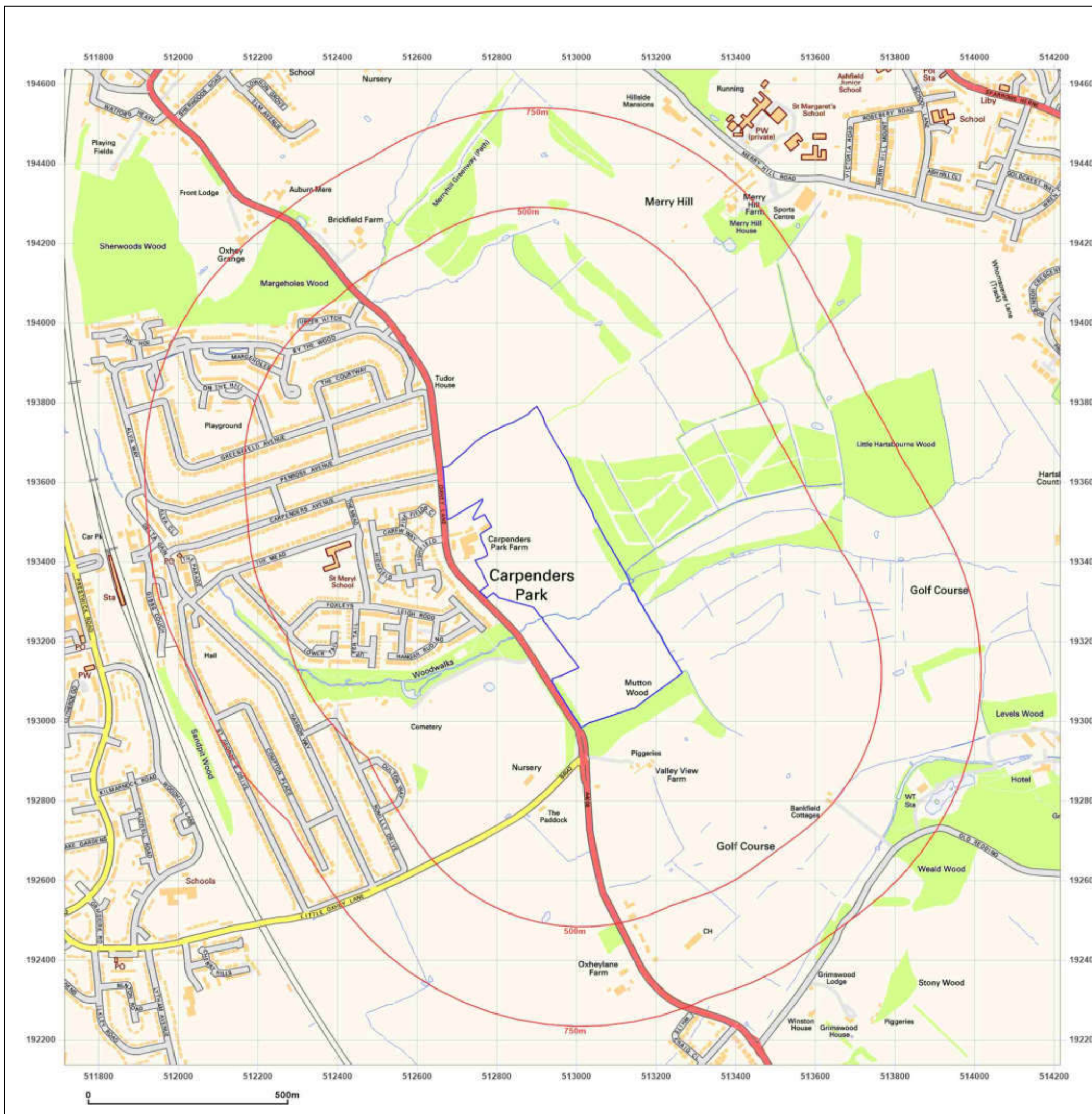


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#### Site Details:

CARPENDERS PARK,  
HERTFORDSHIRE, WD19 5RJ

**Client Ref:** C5872-6096-SD  
**Report Ref:** GS-STB-X5T-CWD-GZL  
**Grid Ref:** 512965, 193387

**Map Name:** National Grid

**Map date:** 2025

**Scale:** 1:10,000

**Printed at:** 1:10,000

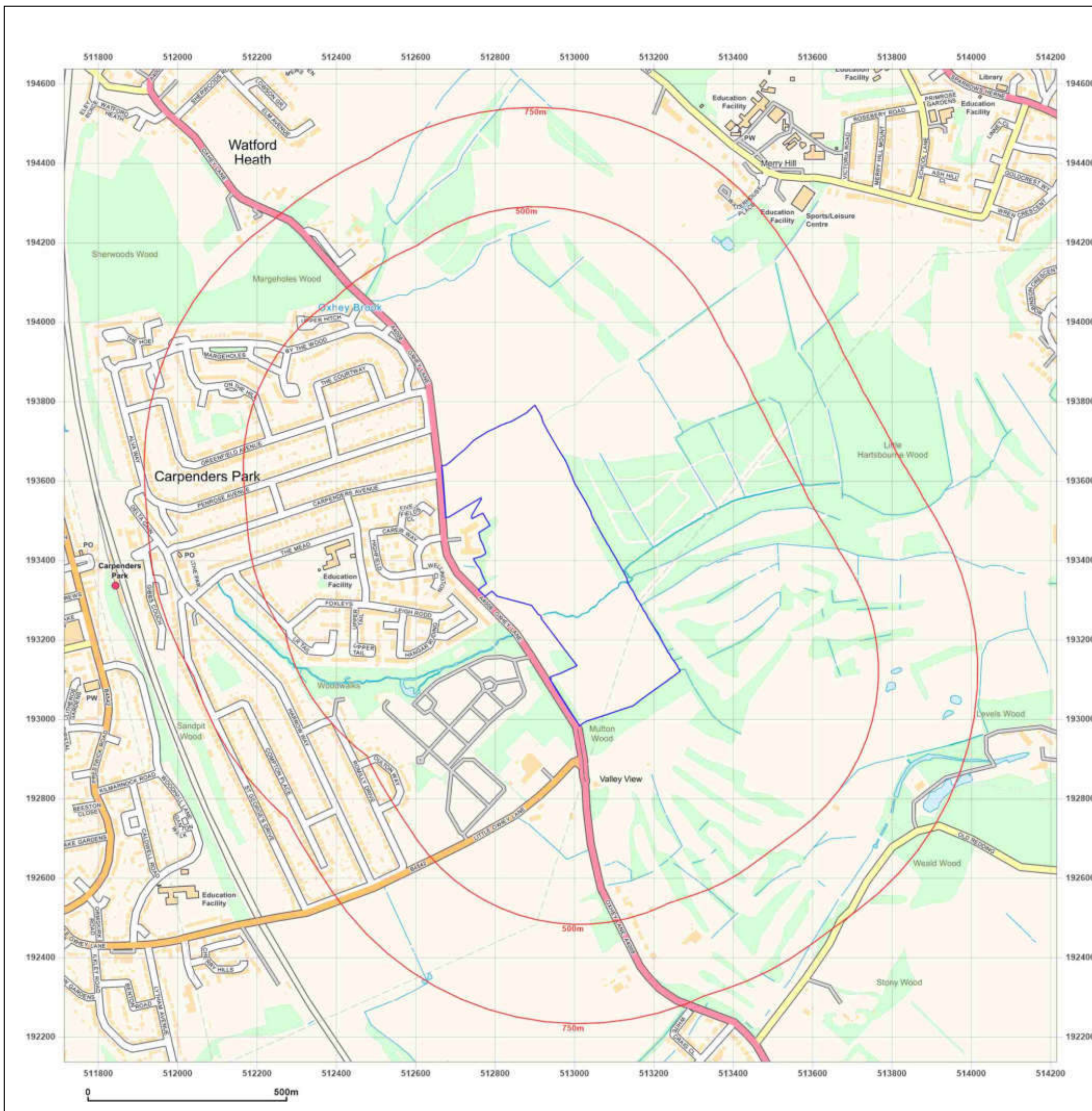


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## **APPENDIX C**

### **Geo-Environmental Data Report**

CARPENDERS PARK, HERTFORDSHIRE, WD19 5RJ

**Order Details**

**Date:** 27/01/2025  
**Your ref:** C5872-6096-SD  
**Our Ref:** GS-OUN-L9C-H5H-73T

**Site Details**

**Location:** 512957 193387  
**Area:** 21.02 ha  
**Authority:** [Three Rivers District Council](#) ↗,  
[Hertsmere Borough Council](#) ↗



**Summary of findings**

[p. 2](#) >

**Aerial image**

[p. 9](#) >

**OS MasterMap site plan**

N/A: >10ha

[Insight User Guide](#) ↗

## Summary of findings

| Page                    | Section                  | <a href="#">Past land use &gt;</a>                        | On site | 0-50m | 50-250m | 250-500m | 500-2000m |
|-------------------------|--------------------------|-----------------------------------------------------------|---------|-------|---------|----------|-----------|
| <a href="#">14 &gt;</a> | <a href="#">1.1 &gt;</a> | <a href="#">Historical industrial land uses &gt;</a>      | 0       | 1     | 6       | 12       | -         |
| <a href="#">15 &gt;</a> | <a href="#">1.2 &gt;</a> | <a href="#">Historical tanks &gt;</a>                     | 0       | 0     | 6       | 0        | -         |
| <a href="#">16 &gt;</a> | <a href="#">1.3 &gt;</a> | <a href="#">Historical energy features &gt;</a>           | 0       | 0     | 3       | 4        | -         |
| 17                      | 1.4                      | Historical petrol stations                                | 0       | 0     | 0       | 0        | -         |
| 17                      | 1.5                      | Historical garages                                        | 0       | 0     | 0       | 0        | -         |
| 17                      | 1.6                      | Historical military land                                  | 0       | 0     | 0       | 0        | -         |
| Page                    | Section                  | <a href="#">Past land use - un-grouped &gt;</a>           | On site | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">18 &gt;</a> | <a href="#">2.1 &gt;</a> | <a href="#">Historical industrial land uses &gt;</a>      | 0       | 1     | 8       | 17       | -         |
| <a href="#">20 &gt;</a> | <a href="#">2.2 &gt;</a> | <a href="#">Historical tanks &gt;</a>                     | 0       | 0     | 7       | 0        | -         |
| <a href="#">20 &gt;</a> | <a href="#">2.3 &gt;</a> | <a href="#">Historical energy features &gt;</a>           | 0       | 0     | 6       | 6        | -         |
| 21                      | 2.4                      | Historical petrol stations                                | 0       | 0     | 0       | 0        | -         |
| 21                      | 2.5                      | Historical garages                                        | 0       | 0     | 0       | 0        | -         |
| Page                    | Section                  | <a href="#">Waste and landfill &gt;</a>                   | On site | 0-50m | 50-250m | 250-500m | 500-2000m |
| 22                      | 3.1                      | Active or recent landfill                                 | 0       | 0     | 0       | 0        | -         |
| 22                      | 3.2                      | Historical landfill (BGS records)                         | 0       | 0     | 0       | 0        | -         |
| 23                      | 3.3                      | Historical landfill (LA/mapping records)                  | 0       | 0     | 0       | 0        | -         |
| <a href="#">23 &gt;</a> | <a href="#">3.4 &gt;</a> | <a href="#">Historical landfill (EA/NRW records) &gt;</a> | 0       | 0     | 0       | 1        | -         |
| 23                      | 3.5                      | Historical waste sites                                    | 0       | 0     | 0       | 0        | -         |
| 23                      | 3.6                      | Licensed waste sites                                      | 0       | 0     | 0       | 0        | -         |
| <a href="#">24 &gt;</a> | <a href="#">3.7 &gt;</a> | <a href="#">Waste exemptions &gt;</a>                     | 0       | 0     | 0       | 1        | -         |
| Page                    | Section                  | <a href="#">Current industrial land use &gt;</a>          | On site | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">25 &gt;</a> | <a href="#">4.1 &gt;</a> | <a href="#">Recent industrial land uses &gt;</a>          | 2       | 1     | 6       | -        | -         |
| 26                      | 4.2                      | Current or recent petrol stations                         | 0       | 0     | 0       | 0        | -         |
| 26                      | 4.3                      | Electricity cables                                        | 0       | 0     | 0       | 0        | -         |
| 26                      | 4.4                      | Gas pipelines                                             | 0       | 0     | 0       | 0        | -         |
| 27                      | 4.5                      | Sites determined as Contaminated Land                     | 0       | 0     | 0       | 0        | -         |



| 27             | 4.6              | Control of Major Accident Hazards (COMAH)                       | 0                        | 0     | 0       | 0        | -         |
|----------------|------------------|-----------------------------------------------------------------|--------------------------|-------|---------|----------|-----------|
| 27             | 4.7              | Regulated explosive sites                                       | 0                        | 0     | 0       | 0        | -         |
| 27             | 4.8              | Hazardous substance storage/usage                               | 0                        | 0     | 0       | 0        | -         |
| 27             | 4.9              | Historical licensed industrial activities (IPC)                 | 0                        | 0     | 0       | 0        | -         |
| 28             | 4.10             | Licensed industrial activities (Part A(1))                      | 0                        | 0     | 0       | 0        | -         |
| 28             | 4.11             | Licensed pollutant release (Part A(2)/B)                        | 0                        | 0     | 0       | 0        | -         |
| 28             | 4.12             | Radioactive Substance Authorisations                            | 0                        | 0     | 0       | 0        | -         |
| <b>28 &gt;</b> | <b>4.13 &gt;</b> | <b><u>Licensed Discharges to controlled waters &gt;</u></b>     | 0                        | 0     | 0       | 3        | -         |
| 29             | 4.14             | Pollutant release to surface waters (Red List)                  | 0                        | 0     | 0       | 0        | -         |
| 29             | 4.15             | Pollutant release to public sewer                               | 0                        | 0     | 0       | 0        | -         |
| 29             | 4.16             | List 1 Dangerous Substances                                     | 0                        | 0     | 0       | 0        | -         |
| 30             | 4.17             | List 2 Dangerous Substances                                     | 0                        | 0     | 0       | 0        | -         |
| <b>30 &gt;</b> | <b>4.18 &gt;</b> | <b><u>Pollution Incidents (EA/NRW) &gt;</u></b>                 | 0                        | 0     | 0       | 1        | -         |
| 30             | 4.19             | Pollution inventory substances                                  | 0                        | 0     | 0       | 0        | -         |
| 30             | 4.20             | Pollution inventory waste transfers                             | 0                        | 0     | 0       | 0        | -         |
| 31             | 4.21             | Pollution inventory radioactive waste                           | 0                        | 0     | 0       | 0        | -         |
| Page           | Section          | <b><u>Hydrogeology &gt;</u></b>                                 | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <b>32 &gt;</b> | <b>5.1 &gt;</b>  | <b><u>Superficial aquifer &gt;</u></b>                          | Identified (within 500m) |       |         |          |           |
| <b>33 &gt;</b> | <b>5.2 &gt;</b>  | <b><u>Bedrock aquifer &gt;</u></b>                              | Identified (within 500m) |       |         |          |           |
| <b>34 &gt;</b> | <b>5.3 &gt;</b>  | <b><u>Groundwater vulnerability &gt;</u></b>                    | Identified (within 50m)  |       |         |          |           |
| <b>35 &gt;</b> | <b>5.4 &gt;</b>  | <b><u>Groundwater vulnerability- soluble rock risk &gt;</u></b> | Identified (within 0m)   |       |         |          |           |
| 36             | 5.5              | Groundwater vulnerability- local information                    | None (within 0m)         |       |         |          |           |
| <b>37 &gt;</b> | <b>5.6 &gt;</b>  | <b><u>Groundwater abstractions &gt;</u></b>                     | 0                        | 0     | 0       | 0        | 4         |
| 39             | 5.7              | Surface water abstractions                                      | 0                        | 0     | 0       | 0        | 0         |
| 39             | 5.8              | Potable abstractions                                            | 0                        | 0     | 0       | 0        | 0         |
| <b>39 &gt;</b> | <b>5.9 &gt;</b>  | <b><u>Source Protection Zones &gt;</u></b>                      | 2                        | 0     | 0       | 1        | -         |
| 39             | 5.10             | Source Protection Zones (confined aquifer)                      | 0                        | 0     | 0       | 0        | -         |
| Page           | Section          | <b><u>Hydrology &gt;</u></b>                                    | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <b>40 &gt;</b> | <b>6.1 &gt;</b>  | <b><u>Water Network (OS MasterMap) &gt;</u></b>                 | 12                       | 7     | 19      | -        | -         |



| 44 > | 6.2 >   | <a href="#">Surface water features &gt;</a>                      | 1                                            | 2     | 14      | -        | -         |
|------|---------|------------------------------------------------------------------|----------------------------------------------|-------|---------|----------|-----------|
| 44 > | 6.3 >   | <a href="#">WFD Surface water body catchments &gt;</a>           | 1                                            | -     | -       | -        | -         |
| 44 > | 6.4 >   | <a href="#">WFD Surface water bodies &gt;</a>                    | 1                                            | 0     | 0       | -        | -         |
| 45   | 6.5     | WFD Groundwater bodies                                           | 0                                            | -     | -       | -        | -         |
| Page | Section | <a href="#">River and coastal flooding &gt;</a>                  | On site                                      | 0-50m | 50-250m | 250-500m | 500-2000m |
| 46 > | 7.1 >   | <a href="#">Risk of flooding from rivers and the sea &gt;</a>    | High (within 50m)                            |       |         |          |           |
| 47 > | 7.2 >   | <a href="#">Historical Flood Events &gt;</a>                     | 2                                            | 0     | 0       | -        | -         |
| 47 > | 7.3 >   | <a href="#">Flood Defences &gt;</a>                              | 0                                            | 5     | 0       | -        | -         |
| 48   | 7.4     | Areas Benefiting from Flood Defences                             | 0                                            | 0     | 0       | -        | -         |
| 48 > | 7.5 >   | <a href="#">Flood Storage Areas &gt;</a>                         | 1                                            | 0     | 0       | -        | -         |
| 49 > | 7.6 >   | <a href="#">Flood Zone 2 &gt;</a>                                | Identified (within 50m)                      |       |         |          |           |
| 50 > | 7.7 >   | <a href="#">Flood Zone 3 &gt;</a>                                | Identified (within 50m)                      |       |         |          |           |
| Page | Section | <a href="#">Surface water flooding &gt;</a>                      |                                              |       |         |          |           |
| 51 > | 8.1 >   | <a href="#">Surface water flooding &gt;</a>                      | 1 in 30 year, Greater than 1.0m (within 50m) |       |         |          |           |
| Page | Section | <a href="#">Groundwater flooding &gt;</a>                        |                                              |       |         |          |           |
| 53 > | 9.1 >   | <a href="#">Groundwater flooding &gt;</a>                        | Negligible (within 50m)                      |       |         |          |           |
| Page | Section | <a href="#">Environmental designations &gt;</a>                  | On site                                      | 0-50m | 50-250m | 250-500m | 500-2000m |
| 54 > | 10.1 >  | <a href="#">Sites of Special Scientific Interest (SSSI) &gt;</a> | 0                                            | 0     | 0       | 0        | 2         |
| 55   | 10.2    | Conserved wetland sites (Ramsar sites)                           | 0                                            | 0     | 0       | 0        | 0         |
| 55   | 10.3    | Special Areas of Conservation (SAC)                              | 0                                            | 0     | 0       | 0        | 0         |
| 55   | 10.4    | Special Protection Areas (SPA)                                   | 0                                            | 0     | 0       | 0        | 0         |
| 55   | 10.5    | National Nature Reserves (NNR)                                   | 0                                            | 0     | 0       | 0        | 0         |
| 56 > | 10.6 >  | <a href="#">Local Nature Reserves (LNR) &gt;</a>                 | 0                                            | 0     | 0       | 0        | 5         |
| 56 > | 10.7 >  | <a href="#">Designated Ancient Woodland &gt;</a>                 | 0                                            | 0     | 0       | 0        | 5         |
| 57   | 10.8    | Biosphere Reserves                                               | 0                                            | 0     | 0       | 0        | 0         |
| 57   | 10.9    | Forest Parks                                                     | 0                                            | 0     | 0       | 0        | 0         |
| 57   | 10.10   | Marine Conservation Zones                                        | 0                                            | 0     | 0       | 0        | 0         |
| 57 > | 10.11 > | <a href="#">Green Belt &gt;</a>                                  | 2                                            | 0     | 0       | 1        | 4         |
| 58   | 10.12   | Proposed Ramsar sites                                            | 0                                            | 0     | 0       | 0        | 0         |



| 58                      | 10.13                      | Possible Special Areas of Conservation (pSAC)         | 0                        | 0     | 0       | 0        | 0         |
|-------------------------|----------------------------|-------------------------------------------------------|--------------------------|-------|---------|----------|-----------|
| 58                      | 10.14                      | Potential Special Protection Areas (pSPA)             | 0                        | 0     | 0       | 0        | 0         |
| 58                      | 10.15                      | Nitrate Sensitive Areas                               | 0                        | 0     | 0       | 0        | 0         |
| 59                      | 10.16                      | Nitrate Vulnerable Zones                              | 0                        | 0     | 0       | 0        | 0         |
| <a href="#">60 &gt;</a> | <a href="#">10.17 &gt;</a> | <a href="#">SSSI Impact Risk Zones &gt;</a>           | 2                        | -     | -       | -        | -         |
| <a href="#">61 &gt;</a> | <a href="#">10.18 &gt;</a> | <a href="#">SSSI Units &gt;</a>                       | 0                        | 0     | 0       | 0        | 3         |
| Page                    | Section                    | Visual and cultural designations                      | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| 63                      | 11.1                       | World Heritage Sites                                  | 0                        | 0     | 0       | -        | -         |
| 63                      | 11.2                       | Area of Outstanding Natural Beauty                    | 0                        | 0     | 0       | -        | -         |
| 63                      | 11.3                       | National Parks                                        | 0                        | 0     | 0       | -        | -         |
| 63                      | 11.4                       | Listed Buildings                                      | 0                        | 0     | 0       | -        | -         |
| 64                      | 11.5                       | Conservation Areas                                    | 0                        | 0     | 0       | -        | -         |
| 64                      | 11.6                       | Scheduled Ancient Monuments                           | 0                        | 0     | 0       | -        | -         |
| 64                      | 11.7                       | Registered Parks and Gardens                          | 0                        | 0     | 0       | -        | -         |
| Page                    | Section                    | <a href="#">Agricultural designations &gt;</a>        | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">65 &gt;</a> | <a href="#">12.1 &gt;</a>  | <a href="#">Agricultural Land Classification &gt;</a> | Grade 3 (within 250m)    |       |         |          |           |
| 66                      | 12.2                       | Open Access Land                                      | 0                        | 0     | 0       | -        | -         |
| 66                      | 12.3                       | Tree Felling Licences                                 | 0                        | 0     | 0       | -        | -         |
| 66                      | 12.4                       | Environmental Stewardship Schemes                     | 0                        | 0     | 0       | -        | -         |
| 67                      | 12.5                       | Countryside Stewardship Schemes                       | 0                        | 0     | 0       | -        | -         |
| Page                    | Section                    | <a href="#">Habitat designations &gt;</a>             | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">68 &gt;</a> | <a href="#">13.1 &gt;</a>  | <a href="#">Priority Habitat Inventory &gt;</a>       | 3                        | 0     | 11      | -        | -         |
| <a href="#">69 &gt;</a> | <a href="#">13.2 &gt;</a>  | <a href="#">Habitat Networks &gt;</a>                 | 1                        | 0     | 1       | -        | -         |
| 69                      | 13.3                       | Open Mosaic Habitat                                   | 0                        | 0     | 0       | -        | -         |
| 70                      | 13.4                       | Limestone Pavement Orders                             | 0                        | 0     | 0       | -        | -         |
| Page                    | Section                    | <a href="#">Geology 1:10,000 scale &gt;</a>           | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">71 &gt;</a> | <a href="#">14.1 &gt;</a>  | <a href="#">10k Availability &gt;</a>                 | Identified (within 500m) |       |         |          |           |
| <a href="#">72 &gt;</a> | <a href="#">14.2 &gt;</a>  | <a href="#">Artificial and made ground (10k) &gt;</a> | 0                        | 0     | 0       | 1        | -         |
| <a href="#">73 &gt;</a> | <a href="#">14.3 &gt;</a>  | <a href="#">Superficial geology (10k) &gt;</a>        | 0                        | 0     | 1       | 0        | -         |



| 74                      | 14.4                      | Landslip (10k)                                           | 0                        | 0     | 0       | 0        | -         |
|-------------------------|---------------------------|----------------------------------------------------------|--------------------------|-------|---------|----------|-----------|
| <a href="#">75 &gt;</a> | <a href="#">14.5 &gt;</a> | <a href="#">Bedrock geology (10k) &gt;</a>               | 1                        | 0     | 1       | 0        | -         |
| 76                      | 14.6                      | Bedrock faults and other linear features (10k)           | 0                        | 0     | 0       | 0        | -         |
| Page                    | Section                   | <a href="#">Geology 1:50,000 scale &gt;</a>              | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">77 &gt;</a> | <a href="#">15.1 &gt;</a> | <a href="#">50k Availability &gt;</a>                    | Identified (within 500m) |       |         |          |           |
| <a href="#">78 &gt;</a> | <a href="#">15.2 &gt;</a> | <a href="#">Artificial and made ground (50k) &gt;</a>    | 0                        | 0     | 0       | 1        | -         |
| 79                      | 15.3                      | Artificial ground permeability (50k)                     | 0                        | 0     | -       | -        | -         |
| <a href="#">80 &gt;</a> | <a href="#">15.4 &gt;</a> | <a href="#">Superficial geology (50k) &gt;</a>           | 0                        | 0     | 1       | 0        | -         |
| 81                      | 15.5                      | Superficial permeability (50k)                           | None (within 50m)        |       |         |          |           |
| 81                      | 15.6                      | Landslip (50k)                                           | 0                        | 0     | 0       | 0        | -         |
| 81                      | 15.7                      | Landslip permeability (50k)                              | None (within 50m)        |       |         |          |           |
| <a href="#">82 &gt;</a> | <a href="#">15.8 &gt;</a> | <a href="#">Bedrock geology (50k) &gt;</a>               | 1                        | 0     | 1       | 0        | -         |
| <a href="#">83 &gt;</a> | <a href="#">15.9 &gt;</a> | <a href="#">Bedrock permeability (50k) &gt;</a>          | Identified (within 50m)  |       |         |          |           |
| 83                      | 15.10                     | Bedrock faults and other linear features (50k)           | 0                        | 0     | 0       | 0        | -         |
| Page                    | Section                   | <a href="#">Boreholes &gt;</a>                           | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">84 &gt;</a> | <a href="#">16.1 &gt;</a> | <a href="#">BGS Boreholes &gt;</a>                       | 0                        | 1     | 6       | -        | -         |
| Page                    | Section                   | <a href="#">Natural ground subsidence &gt;</a>           |                          |       |         |          |           |
| <a href="#">86 &gt;</a> | <a href="#">17.1 &gt;</a> | <a href="#">Shrink swell clays &gt;</a>                  | Moderate (within 50m)    |       |         |          |           |
| <a href="#">87 &gt;</a> | <a href="#">17.2 &gt;</a> | <a href="#">Running sands &gt;</a>                       | Very low (within 50m)    |       |         |          |           |
| <a href="#">88 &gt;</a> | <a href="#">17.3 &gt;</a> | <a href="#">Compressible deposits &gt;</a>               | Negligible (within 50m)  |       |         |          |           |
| <a href="#">89 &gt;</a> | <a href="#">17.4 &gt;</a> | <a href="#">Collapsible deposits &gt;</a>                | Very low (within 50m)    |       |         |          |           |
| <a href="#">90 &gt;</a> | <a href="#">17.5 &gt;</a> | <a href="#">Landslides &gt;</a>                          | Low (within 50m)         |       |         |          |           |
| <a href="#">92 &gt;</a> | <a href="#">17.6 &gt;</a> | <a href="#">Ground dissolution of soluble rocks &gt;</a> | Negligible (within 50m)  |       |         |          |           |
| Page                    | Section                   | <a href="#">Mining and ground workings &gt;</a>          | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| 94                      | 18.1                      | BritPits                                                 | 0                        | 0     | 0       | 0        | -         |
| <a href="#">95 &gt;</a> | <a href="#">18.2 &gt;</a> | <a href="#">Surface ground workings &gt;</a>             | 0                        | 0     | 15      | -        | -         |
| 95                      | 18.3                      | Underground workings                                     | 0                        | 0     | 0       | 0        | 0         |
| 96                      | 18.4                      | Underground mining extents                               | 0                        | 0     | 0       | 0        | -         |
| 96                      | 18.5                      | Historical Mineral Planning Areas                        | 0                        | 0     | 0       | 0        | -         |

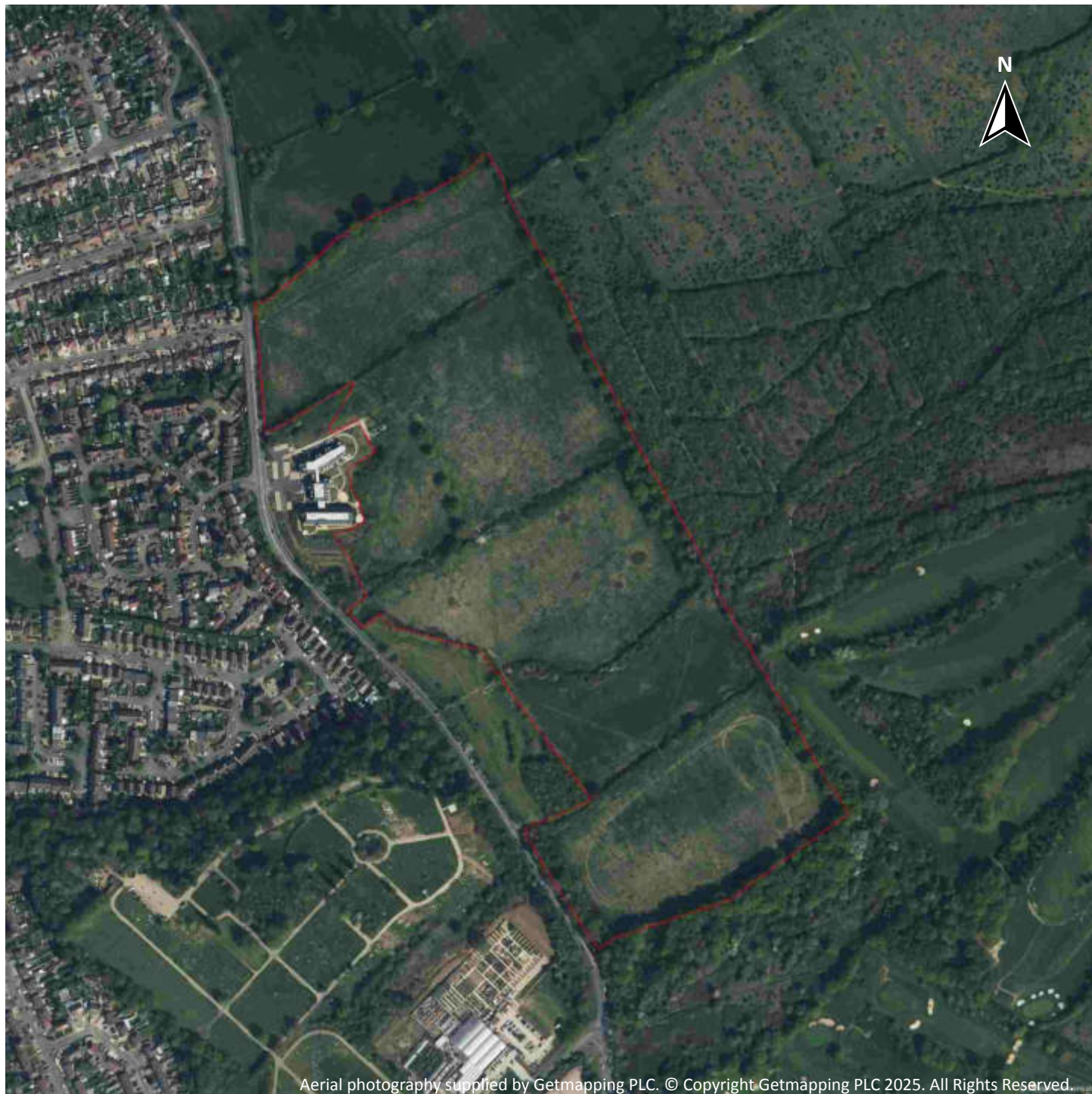


| <a href="#">96</a> >  | <a href="#">18.6</a> > | <a href="#">Non-coal mining</a> >                         | 1                        | 0     | 0       | 0        | 2         |
|-----------------------|------------------------|-----------------------------------------------------------|--------------------------|-------|---------|----------|-----------|
| 97                    | 18.7                   | JPB mining areas                                          | None (within 0m)         |       |         |          |           |
| 97                    | 18.8                   | The Coal Authority non-coal mining                        | 0                        | 0     | 0       | 0        | -         |
| 97                    | 18.9                   | Researched mining                                         | 0                        | 0     | 0       | 0        | -         |
| 97                    | 18.10                  | Mining record office plans                                | 0                        | 0     | 0       | 0        | -         |
| 98                    | 18.11                  | BGS mine plans                                            | 0                        | 0     | 0       | 0        | -         |
| 98                    | 18.12                  | Coal mining                                               | None (within 0m)         |       |         |          |           |
| 98                    | 18.13                  | Brine areas                                               | None (within 0m)         |       |         |          |           |
| 98                    | 18.14                  | Gypsum areas                                              | None (within 0m)         |       |         |          |           |
| 98                    | 18.15                  | Tin mining                                                | None (within 0m)         |       |         |          |           |
| 99                    | 18.16                  | Clay mining                                               | None (within 0m)         |       |         |          |           |
| Page                  | Section                | <a href="#">Ground cavities and sinkholes</a> >           | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| 100                   | 19.1                   | Natural cavities                                          | 0                        | 0     | 0       | 0        | -         |
| <a href="#">101</a> > | <a href="#">19.2</a> > | <a href="#">Mining cavities</a> >                         | 0                        | 0     | 0       | 0        | 3         |
| 101                   | 19.3                   | Reported recent incidents                                 | 0                        | 0     | 0       | 0        | -         |
| 101                   | 19.4                   | Historical incidents                                      | 0                        | 0     | 0       | 0        | -         |
| Page                  | Section                | <a href="#">Radon</a> >                                   |                          |       |         |          |           |
| <a href="#">102</a> > | <a href="#">20.1</a> > | <a href="#">Radon</a> >                                   | Less than 1% (within 0m) |       |         |          |           |
| Page                  | Section                | <a href="#">Soil chemistry</a> >                          | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| <a href="#">104</a> > | <a href="#">21.1</a> > | <a href="#">BGS Estimated Background Soil Chemistry</a> > | 12                       | 4     | -       | -        | -         |
| <a href="#">105</a> > | <a href="#">21.2</a> > | <a href="#">BGS Estimated Urban Soil Chemistry</a> >      | 17                       | 7     | -       | -        | -         |
| 106                   | 21.3                   | BGS Measured Urban Soil Chemistry                         | 0                        | 0     | -       | -        | -         |
| Page                  | Section                | <a href="#">Railway infrastructure and projects</a>       | On site                  | 0-50m | 50-250m | 250-500m | 500-2000m |
| 107                   | 22.1                   | Underground railways (London)                             | 0                        | 0     | 0       | -        | -         |
| 107                   | 22.2                   | Underground railways (Non-London)                         | 0                        | 0     | 0       | -        | -         |
| 107                   | 22.3                   | Railway tunnels                                           | 0                        | 0     | 0       | -        | -         |
| 107                   | 22.4                   | Historical railway and tunnel features                    | 0                        | 0     | 0       | -        | -         |
| 107                   | 22.5                   | Royal Mail tunnels                                        | 0                        | 0     | 0       | -        | -         |
| 108                   | 22.6                   | Historical railways                                       | 0                        | 0     | 0       | -        | -         |



|     |      |             |   |   |   |   |   |
|-----|------|-------------|---|---|---|---|---|
| 108 | 22.7 | Railways    | 0 | 0 | 0 | - | - |
| 108 | 22.8 | Crossrail 2 | 0 | 0 | 0 | 0 | - |
| 108 | 22.9 | HS2         | 0 | 0 | 0 | 0 | - |

## Recent aerial photograph

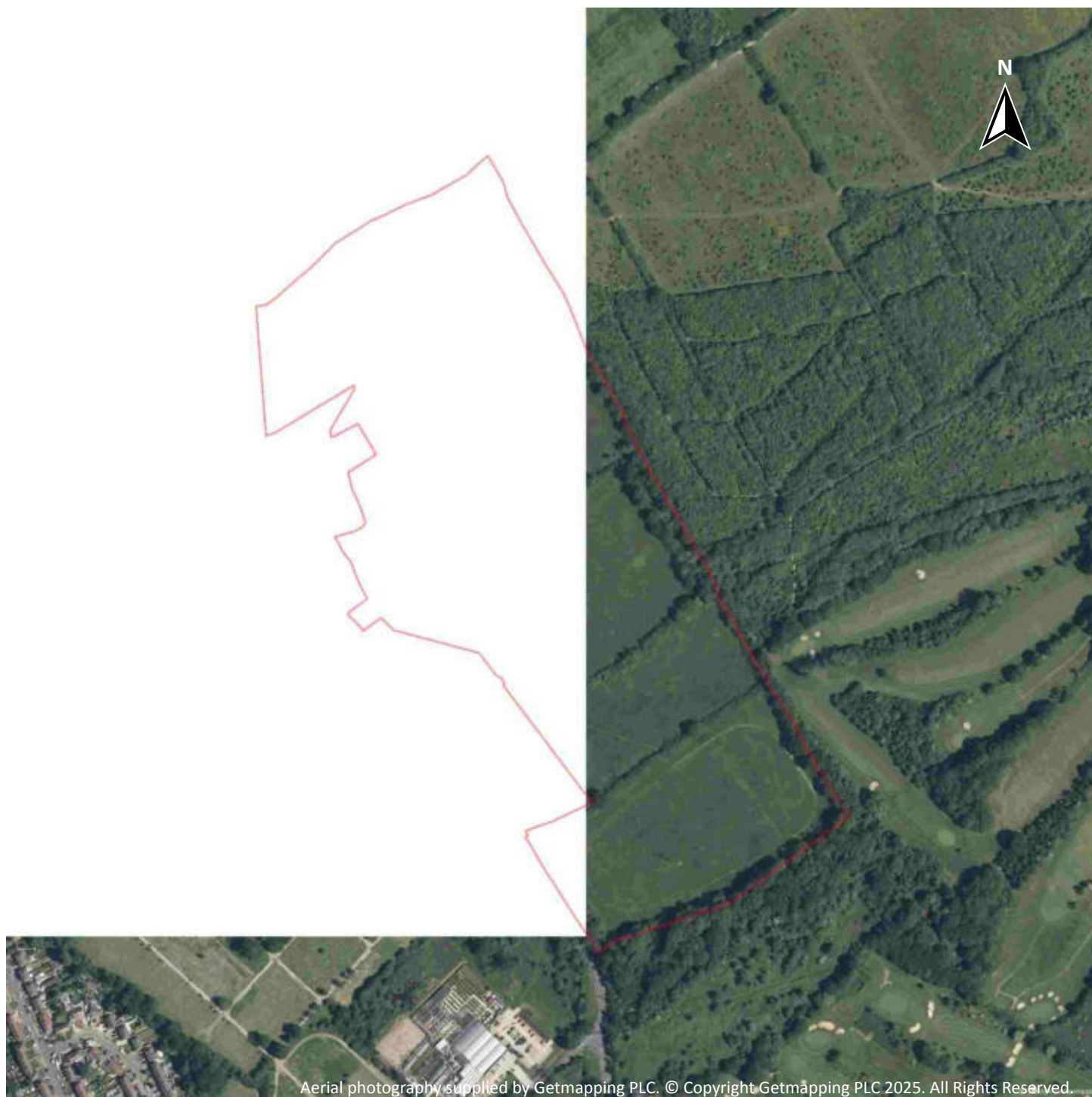


Capture Date: 21/04/2022

Site Area: 21.02ha



## Recent site history - 2021 aerial photograph



Capture Date: 13/06/2021

Site Area: 21.02ha



## Recent site history - 2015 aerial photograph



Capture Date: 20/04/2015

Site Area: 21.02ha



## Recent site history - 2013 aerial photograph



Aerial photography supplied by Getmapping PLC. © Copyright Getmapping PLC 2025. All Rights Reserved.

Capture Date: 28/04/2013

Site Area: 21.02ha



## Recent site history - 1999 aerial photograph

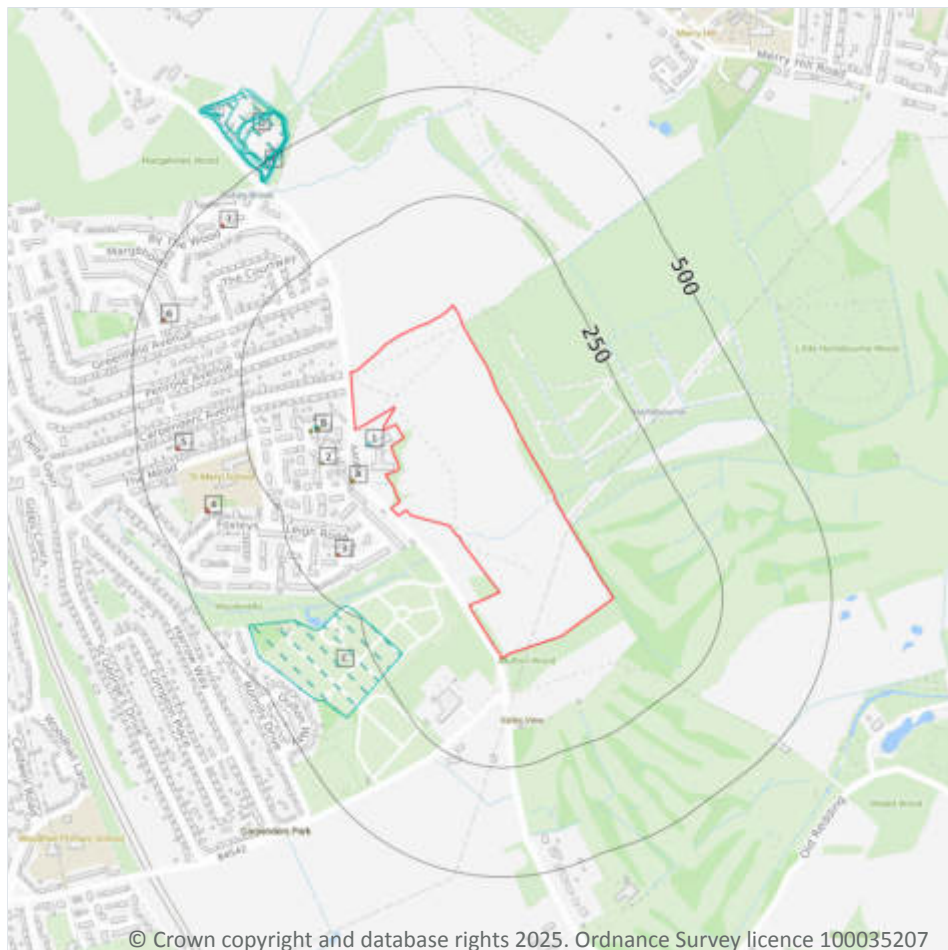


Capture Date: 29/08/1999

Site Area: 21.02ha



## 1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

### 1.1 Historical industrial land uses

Records within 500m

19

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on [page 14 >](#)

| ID | Location | Land use   | Dates present | Group ID |
|----|----------|------------|---------------|----------|
| 1  | 39m W    | Pump House | 1883          | 2199834  |



| ID | Location | Land use             | Dates present | Group ID |
|----|----------|----------------------|---------------|----------|
| B  | 81m W    | Gasometer            | 1899          | 2289979  |
| B  | 82m W    | Gasometer            | 1895          | 2297479  |
| B  | 86m W    | Gasometer            | 1896          | 2228884  |
| B  | 98m W    | Gasometer            | 1883          | 2161499  |
| C  | 187m SW  | Cemetery             | 1992          | 2270625  |
| C  | 187m SW  | Cemetery             | 1959 - 1976   | 2291502  |
| D  | 459m NW  | Brick Works          | 1913 - 1920   | 2295410  |
| E  | 463m NW  | Unspecified Factory  | 1992          | 2273114  |
| D  | 464m NW  | Brick Works          | 1899          | 2248324  |
| D  | 467m NW  | Brick Works          | 1895 - 1896   | 2285240  |
| D  | 469m NW  | Brick Works          | 1935 - 1938   | 2253440  |
| D  | 469m NW  | Brick and Clay Works | 1938          | 2172523  |
| E  | 485m NW  | Unspecified Factory  | 1968 - 1976   | 2210717  |
| D  | 489m NW  | Unspecified Pit      | 1913 - 1920   | 2295224  |
| D  | 497m NW  | Unspecified Pit      | 1935          | 2241420  |
| D  | 497m NW  | Unspecified Pit      | 1938          | 2209976  |
| D  | 498m NW  | Unspecified Pit      | 1896 - 1899   | 2279219  |
| D  | 500m NW  | Unspecified Pit      | 1938          | 2209964  |

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.2 Historical tanks

### Records within 500m

6

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on [page 14 >](#)



| ID | Location | Land use         | Dates present | Group ID |
|----|----------|------------------|---------------|----------|
| A  | 74m W    | Unspecified Tank | 1964          | 404242   |
| A  | 74m W    | Unspecified Tank | 1975          | 406549   |
| B  | 79m W    | Unspecified Tank | 1913          | 390768   |
| B  | 82m W    | Gasometer        | 1871 - 1898   | 430493   |
| B  | 98m W    | Gasometer        | 1883          | 382877   |
| 2  | 104m W   | Unspecified Tank | 1935          | 390774   |

*This data is sourced from Ordnance Survey / Groundsure.*

### 1.3 Historical energy features

#### Records within 500m

7

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on [page 14 >](#)

| ID | Location | Land use               | Dates present | Group ID |
|----|----------|------------------------|---------------|----------|
| B  | 82m W    | Gasometer              | 1871 - 1898   | 293113   |
| B  | 98m W    | Gasometer              | 1883          | 276037   |
| 3  | 157m SW  | Electricity Substation | 1975 - 1999   | 314252   |
| 4  | 381m W   | Electricity Substation | 1972 - 1992   | 287250   |
| 5  | 404m W   | Electricity Substation | 1972 - 1992   | 312124   |
| 6  | 441m NW  | Electricity Substation | 1972          | 268035   |
| 7  | 441m NW  | Electricity Substation | 1972          | 268034   |

*This data is sourced from Ordnance Survey / Groundsure.*



## 1.4 Historical petrol stations

**Records within 500m****0**

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.5 Historical garages

**Records within 500m****0**

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 1.6 Historical military land

**Records within 500m****0**

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

*This data is sourced from Ordnance Survey / Groundsure / other sources.*



## 2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

### 2.1 Historical industrial land uses

Records within 500m

26

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on [page 18](#) >

| ID | Location | Land Use   | Date | Group ID |
|----|----------|------------|------|----------|
| 1  | 39m W    | Pump House | 1883 | 2199834  |
| B  | 81m W    | Gasometer  | 1899 | 2289979  |
| B  | 82m W    | Gasometer  | 1895 | 2297479  |



| ID | Location | Land Use             | Date | Group ID |
|----|----------|----------------------|------|----------|
| B  | 86m W    | Gasometer            | 1896 | 2228884  |
| B  | 98m W    | Gasometer            | 1883 | 2161499  |
| D  | 187m SW  | Cemetery             | 1976 | 2291502  |
| D  | 187m SW  | Cemetery             | 1968 | 2291502  |
| D  | 187m SW  | Cemetery             | 1959 | 2291502  |
| D  | 187m SW  | Cemetery             | 1992 | 2270625  |
| G  | 459m NW  | Brick Works          | 1920 | 2295410  |
| G  | 459m NW  | Brick Works          | 1913 | 2295410  |
| H  | 463m NW  | Unspecified Factory  | 1992 | 2273114  |
| G  | 464m NW  | Brick Works          | 1899 | 2248324  |
| G  | 467m NW  | Brick Works          | 1895 | 2285240  |
| G  | 469m NW  | Brick Works          | 1938 | 2253440  |
| G  | 469m NW  | Brick Works          | 1896 | 2285240  |
| G  | 469m NW  | Brick and Clay Works | 1938 | 2172523  |
| G  | 469m NW  | Brick Works          | 1935 | 2253440  |
| H  | 485m NW  | Unspecified Factory  | 1976 | 2210717  |
| H  | 485m NW  | Unspecified Factory  | 1968 | 2210717  |
| G  | 489m NW  | Unspecified Pit      | 1920 | 2295224  |
| G  | 489m NW  | Unspecified Pit      | 1913 | 2295224  |
| G  | 497m NW  | Unspecified Pit      | 1935 | 2241420  |
| G  | 497m NW  | Unspecified Pit      | 1938 | 2209976  |
| G  | 498m NW  | Unspecified Pit      | 1899 | 2279219  |
| G  | 500m NW  | Unspecified Pit      | 1938 | 2209964  |

*This data is sourced from Ordnance Survey / Groundsure.*



## 2.2 Historical tanks

### Records within 500m

**7**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on [page 18 >](#)

| ID | Location | Land Use         | Date | Group ID |
|----|----------|------------------|------|----------|
| A  | 74m W    | Unspecified Tank | 1975 | 406549   |
| A  | 74m W    | Unspecified Tank | 1964 | 404242   |
| B  | 79m W    | Unspecified Tank | 1913 | 390768   |
| B  | 82m W    | Gasometer        | 1871 | 430493   |
| B  | 82m W    | Gasometer        | 1898 | 430493   |
| B  | 98m W    | Gasometer        | 1883 | 382877   |
| 2  | 104m W   | Unspecified Tank | 1935 | 390774   |

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.3 Historical energy features

### Records within 500m

**12**

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on [page 18 >](#)

| ID | Location | Land Use               | Date | Group ID |
|----|----------|------------------------|------|----------|
| B  | 82m W    | Gasometer              | 1871 | 293113   |
| B  | 82m W    | Gasometer              | 1898 | 293113   |
| B  | 98m W    | Gasometer              | 1883 | 276037   |
| C  | 157m SW  | Electricity Substation | 1998 | 314252   |
| C  | 157m SW  | Electricity Substation | 1999 | 314252   |
| C  | 157m SW  | Electricity Substation | 1975 | 314252   |
| E  | 381m W   | Electricity Substation | 1972 | 287250   |



| ID | Location | Land Use               | Date | Group ID |
|----|----------|------------------------|------|----------|
| E  | 382m W   | Electricity Substation | 1992 | 287250   |
| F  | 404m W   | Electricity Substation | 1972 | 312124   |
| F  | 404m W   | Electricity Substation | 1992 | 312124   |
| 3  | 441m NW  | Electricity Substation | 1972 | 268035   |
| 4  | 441m NW  | Electricity Substation | 1972 | 268034   |

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.4 Historical petrol stations

**Records within 500m**

**0**

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*

## 2.5 Historical garages

**Records within 500m**

**0**

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

*This data is sourced from Ordnance Survey / Groundsure.*



## 3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Historical landfill (EA/NRW)
- Waste exemptions

### 3.1 Active or recent landfill

Records within 500m

0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

### 3.2 Historical landfill (BGS records)

Records within 500m

0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

*This data is sourced from the British Geological Survey.*



### 3.3 Historical landfill (LA/mapping records)

Records within 500m

0

Landfill sites identified from Local Authority records and high detail historical mapping.

*This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.*

### 3.4 Historical landfill (EA/NRW records)

Records within 500m

1

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on [page 22 >](#)

| ID | Location | Details                                                                          |                                                                                                                                                                              |                                                                                                      |
|----|----------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 2  | 447m NW  | Site Address: Oxhey Lane,<br>Watford, Hertfordshire<br>Licence Holder Address: - | Waste Licence: -<br>Site Reference: HCC/005<br>Waste Type: Inert<br>Environmental Permitting Regulations<br>(Waste) Reference: -<br>Licence Issue: -<br>Licence Surrender: - | Operator: -<br>Licence Holder: S J Simmons<br>First Recorded 17/08/1939<br>Last Recorded: 31/12/1957 |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

### 3.5 Historical waste sites

Records within 500m

0

Waste site records derived from Local Authority planning records and high detail historical mapping.

*This data is sourced from Ordnance Survey/Groundsure and Local Authority records.*

### 3.6 Licensed waste sites

Records within 500m

0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

### 3.7 Waste exemptions

#### Records within 500m

**1**

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

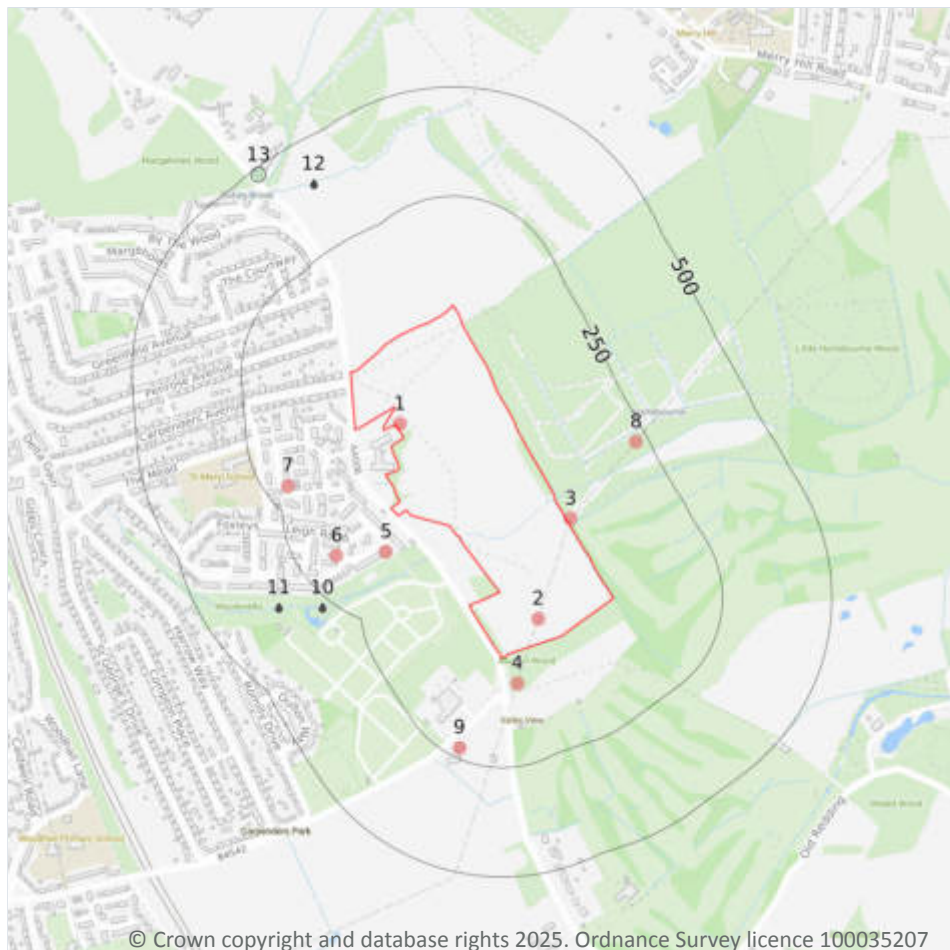
Features are displayed on the Waste and landfill map on [page 22 >](#)

| ID | Location | Site                             | Reference | Category                           | Sub-Category     | Description                                        |
|----|----------|----------------------------------|-----------|------------------------------------|------------------|----------------------------------------------------|
| 1  | 296m SW  | Oxhey Lane, Watford,<br>Wd19 5rl | WEX044530 | Disposing of<br>waste<br>exemption | Not on a<br>farm | Deposit of waste from dredging<br>of inland waters |

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- Licensed Discharges to controlled waters
- Pollution Incidents (EA/NRW)

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### 4.1 Recent industrial land uses

Records within 250m

9

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on [page 25 >](#)

| ID | Location | Company                         | Address             | Activity                       | Category                         |
|----|----------|---------------------------------|---------------------|--------------------------------|----------------------------------|
| 1  | On site  | Mast<br>(Telecomm<br>unication) | Hertfordshire, WD19 | Telecommunications<br>Features | Infrastructure and<br>Facilities |
| 2  | On site  | Pylon                           | Hertfordshire, HA5  | Electrical Features            | Infrastructure and<br>Facilities |



| ID | Location | Company                  | Address                                                                  | Activity                              | Category                      |
|----|----------|--------------------------|--------------------------------------------------------------------------|---------------------------------------|-------------------------------|
| 3  | 9m E     | Pylon                    | Hertfordshire, WD19                                                      | Electrical Features                   | Infrastructure and Facilities |
| 4  | 67m S    | Pylon                    | Hertfordshire, HA5                                                       | Electrical Features                   | Infrastructure and Facilities |
| 5  | 87m SW   | Morgan Water Engineering | 63, Hangar Ruding, Carpenders Park, Hertfordshire, WD19 5BH              | Air and Water Filtration              | Industrial Products           |
| 6  | 165m SW  | Electricity Sub Station  | Hertfordshire, WD19                                                      | Electrical Features                   | Infrastructure and Facilities |
| 7  | 201m W   | Electricity Sub Station  | Hertfordshire, WD19                                                      | Electrical Features                   | Infrastructure and Facilities |
| 8  | 223m E   | Pylon                    | Hertfordshire, WD19                                                      | Electrical Features                   | Infrastructure and Facilities |
| 9  | 226m S   | Lucketts of Watford      | The Paddock, Little Oxhey Lane, Carpenders Park, Hertfordshire, WD19 5BA | Vehicle Repair, Testing and Servicing | Repair and Servicing          |

*This data is sourced from Ordnance Survey.*

## 4.2 Current or recent petrol stations

**Records within 500m**

**0**

Open, closed, under development and obsolete petrol stations.

*This data is sourced from Experian.*

## 4.3 Electricity cables

**Records within 500m**

**0**

High voltage underground electricity transmission cables.

*This data is sourced from National Grid.*

## 4.4 Gas pipelines

**Records within 500m**

**0**

High pressure underground gas transmission pipelines.

*This data is sourced from National Grid.*



## 4.5 Sites determined as Contaminated Land

**Records within 500m****0**

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

*This data is sourced from Local Authority records.*

## 4.6 Control of Major Accident Hazards (COMAH)

**Records within 500m****0**

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

*This data is sourced from the Health and Safety Executive.*

## 4.7 Regulated explosive sites

**Records within 500m****0**

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

*This data is sourced from the Health and Safety Executive.*

## 4.8 Hazardous substance storage/usage

**Records within 500m****0**

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

*This data is sourced from Local Authority records.*

## 4.9 Historical licensed industrial activities (IPC)

**Records within 500m****0**

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

*This data is sourced from the Environment Agency and Natural Resources Wales.*



#### 4.10 Licensed industrial activities (Part A(1))

Records within 500m

0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

#### 4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

0

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

*This data is sourced from Local Authority records.*

#### 4.12 Radioactive Substance Authorisations

Records within 500m

0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

#### 4.13 Licensed Discharges to controlled waters

Records within 500m

3

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on [page 25 >](#)

| ID | Location | Address                            | Details                                                                                                                                                                       |                                                                                                                                                                    |
|----|----------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | 273m SW  | CARPENDERSPARKSTW,BUS<br>HEY,HERTS | Effluent Type: SEWAGE DISCHARGES -<br>FINAL/TREATED EFFLUENT - NOT<br>WATER COMPANY<br>Permit Number: CTCR.0019<br>Permit Version: 1<br>Receiving Water:<br>HARTSBOURNESTREAM | Status: VARIED BY APPLICATION - (WRA<br>91 SCHED 10 - AS AMENDED BY ENV<br>ACT 1995)<br>Issue date: 02/09/1952<br>Effective Date: 10/04/1967<br>Revocation Date: - |



| ID | Location | Address                                                                 | Details                                                                                                                                                                        |                                                                                                                                                             |
|----|----------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | 343m SW  | TOILETS,CARPENDERSPKCE<br>METERY,OXHEYLANE,ARPEN<br>DERSPK,BUSHEY,HERTS | Effluent Type: SEWAGE DISCHARGES -<br>FINAL/TREATED EFFLUENT - NOT<br>WATER COMPANY<br>Permit Number: CNTM.1274<br>Permit Version: 1<br>Receiving Water:<br>HARTSBOURNE STREAM | Status: NEW CONSENT, BY<br>APPLICATION (WRA 91, SECTION 88)<br>Issue date: 17/01/1994<br>Effective Date: 17/01/1994<br>Revocation Date: -                   |
| 12 | 399m NW  | ALANVIC&BRAESIDE,OXHEY<br>LANE,OXHEY,HERTFORDSHI<br>RE,WD195RQ          | Effluent Type: SEWAGE DISCHARGES -<br>FINAL/TREATED EFFLUENT - NOT<br>WATER COMPANY<br>Permit Number: CANM.0523<br>Permit Version: 1<br>Receiving Water: TO OXHEY STREAM       | Status: NEW CONSENT (WRA 91, S88 &<br>SCHED 10 AS AMENDED BY ENV ACT<br>1995)<br>Issue date: 01/11/2002<br>Effective Date: 01/11/2002<br>Revocation Date: - |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

#### 4.14 Pollutant release to surface waters (Red List)

Records within 500m

0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

#### 4.15 Pollutant release to public sewer

Records within 500m

0

Discharges of Special Category Effluents to the public sewer.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

#### 4.16 List 1 Dangerous Substances

Records within 500m

0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 4.17 List 2 Dangerous Substances

Records within 500m

0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 4.18 Pollution Incidents (EA/NRW)

Records within 500m

1

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on [page 25 >](#)

| ID | Location | Details                                                                                                                         |                                                                                                               |
|----|----------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 13 | 485m NW  | Incident Date: 11/07/2002<br>Incident Identification: 90933<br>Pollutant: Sewage Materials<br>Pollutant Description: Grey Water | Water Impact: Category 3 (Minor)<br>Land Impact: Category 4 (No Impact)<br>Air Impact: Category 4 (No Impact) |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 4.19 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*

## 4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*



## 4.21 Pollution inventory radioactive waste

Records within 500m

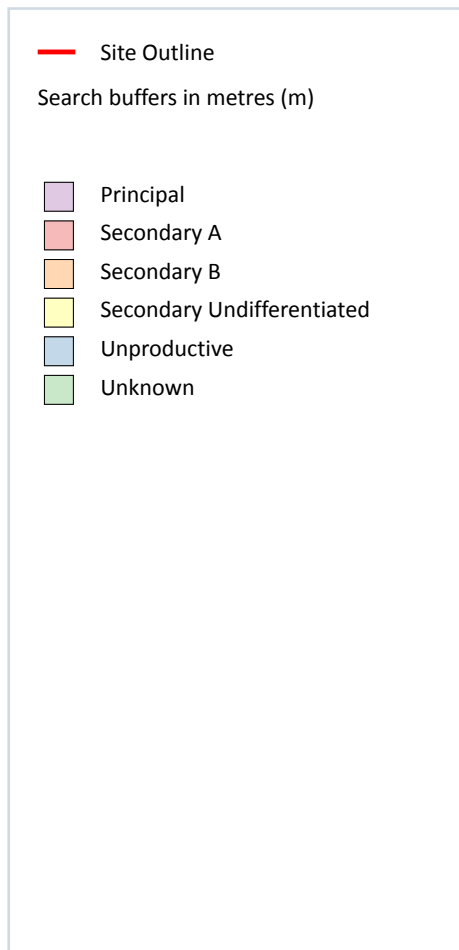
0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

*This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.*



## 5 Hydrogeology - Superficial aquifer



## 5.1 Superficial aquifer

1

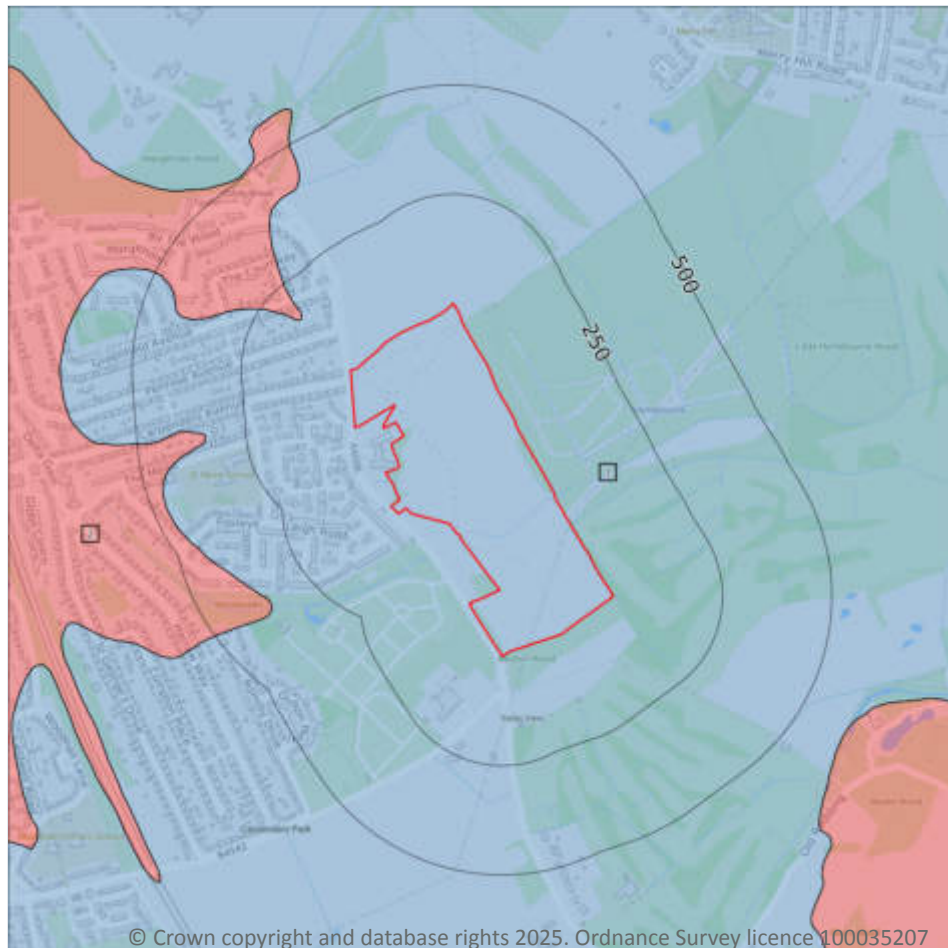
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on [page 32](#) >

| ID | Location | Designation | Description                                                                                                                                                                                                                            |
|----|----------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | 200m SW  | Secondary A | Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers |

*This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.*

## Bedrock aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
  - Secondary A
  - Secondary B
  - Secondary Undifferentiated
  - Unproductive

### 5.2 Bedrock aquifer

#### Records within 500m

2

Aquifer status of groundwater held within bedrock geology.

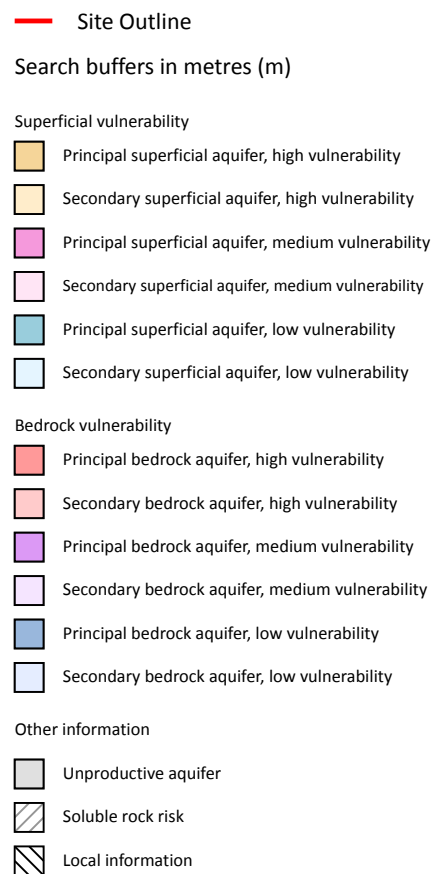
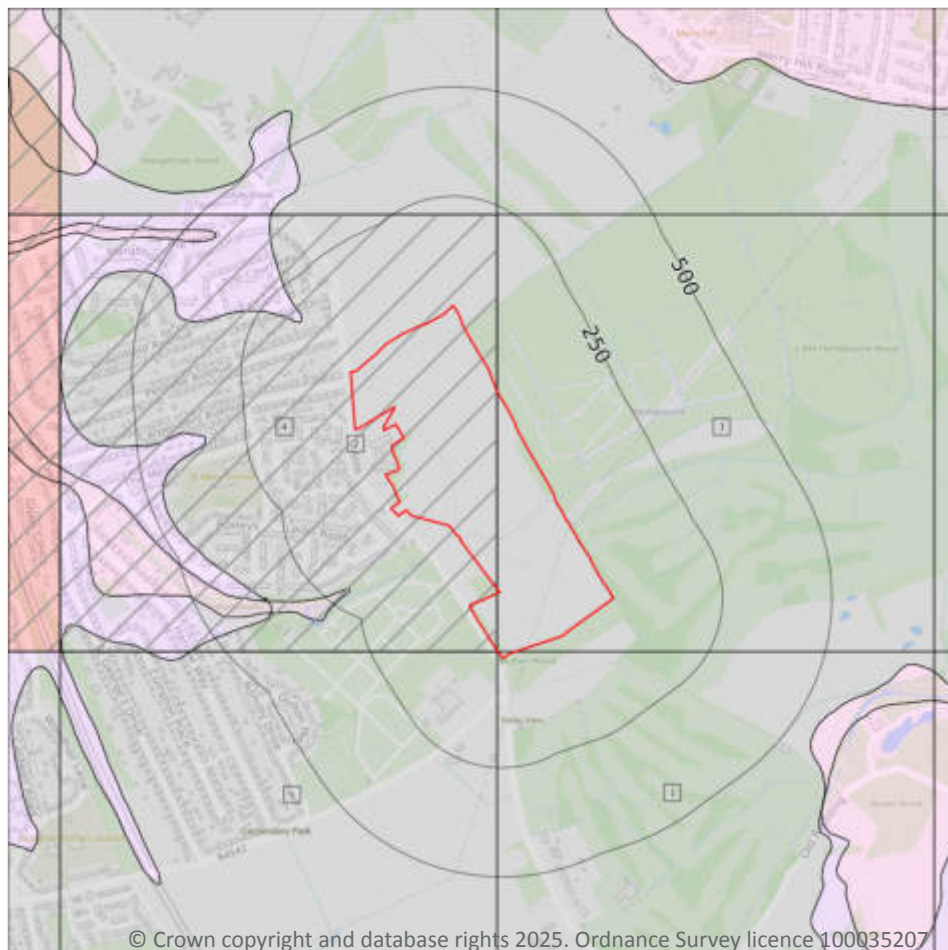
Features are displayed on the Bedrock aquifer map on [page 33](#) >

| ID | Location | Designation  | Description                                                                                                                                                                                                                            |
|----|----------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | On site  | Unproductive | <b>These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow</b>                                                                                             |
| 2  | 163m NW  | Secondary A  | Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers |

*This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.*



## Groundwater vulnerability



### 5.3 Groundwater vulnerability

#### Records within 50m

4

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on [page 34](#) >

| ID | Location | Summary                                                                                                                                                                   | Soil / surface                                                                      | Superficial geology                                                                                            | Bedrock geology                                                                             |
|----|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 1  | On site  | Summary Classification:<br>Unproductive aquifer (may have productive aquifer beneath)<br>Combined classification:<br>Unproductive Bedrock Aquifer, No Superficial Aquifer | Leaching class: Low<br>Infiltration value: 40-70%<br>Dilution value: 300-550mm/year | Vulnerability: -<br>Aquifer type: -<br>Thickness: <3m<br>Patchiness value: <90%<br>Recharge potential: No Data | Vulnerability:<br>Unproductive<br>Aquifer type:<br>Unproductive<br>Flow mechanism:<br>Mixed |
| 2  | On site  | Summary Classification:<br>Unproductive aquifer (may have productive aquifer beneath)<br>Combined classification:<br>Unproductive Bedrock Aquifer, No Superficial Aquifer | Leaching class: Low<br>Infiltration value: 40-70%<br>Dilution value: 300-550mm/year | Vulnerability: -<br>Aquifer type: -<br>Thickness: <3m<br>Patchiness value: <90%<br>Recharge potential: No Data | Vulnerability:<br>Unproductive<br>Aquifer type:<br>Unproductive<br>Flow mechanism:<br>Mixed |
| 3  | On site  | Summary Classification:<br>Unproductive aquifer (may have productive aquifer beneath)<br>Combined classification:<br>Unproductive Bedrock Aquifer, No Superficial Aquifer | Leaching class: Low<br>Infiltration value: 40-70%<br>Dilution value: 300-550mm/year | Vulnerability: -<br>Aquifer type: -<br>Thickness: <3m<br>Patchiness value: <90%<br>Recharge potential: No Data | Vulnerability:<br>Unproductive<br>Aquifer type:<br>Unproductive<br>Flow mechanism:<br>Mixed |
| 5  | 2m S     | Summary Classification:<br>Unproductive aquifer (may have productive aquifer beneath)<br>Combined classification:<br>Unproductive Bedrock Aquifer, No Superficial Aquifer | Leaching class: Low<br>Infiltration value: 40-70%<br>Dilution value: 300-550mm/year | Vulnerability: -<br>Aquifer type: -<br>Thickness: <3m<br>Patchiness value: <90%<br>Recharge potential: No Data | Vulnerability:<br>Unproductive<br>Aquifer type:<br>Unproductive<br>Flow mechanism:<br>Mixed |

*This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.*

## 5.4 Groundwater vulnerability- soluble rock risk

### Records on site

1

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.



| ID | Maximum soluble risk category                                                                                                                                                                                                                           | Percentage of grid square covered by maximum risk |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 4  | Significant soluble rocks are likely to be present. Low possibility of localised subsidence or dissolution-related degradation of bedrock occurring naturally, but may be possible in adverse conditions such as high surface or subsurface water flow. | 2.0%                                              |

*This data is sourced from the British Geological Survey and the Environment Agency.*

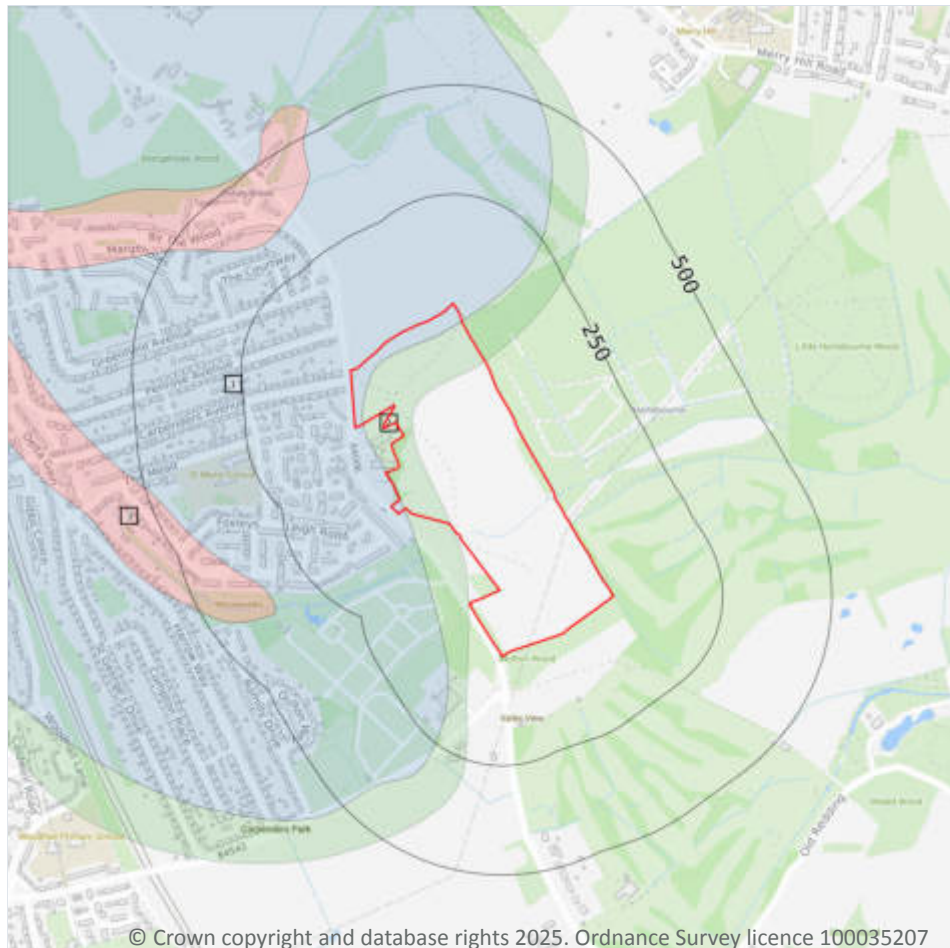
## 5.5 Groundwater vulnerability- local information

|                 |   |
|-----------------|---|
| Records on site | 0 |
|-----------------|---|

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk) ↗.

*This data is sourced from the British Geological Survey and the Environment Agency.*

## Abstractions and Source Protection Zones



- Site Outline
- Search buffers in metres (m)
- Source Protection Zone 1  
Inner catchment
- Source Protection Zone 2  
Outer catchment
- Source Protection Zone 3  
Total catchment
- Source Protection Zone 4  
Zone of Special Interest
- Source Protection Zone 1c  
Inner catchment - confined aquifer
- Source Protection Zone 2c  
Outer catchment - confined aquifer
- Source Protection Zone 3c  
Total catchment - confined aquifer
- Drinking water abstraction licences  
Polygon features
- Drinking water abstraction licences  
Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

### 5.6 Groundwater abstractions

#### Records within 2000m

4

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on [page 37 >](#)

| ID | Location | Details                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                   |
|----|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -  | 1139m E  | Status: Historical<br>Licence No: 28/39/28/0542<br>Details: Spray Irrigation - Direct<br>Direct Source: THAMES GROUNDWATER<br>Point: HARTSBOURNE COUNTRY CLUB<br>Data Type: Point<br>Name: HARTSBOURNE COUNTRY CLUB LTD<br>Easting: 514300<br>Northing: 193600                         | Annual Volume (m <sup>3</sup> ): -<br>Max Daily Volume (m <sup>3</sup> ): -<br>Original Application No: -<br>Original Start Date: 07/05/1998<br>Expiry Date: 31/10/2004<br>Issue No: 100<br>Version Start Date: 07/05/1998<br>Version End Date: -                 |
| -  | 1182m E  | Status: Active<br>Licence No: 28/39/28/0602/R01<br>Details: Spray Irrigation - Direct<br>Direct Source: THAMES GROUNDWATER<br>Point: HARTSBOURNE COUNTRY CLUB- BOREHOLE<br>Data Type: Point<br>Name: HARTSBOURNE COUNTRY CLUB (MEMBERS) LIMITED<br>Easting: 514348<br>Northing: 193598 | Annual Volume (m <sup>3</sup> ): 40000<br>Max Daily Volume (m <sup>3</sup> ): 600<br>Original Application No: NPS/WR/012705<br>Original Start Date: 01/04/2014<br>Expiry Date: 31/03/2026<br>Issue No: 1<br>Version Start Date: 01/04/2014<br>Version End Date: - |
| -  | 1182m E  | Status: Historical<br>Licence No: 28/39/28/0602<br>Details: Spray Irrigation - Direct<br>Direct Source: THAMES GROUNDWATER<br>Point: HARTSBOURNE COUNTRY CLUB- BOREHOLE<br>Data Type: Point<br>Name: HARTSBOURNE COUNTRY CLUB (MEMBERS) LIMITED<br>Easting: 514348<br>Northing: 193598 | Annual Volume (m <sup>3</sup> ): 40000<br>Max Daily Volume (m <sup>3</sup> ): 600<br>Original Application No: -<br>Original Start Date: 31/01/2006<br>Expiry Date: 31/03/2014<br>Issue No: 1<br>Version Start Date: 31/01/2006<br>Version End Date: -             |
| -  | 1185m E  | Status: Historical<br>Licence No: 28/39/28/0602<br>Details: Spray Irrigation - Direct<br>Direct Source: THAMES GROUNDWATER<br>Point: HARTSBOURNE COUNTRY CLUB- BOREHOLE<br>Data Type: Point<br>Name: HARTSBOURNE COUNTRY CLUB (MEMBERS) LIMITED<br>Easting: 514350<br>Northing: 193600 | Annual Volume (m <sup>3</sup> ): 40000<br>Max Daily Volume (m <sup>3</sup> ): 600<br>Original Application No: -<br>Original Start Date: 31/01/2006<br>Expiry Date: 31/03/2014<br>Issue No: 1<br>Version Start Date: 31/01/2006<br>Version End Date: -             |

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 5.7 Surface water abstractions

Records within 2000m

0

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 5.8 Potable abstractions

Records within 2000m

0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 5.9 Source Protection Zones

Records within 500m

3

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination. Features are displayed on the Abstractions and Source Protection Zones map on [page 37 >](#)

| ID | Location | Type | Description     |
|----|----------|------|-----------------|
| 1  | On site  | 2    | Outer catchment |
| 2  | On site  | 3    | Total catchment |
| 3  | 345m SW  | 1    | Inner catchment |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 5.10 Source Protection Zones (confined aquifer)

Records within 500m

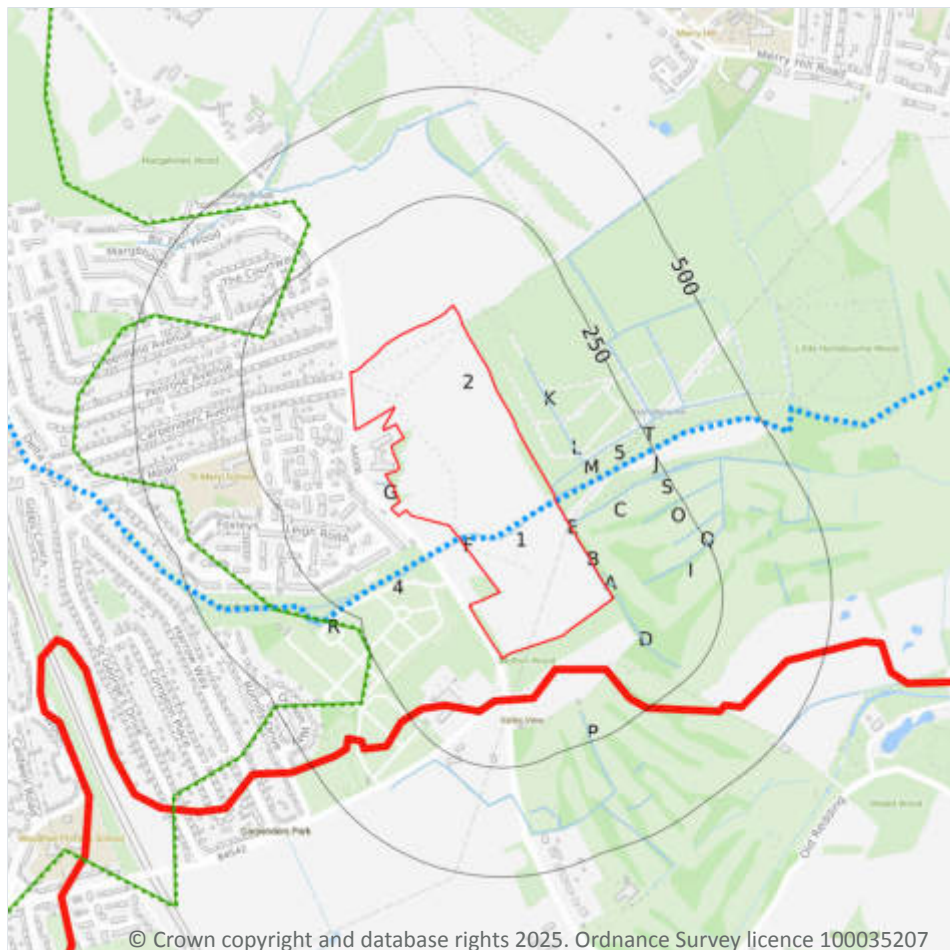
0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 6 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)
- ⋯ WFD River, canal and surface water transfer water bodies
- WFD Lake water bodies
- WFD Transitional and coastal water bodies
- WFD Surface water body catchments boundaries
- WFD Groundwater body boundaries

### 6.1 Water Network (OS MasterMap)

Records within 250m

38

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on [page 40 >](#)

| ID | Location | Type of water feature                               | Ground level      | Permanence                                                      | Name        |
|----|----------|-----------------------------------------------------|-------------------|-----------------------------------------------------------------|-------------|
| 1  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |

| ID | Location | Type of water feature                               | Ground level      | Permanence                                                      | Name        |
|----|----------|-----------------------------------------------------|-------------------|-----------------------------------------------------------------|-------------|
| A  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| A  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| A  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| B  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| C  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| D  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| E  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| E  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| E  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| E  | On site  | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | -           |
| F  | On site  | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| A  | On site  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| F  | 2m S     | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |



| ID | Location | Type of water feature                               | Ground level      | Permanence                                                      | Name        |
|----|----------|-----------------------------------------------------|-------------------|-----------------------------------------------------------------|-------------|
| E  | 3m E     | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| G  | 7m W     | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| E  | 12m E    | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| F  | 19m SW   | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| F  | 45m SW   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| F  | 67m SW   | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| I  | 75m SE   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| 4  | 82m SW   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| E  | 82m E    | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | -           |
| J  | 85m E    | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| K  | 86m N    | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| L  | 93m NE   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| M  | 94m E    | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |



| ID | Location | Type of water feature                               | Ground level      | Permanence                                                      | Name        |
|----|----------|-----------------------------------------------------|-------------------|-----------------------------------------------------------------|-------------|
| 5  | 95m E    | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| O  | 143m E   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| P  | 179m SE  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| Q  | 180m E   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| R  | 219m SW  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| R  | 219m SW  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | Hartsbourne |
| S  | 219m E   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| S  | 220m E   | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| P  | 237m SE  | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | -           |
| P  | 240m SE  | Inland river not influenced by normal tidal action. | On ground surface | Watercourse contains water year round (in normal circumstances) | -           |
| T  | 250m E   | Inland river not influenced by normal tidal action. | Underground       | Watercourse contains water year round (in normal circumstances) | Hartsbourne |

*This data is sourced from the Ordnance Survey.*



## 6.2 Surface water features

### Records within 250m

**17**

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on [page 40 >](#)

*This data is sourced from the Ordnance Survey.*

## 6.3 WFD Surface water body catchments

### Records on site

**1**

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on [page 40 >](#)

| ID | Location | Type  | Water body catchment                     | Water body ID  | Operational catchment | Management catchment |
|----|----------|-------|------------------------------------------|----------------|-----------------------|----------------------|
| 2  | On site  | River | Colne (from Confluence with Ver to Gade) | GB106039029840 | Colne                 | Colne                |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 6.4 WFD Surface water bodies

### Records identified

**1**

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on [page 40 >](#)

| ID | Location | Type  | Name                                     | Water body ID                    | Overall rating | Chemical rating | Ecological rating | Year |
|----|----------|-------|------------------------------------------|----------------------------------|----------------|-----------------|-------------------|------|
| 3  | On site  | River | Colne (from Confluence with Ver to Gade) | <a href="#">GB106039029840 ↗</a> | Poor           | Fail            | Poor              | 2019 |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 6.5 WFD Groundwater bodies

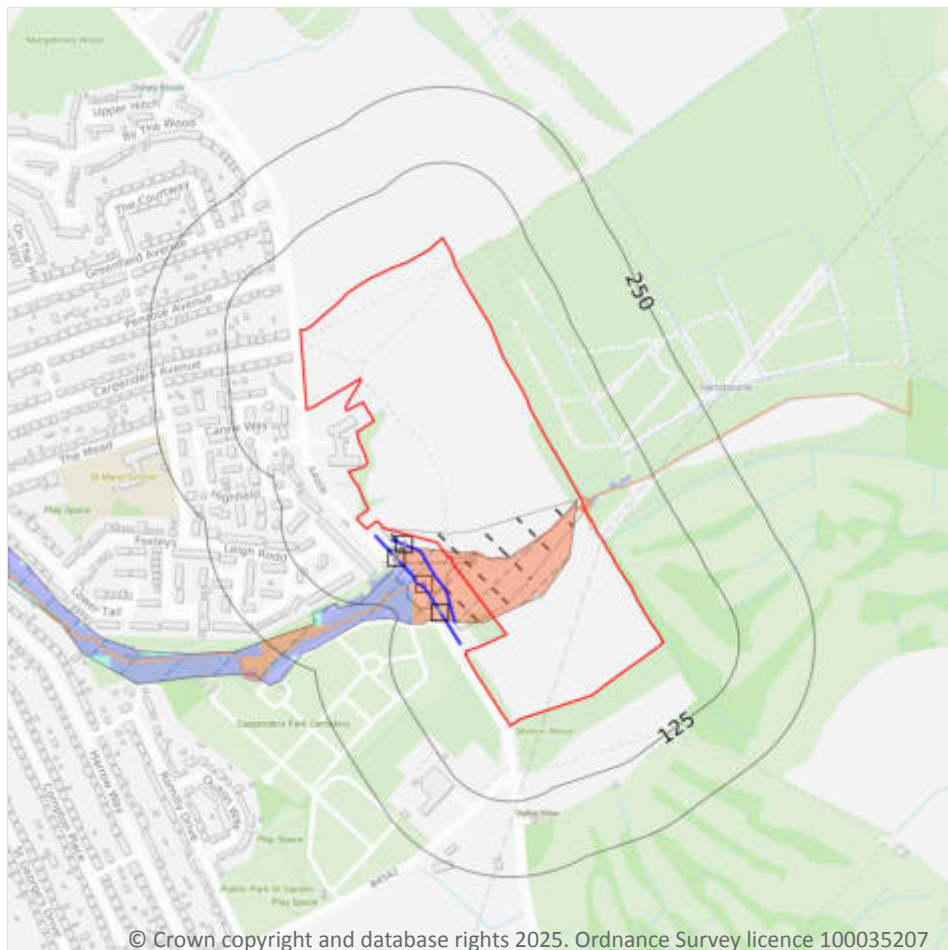
|                 |   |
|-----------------|---|
| Records on site | 0 |
|-----------------|---|

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 7 River and coastal flooding



- Site Outline
- Search buffers in metres (m)
- River and coastal flooding:
- High
- Medium
- Low
- Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

### 7.1 Risk of flooding from rivers and the sea

#### Records within 50m

25

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

Features are displayed on the River and coastal flooding map on [page 46 >](#)



| Distance       | Flood risk category |
|----------------|---------------------|
| <b>On site</b> | <b>High</b>         |
| 0 - 50m        | High                |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 7.2 Historical Flood Events

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>2</b> |
|----------------------------|----------|

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

Features are displayed on the River and coastal flooding map on [page 46 >](#)

| ID | Location | Event name                | Date of flood            | Flood source | Flood cause                                    | Type of flood |
|----|----------|---------------------------|--------------------------|--------------|------------------------------------------------|---------------|
| 6  | On site  | 06mayspring1988           | 1988-01-01<br>1988-12-12 | Main river   | Channel capacity exceeded (no raised defences) | Fluvial       |
| A  | On site  | 06septemberautumn<br>1992 | 1992-01-01<br>1992-12-12 | Main river   | Channel capacity exceeded (no raised defences) | Fluvial       |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 7.3 Flood Defences

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>5</b> |
|----------------------------|----------|

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

Features are displayed on the River and coastal flooding map on [page 46 >](#)

| ID | Location | Update     |
|----|----------|------------|
| F  | 14m S    | 08/11/2022 |
| 7  | 15m SW   | 08/11/2022 |
| 8  | 17m SW   | 08/11/2022 |
| A  | 20m SW   | 08/11/2022 |



| ID | Location | Update     |
|----|----------|------------|
| F  | 38m S    | 08/11/2022 |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 7.4 Areas Benefiting from Flood Defences

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>0</b> |
|----------------------------|----------|

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## 7.5 Flood Storage Areas

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>1</b> |
|----------------------------|----------|

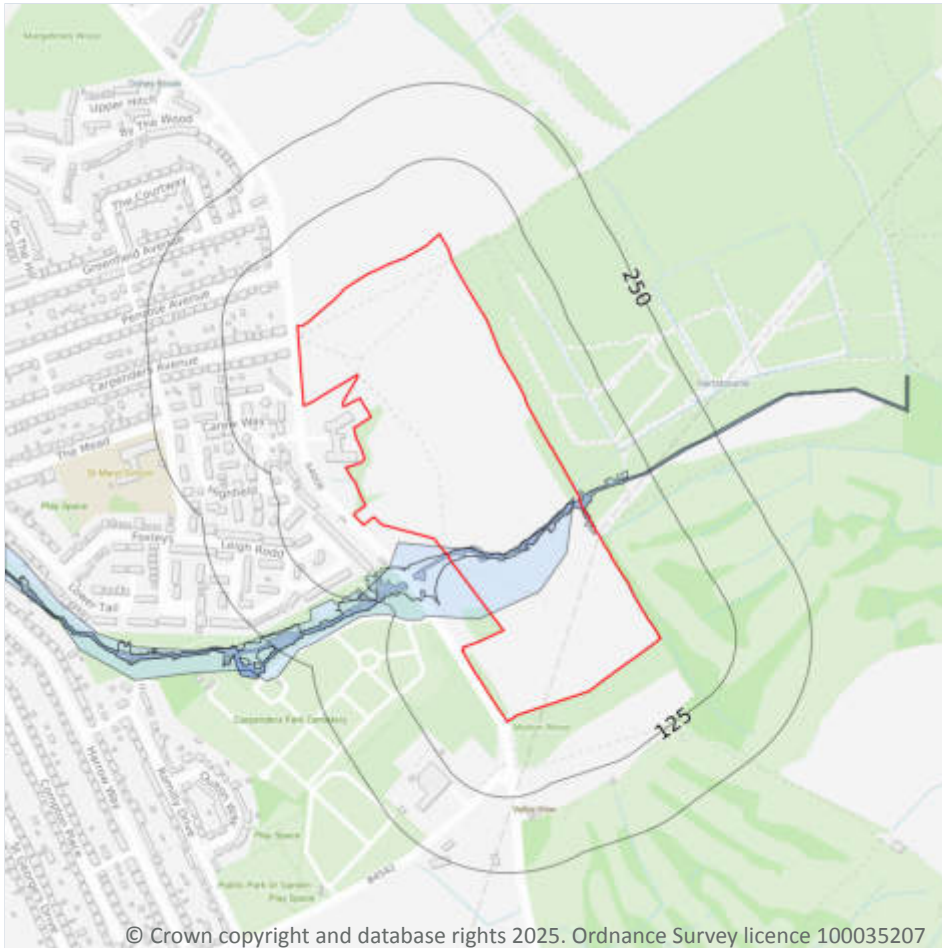
Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

Features are displayed on the River and coastal flooding map on [page 46 >](#)

| ID | Location | Update             |
|----|----------|--------------------|
| B  | On site  | Flood Storage Area |

*This data is sourced from the Environment Agency and Natural Resources Wales.*

## River and coastal flooding - Flood Zones



- Site Outline
- Search buffers in metres (m)
- Flood zone 2
- Flood zone 3

### 7.6 Flood Zone 2

#### Records within 50m

1

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

Features are displayed on the River and coastal flooding map on [page 46 >](#)

| Location | Type                             |
|----------|----------------------------------|
| On site  | Zone 2 - (Fluvial /Tidal Models) |

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 7.7 Flood Zone 3

### Records within 50m

**1**

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

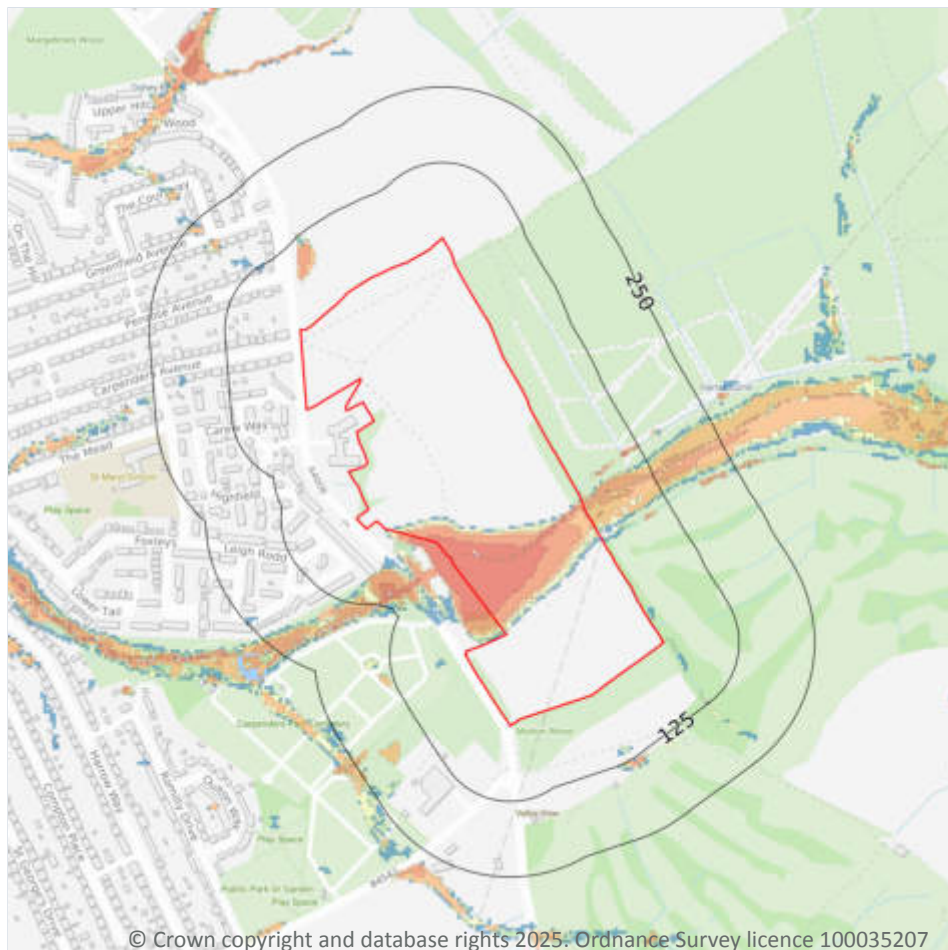
Features are displayed on the River and coastal flooding map on [page 46](#) >

| Location | Type                      |
|----------|---------------------------|
| On site  | Zone 3 - (Fluvial Models) |

*This data is sourced from the Environment Agency and Natural Resources Wales.*



## 8 Surface water flooding



— Site Outline

Search buffers in metres (m)

1 in 1000 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

### 8.1 Surface water flooding

**Highest risk on site**

**1 in 30 year, Greater than 1.0m**

**Highest risk within 50m**

**1 in 30 year, Greater than 1.0m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on [page 51](#) >

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

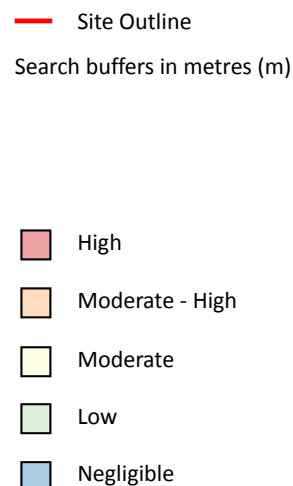
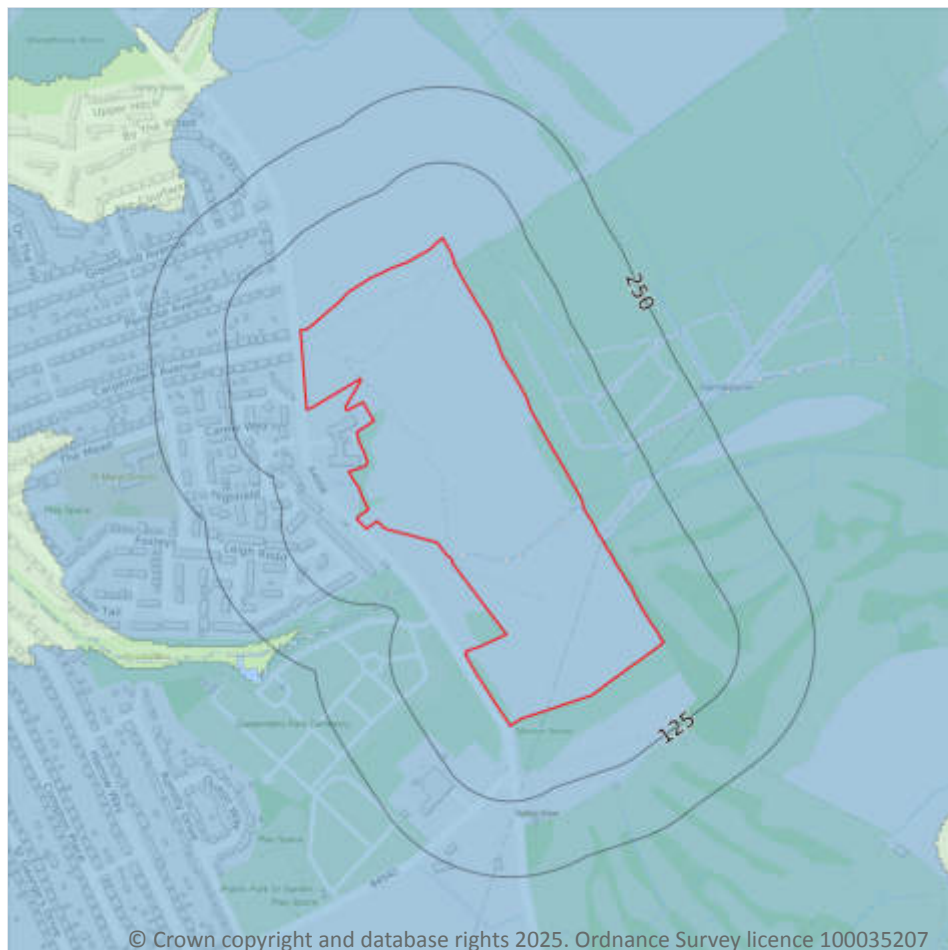
The table below shows the maximum flood depths for a range of return periods for the site.

| Return period  | Maximum modelled depth |
|----------------|------------------------|
| 1 in 1000 year | Greater than 1.0m      |
| 1 in 250 year  | Greater than 1.0m      |
| 1 in 100 year  | Greater than 1.0m      |
| 1 in 30 year   | Greater than 1.0m      |

*This data is sourced from Ambiantal Risk Analytics.*



## 9 Groundwater flooding



### 9.1 Groundwater flooding

Highest risk on site

Negligible

Highest risk within 50m

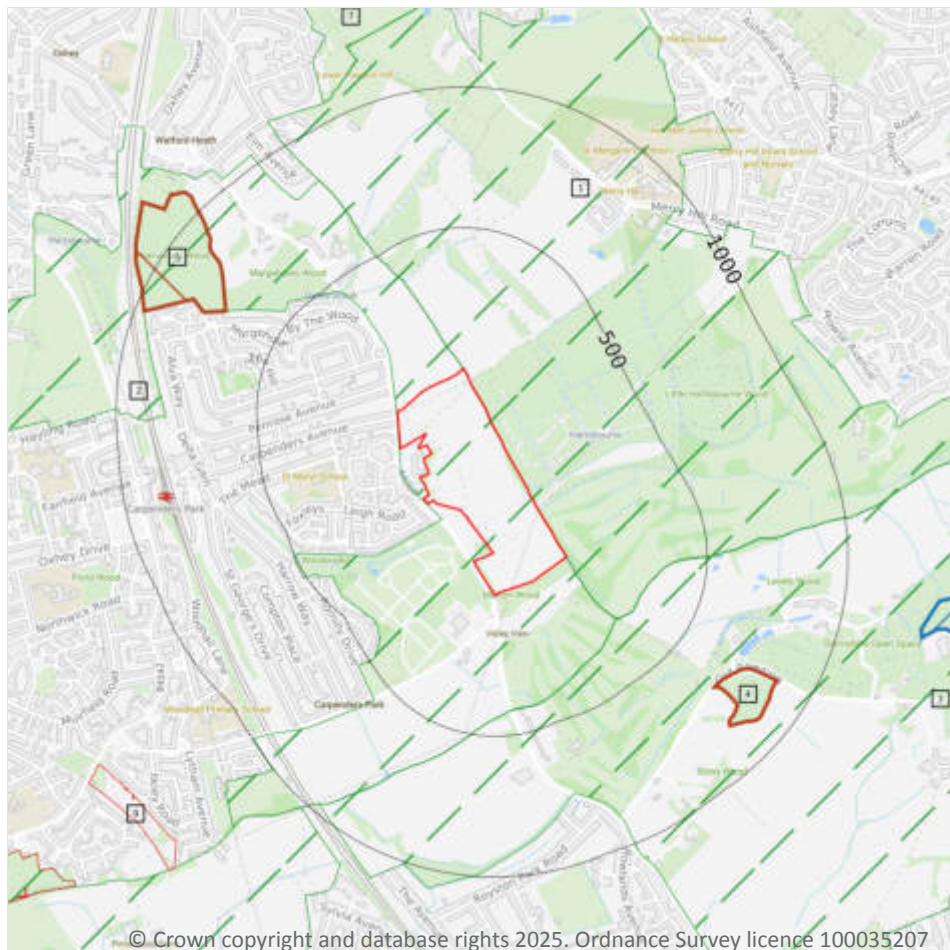
Negligible

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on [page 53](#) >

*This data is sourced from Ambiantal Risk Analytics.*

## 10 Environmental designations



- Site Outline
- Search buffers in metres (m)
- Sites of Special Scientific Interest (SSSI)
- + Local Nature Reserves (LNR)
- Designated Ancient Woodland
- Green Belt

### 10.1 Sites of Special Scientific Interest (SSSI)

#### Records within 2000m

2

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on [page 54](#) >

| ID | Location | Name         | Data source     |
|----|----------|--------------|-----------------|
| 8  | 1286m E  | Harrow Weald | Natural England |



| ID | Location | Name           | Data source     |
|----|----------|----------------|-----------------|
| -  | 1844m E  | Bentley Priory | Natural England |

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.2 Conserved wetland sites (Ramsar sites)

|                             |          |
|-----------------------------|----------|
| <b>Records within 2000m</b> | <b>0</b> |
|-----------------------------|----------|

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.3 Special Areas of Conservation (SAC)

|                             |          |
|-----------------------------|----------|
| <b>Records within 2000m</b> | <b>0</b> |
|-----------------------------|----------|

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.4 Special Protection Areas (SPA)

|                             |          |
|-----------------------------|----------|
| <b>Records within 2000m</b> | <b>0</b> |
|-----------------------------|----------|

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.5 National Nature Reserves (NNR)

|                             |          |
|-----------------------------|----------|
| <b>Records within 2000m</b> | <b>0</b> |
|-----------------------------|----------|

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.6 Local Nature Reserves (LNR)

### Records within 2000m

5

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on [page 54 >](#)

| ID | Location | Name                   | Data source     |
|----|----------|------------------------|-----------------|
| 9  | 1426m SW | Prestwick Road Meadows | Natural England |
| -  | 1673m SW | Oxhey Woods            | Natural England |
| -  | 1711m W  | Oxhey Woods            | Natural England |
| A  | 1807m SW | Oxhey Woods            | Natural England |
| -  | 1844m E  | Bentley Priory         | Natural England |

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.7 Designated Ancient Woodland

### Records within 2000m

5

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on [page 54 >](#)

| ID | Location | Name           | Woodland Type                   |
|----|----------|----------------|---------------------------------|
| 4  | 700m SE  | Unknown        | Ancient & Semi-Natural Woodland |
| 5  | 707m NW  | Sherwoods Park | Ancient Replanted Woodland      |
| -  | 1711m W  | Abbotts Wood   | Ancient & Semi-Natural Woodland |
| -  | 1877m W  | Abbotts Wood   | Ancient & Semi-Natural Woodland |
| -  | 1999m W  | Abbotts Wood   | Ancient Replanted Woodland      |

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*



## 10.8 Biosphere Reserves

Records within 2000m

0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.9 Forest Parks

Records within 2000m

0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

*This data is sourced from the Forestry Commission.*

## 10.10 Marine Conservation Zones

Records within 2000m

0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

## 10.11 Green Belt

Records within 2000m

7

Areas designated to prevent urban sprawl by keeping land permanently open.

Features are displayed on the Environmental designations map on [page 54 >](#)

| ID | Location | Name              | Local Authority name |
|----|----------|-------------------|----------------------|
| 1  | On site  | London Green Belt | Hertsmere            |
| 2  | On site  | London Green Belt | Three Rivers         |
| 3  | 281m SE  | London Green Belt | Harrow               |
| 6  | 1019m SW | London Green Belt | Harrow               |
| 7  | 1067m N  | London Green Belt | Watford              |
| -  | 1817m S  | London Green Belt | Harrow               |



| ID | Location | Name              | Local Authority name |
|----|----------|-------------------|----------------------|
| -  | 1928m S  | London Green Belt | Harrow               |

*This data is sourced from the Ministry of Housing, Communities and Local Government.*

## 10.12 Proposed Ramsar sites

**Records within 2000m**

**0**

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

*This data is sourced from Natural England.*

## 10.13 Possible Special Areas of Conservation (pSAC)

**Records within 2000m**

**0**

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

*This data is sourced from Natural England and Natural Resources Wales.*

## 10.14 Potential Special Protection Areas (pSPA)

**Records within 2000m**

**0**

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

*This data is sourced from Natural England.*

## 10.15 Nitrate Sensitive Areas

**Records within 2000m**

**0**

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate



Sensitive Areas fall within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

*This data is sourced from Natural England.*

## 10.16 Nitrate Vulnerable Zones

Records within 2000m

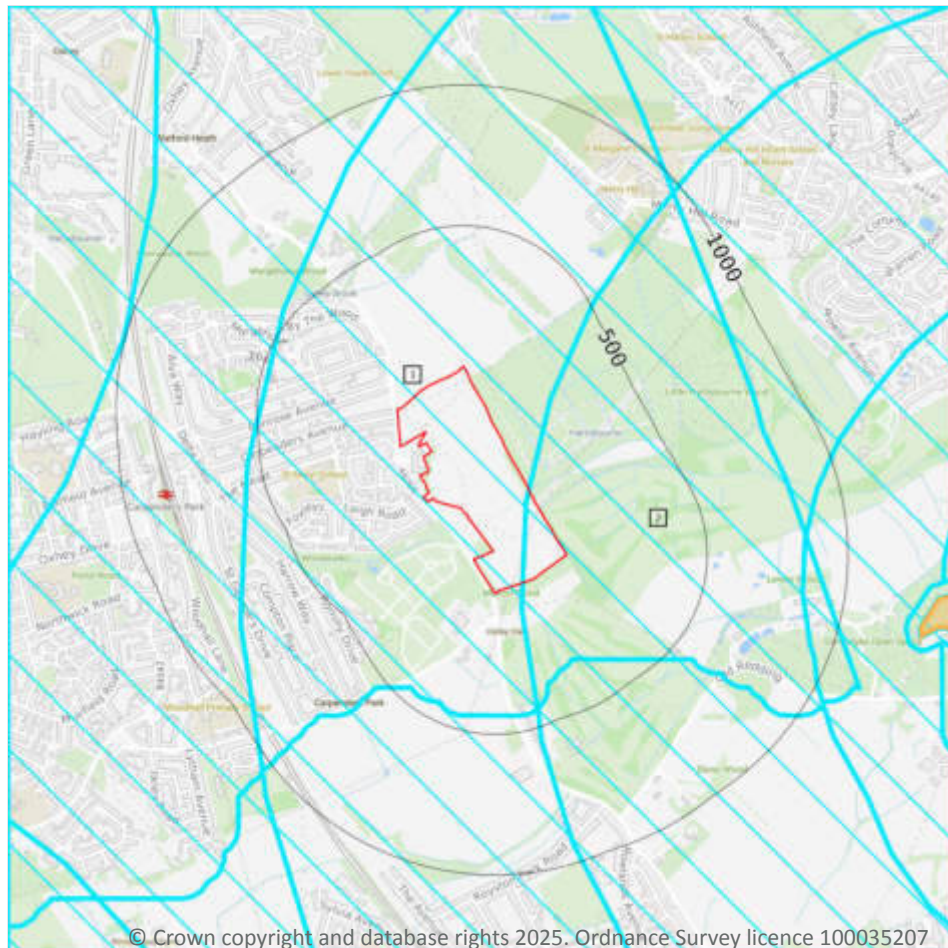
0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

*This data is sourced from Natural England and Natural Resources Wales.*



## SSSI Impact Zones and Units



- Site Outline
- Search buffers in metres (m)
- SSSI Impact Risk Zones
- SSSI Units
- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

### 10.17 SSSI Impact Risk Zones

#### Records on site

2

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on [page 60](#) >

| ID | Location | Type of developments requiring consultation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | On site  | <p>Infrastructure - Airports, helipads and other aviation proposals.</p> <p>Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil &amp; gas exploration/extraction.</p> <p>Air pollution - Livestock &amp; poultry units with floorspace &gt; 500m<sup>2</sup>, slurry lagoons &amp; digestate stores &gt; 750m<sup>2</sup>, manure stores &gt; 3500t.</p> <p>Discharges - Any discharge of water or liquid waste of more than 20m<sup>3</sup>/day to ground (ie to seep away) or to surface water, such as a beck or stream.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2  | On site  | <p>Infrastructure - Pipelines and underground cables, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals.</p> <p>Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil &amp; gas exploration/extraction.</p> <p>Air pollution - Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, livestock &amp; poultry units with floorspace &gt; 500m<sup>2</sup>, slurry lagoons &amp; digestate stores &gt; 200m<sup>2</sup>, manure stores &gt; 250t).</p> <p>Combustion - General combustion processes &gt;20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.</p> <p>Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill.</p> <p>Composting - Any composting proposal with more than 75000 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management.</p> <p>Discharges - Any discharge of water or liquid waste of more than 20m<sup>3</sup>/day to ground (ie to seep away) or to surface water, such as a beck or stream.</p> <p>Water supply - Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m<sup>2</sup> or more.</p> |

*This data is sourced from Natural England.*

## 10.18 SSSI Units

### Records within 2000m

3

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

Features are displayed on the SSSI Impact Zones and Units map on [page 60 >](#)

ID: A  
 Location: 1286m E  
 SSSI name: Harrow Weald  
 Unit name: 1  
 Broad habitat: Earth Heritage  
 Condition: Unfavourable - Declining  
 Reportable features:



| Feature name                  | Feature condition        | Date of assessment |
|-------------------------------|--------------------------|--------------------|
| ED - Quaternary of the Thames | Unfavourable - Declining | 07/03/2022         |
| FB - Quaternary of the Thames | Unfavourable - Declining | 07/03/2022         |

ID: -  
Location: 1844m E  
SSSI name: Bentley Priory  
Unit name: 1  
Broad habitat: Acid Grassland - Lowland  
Condition: Favourable  
Reportable features:

| Feature name | Feature condition | Date of assessment |
|--------------|-------------------|--------------------|
| Scrub        | Favourable        | 27/01/2020         |

ID: -  
Location: 1892m E  
SSSI name: Bentley Priory  
Unit name: 2  
Broad habitat: Neutral Grassland - Lowland  
Condition: Favourable  
Reportable features:

| Feature name                    | Feature condition | Date of assessment |
|---------------------------------|-------------------|--------------------|
| Lowland neutral grassland (MG5) | Favourable        | 05/07/2011         |
| Scrub                           | Favourable        | 05/07/2011         |

*This data is sourced from Natural England and Natural Resources Wales.*



## 11 Visual and cultural designations

### 11.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

### 11.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

*This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.*

### 11.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

*This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.*

### 11.4 Listed Buildings

Records within 250m

0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.



*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 11.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 11.6 Scheduled Ancient Monuments

Records within 250m

0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*

## 11.7 Registered Parks and Gardens

Records within 250m

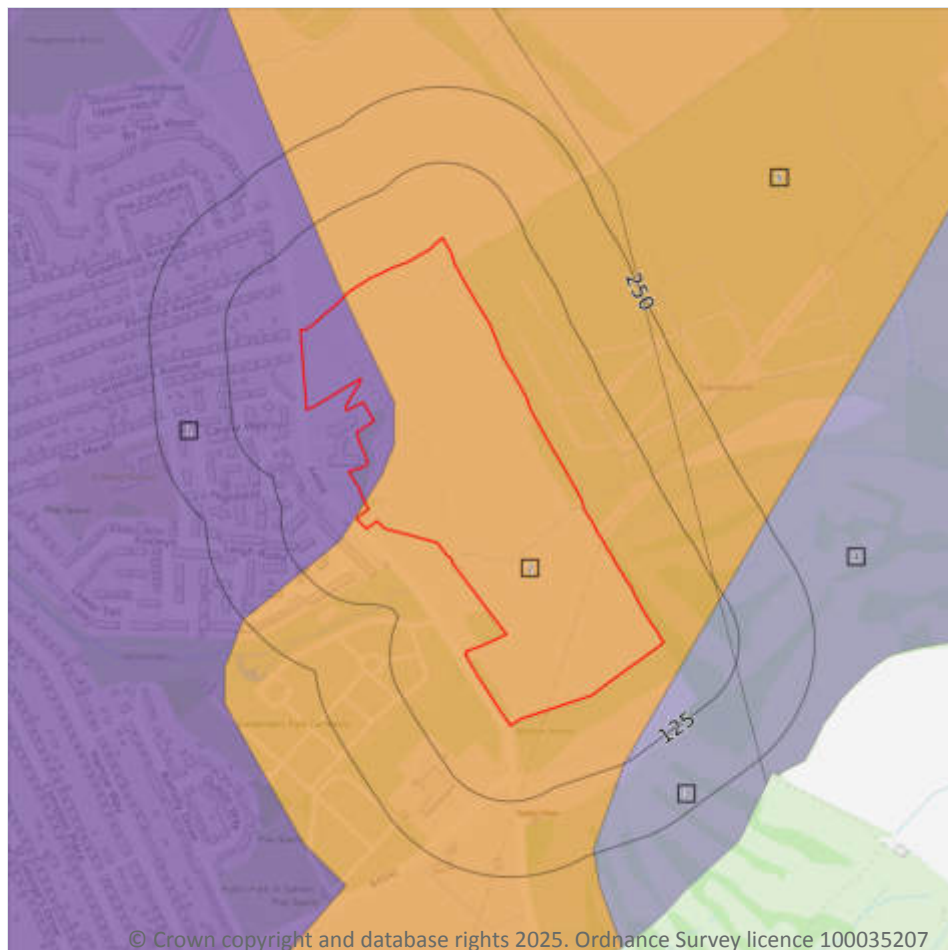
0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

*This data is sourced from Historic England, Cadw and Historic Environment Scotland.*



## 12 Agricultural designations



- Site Outline
- Search buffers in metres (m)
- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

### 12.1 Agricultural Land Classification

Records within 250m

5

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on [page 65](#) >

| ID | Location | Classification | Description                                                                                                                                                                                                                                                                                     |
|----|----------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | On site  | Urban          | Non-agricultural/no quality assigned                                                                                                                                                                                                                                                            |
| 2  | On site  | Grade 3        | Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2. |



| ID | Location | Classification      | Description                                                                                                                                                                                                                                                                                     |
|----|----------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3  | 45m SE   | Non<br>Agricultural | Non-agricultural/no quality assigned                                                                                                                                                                                                                                                            |
| 4  | 107m SE  | Non<br>Agricultural | Non-agricultural/no quality assigned                                                                                                                                                                                                                                                            |
| 5  | 116m SE  | Grade 3             | Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2. |

*This data is sourced from Natural England.*

## 12.2 Open Access Land

**Records within 250m**

**0**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

*This data is sourced from Natural England and Natural Resources Wales.*

## 12.3 Tree Felling Licences

**Records within 250m**

**0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

*This data is sourced from the Forestry Commission.*

## 12.4 Environmental Stewardship Schemes

**Records within 250m**

**0**

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

*This data is sourced from Natural England.*



## 12.5 Countryside Stewardship Schemes

Records within 250m

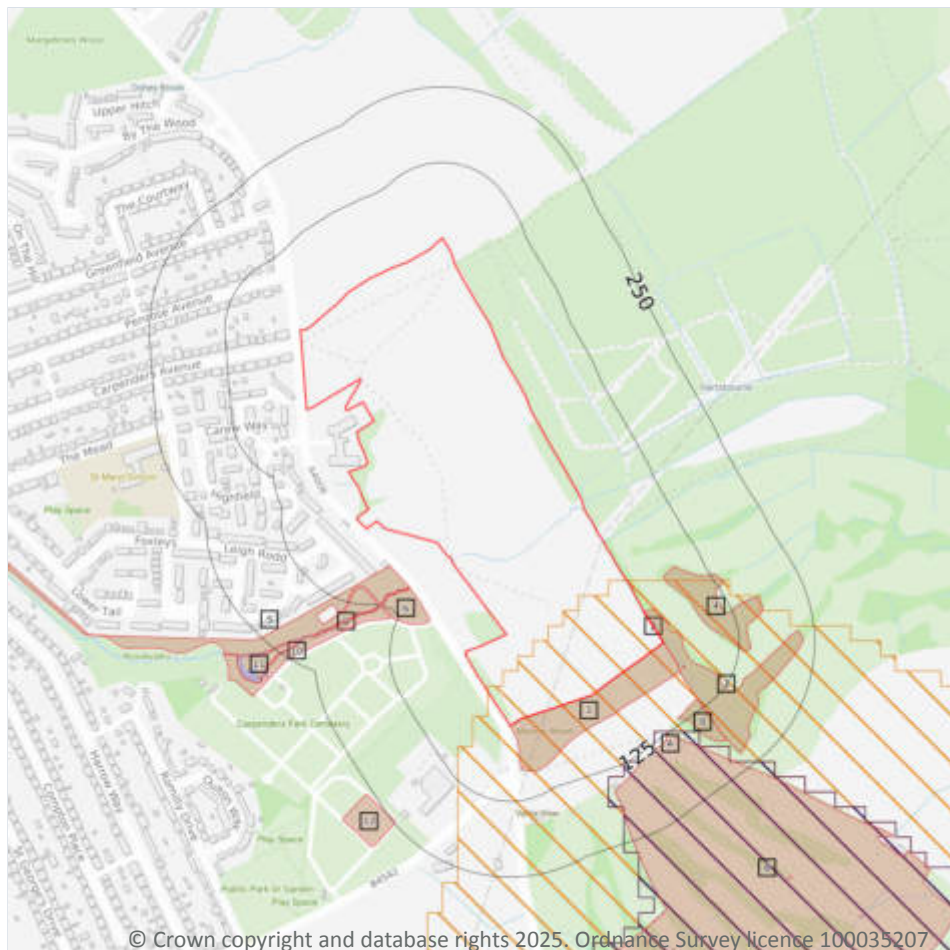
0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

*This data is sourced from Natural England.*



## 13 Habitat designations



- Site Outline
- Search buffers in metres (m)
- Priority Habitat Inventory
- Open Mosaic Habitat
- Limestone Pavement Orders
- Habitat Networks
- Primary Habitat
- Restorable Habitat
- Associated Habitats
- Habitat Restoration-Creation
- Network Enhancement Zone 1
- Network Enhancement Zone 2

### 13.1 Priority Habitat Inventory

Records within 250m

14

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

Features are displayed on the Habitat designations map on [page 68](#) >

| ID | Location | Main Habitat       | Other habitats                  |
|----|----------|--------------------|---------------------------------|
| 1  | On site  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 2  | On site  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 3  | On site  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 4  | 56m SE   | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |



| ID | Location | Main Habitat       | Other habitats                  |
|----|----------|--------------------|---------------------------------|
| 5  | 57m SW   | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 6  | 78m S    | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 7  | 81m SW   | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 8  | 108m SE  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| B  | 125m SE  | Lowland heathland  | Main habitat: LHEAT (INV > 50%) |
| 9  | 125m SW  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 10 | 126m SW  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| A  | 137m SE  | Lowland heathland  | Main habitat: LHEAT (INV > 50%) |
| 11 | 222m SW  | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |
| 12 | 247m S   | Deciduous woodland | Main habitat: DWOOD (INV > 50%) |

*This data is sourced from Natural England.*

## 13.2 Habitat Networks

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>2</b> |
|----------------------------|----------|

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

Features are displayed on the Habitat designations map on [page 68](#) >

| ID | Location | Type                       | Habitat           |
|----|----------|----------------------------|-------------------|
| A  | On site  | Network Enhancement Zone 1 | Not specified     |
| B  | 110m SE  | Primary Habitat            | Lowland heathland |

*This data is sourced from Natural England.*

## 13.3 Open Mosaic Habitat

|                            |          |
|----------------------------|----------|
| <b>Records within 250m</b> | <b>0</b> |
|----------------------------|----------|

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

*This data is sourced from Natural England.*



## 13.4 Limestone Pavement Orders

Records within 250m

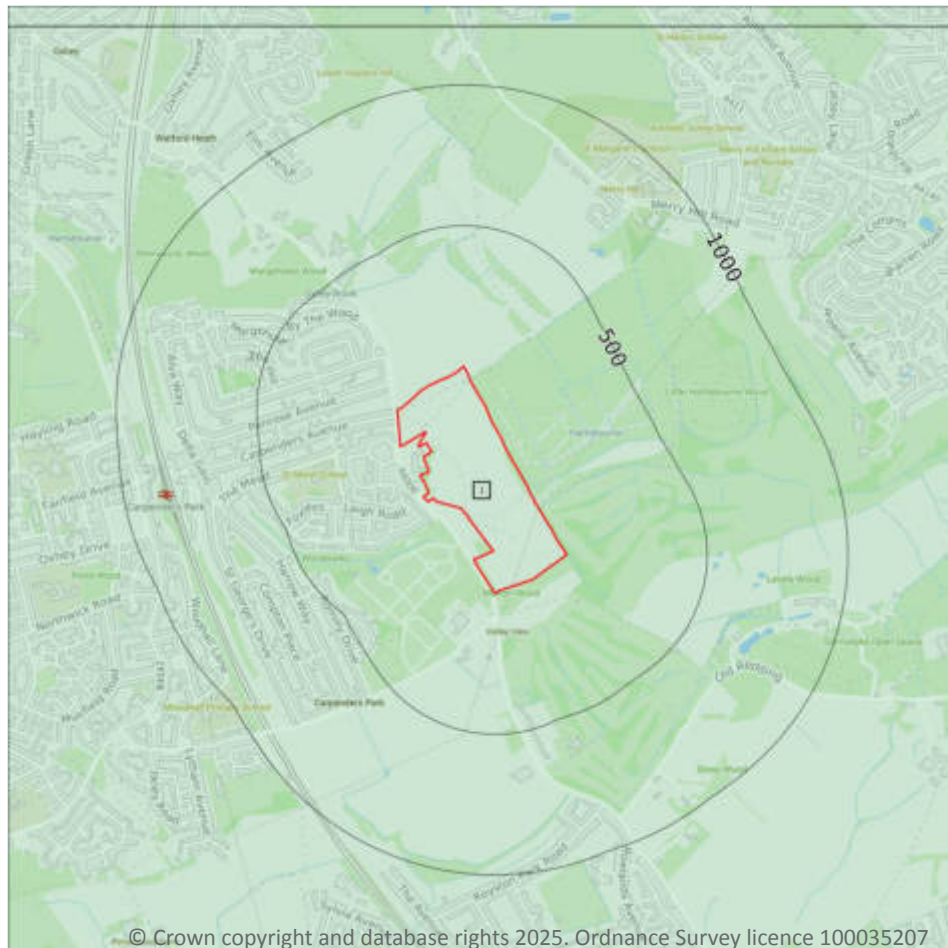
0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

*This data is sourced from Natural England.*



## 14 Geology 1:10,000 scale - Availability



- Site Outline**
- Search buffers in metres (m)
- Full coverage
  - Partial coverage
  - No coverage

### 14.1 10k Availability

#### Records within 500m

1

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on [page 71](#) >

| ID | Location | Artificial | Superficial | Bedrock | Mass movement | Sheet No. |
|----|----------|------------|-------------|---------|---------------|-----------|
| 1  | On site  | Full       | Full        | Full    | No coverage   | TQ19SW    |

*This data is sourced from the British Geological Survey.*



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-  Reclaimed ground
-  Made ground
-  Worked ground
-  Infilled ground
-  Disturbed ground
-  Landscaped ground

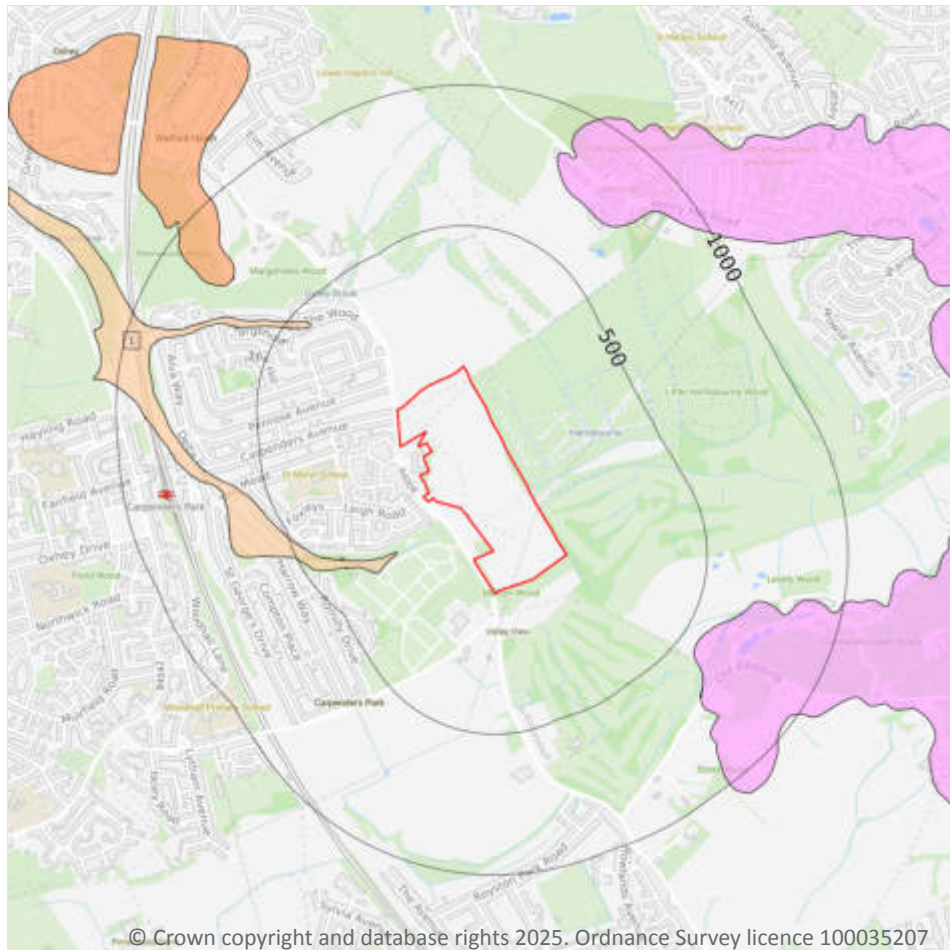
|                     |   |
|---------------------|---|
| Records within 500m | 1 |
|---------------------|---|

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on [page 72 >](#)

| ID | Location | LEX Code     | Description     | Rock description           |
|----|----------|--------------|-----------------|----------------------------|
| 1  | 457m NW  | WMGR-UNKNOWN | Infilled Ground | Unknown/unclassified Entry |


 Contact us with any questions at:  
[info@groundsure.com](mailto:info@groundsure.com) ↗  
 01273 257 755

## Geology 1:10,000 scale - Superficial



- Site Outline
- Search buffers in metres (m)
- Landslip (10k)
- Superficial geology (10k)  
Please see table for more details.

### 14.3 Superficial geology (10k)

#### Records within 500m

1

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on [page 73](#) >

| ID | Location | LEX Code | Description                                                 | Rock description |
|----|----------|----------|-------------------------------------------------------------|------------------|
| 1  | 211m SW  | RTDU-XSV | River Terrace Deposits (undifferentiated) - Sand And Gravel | Sand And Gravel  |

*This data is sourced from the British Geological Survey.*



## 14.4 Landslip (10k)

Records within 500m

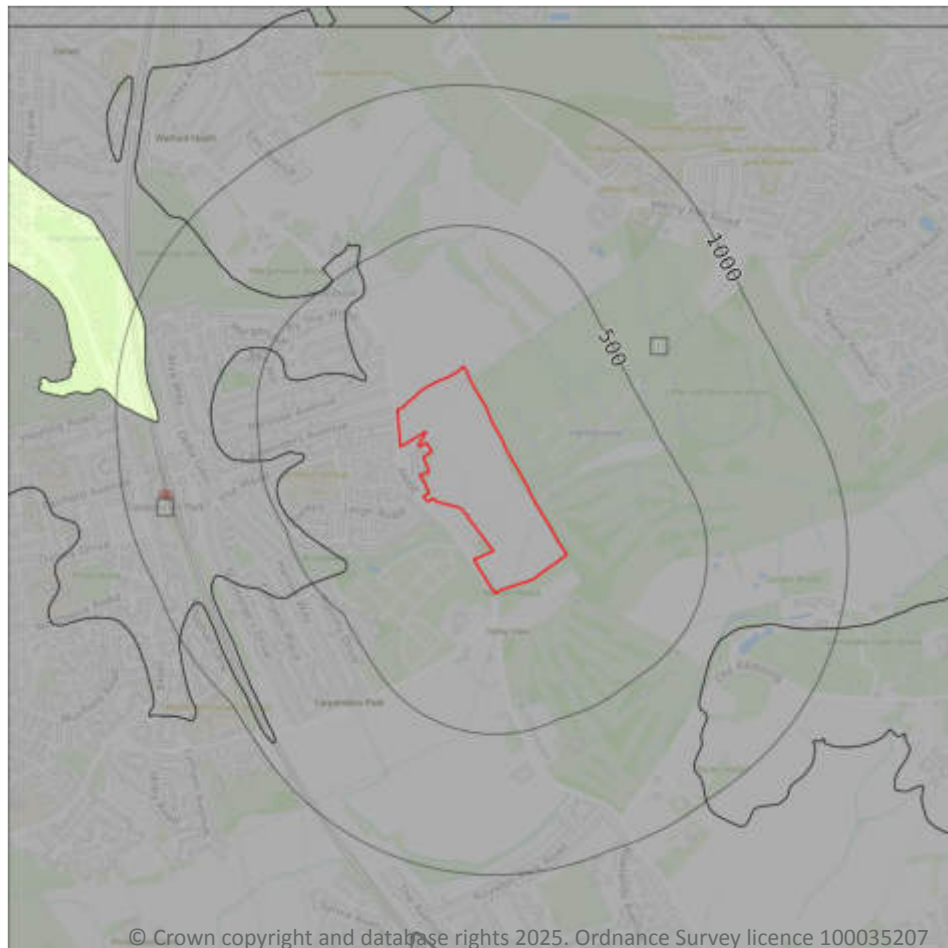
0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

*This data is sourced from the British Geological Survey.*



## Geology 1:10,000 scale - Bedrock



- Site Outline
- Search buffers in metres (m)
- Bedrock faults and other linear features (10k)
- Bedrock geology (10k)  
Please see table for more details.

### 14.5 Bedrock geology (10k)

#### Records within 500m

2

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on [page 75 >](#)

| ID | Location | LEX Code  | Description                  | Rock age        |
|----|----------|-----------|------------------------------|-----------------|
| 1  | On site  | LC-CLAY   | London Clay Formation - Clay | Eocene Epoch    |
| 2  | 153m NW  | LMBE-SACL | Lambeth Group - Sandy Clay   | Paleocene Epoch |

*This data is sourced from the British Geological Survey.*



## 14.6 Bedrock faults and other linear features (10k)

Records within 500m

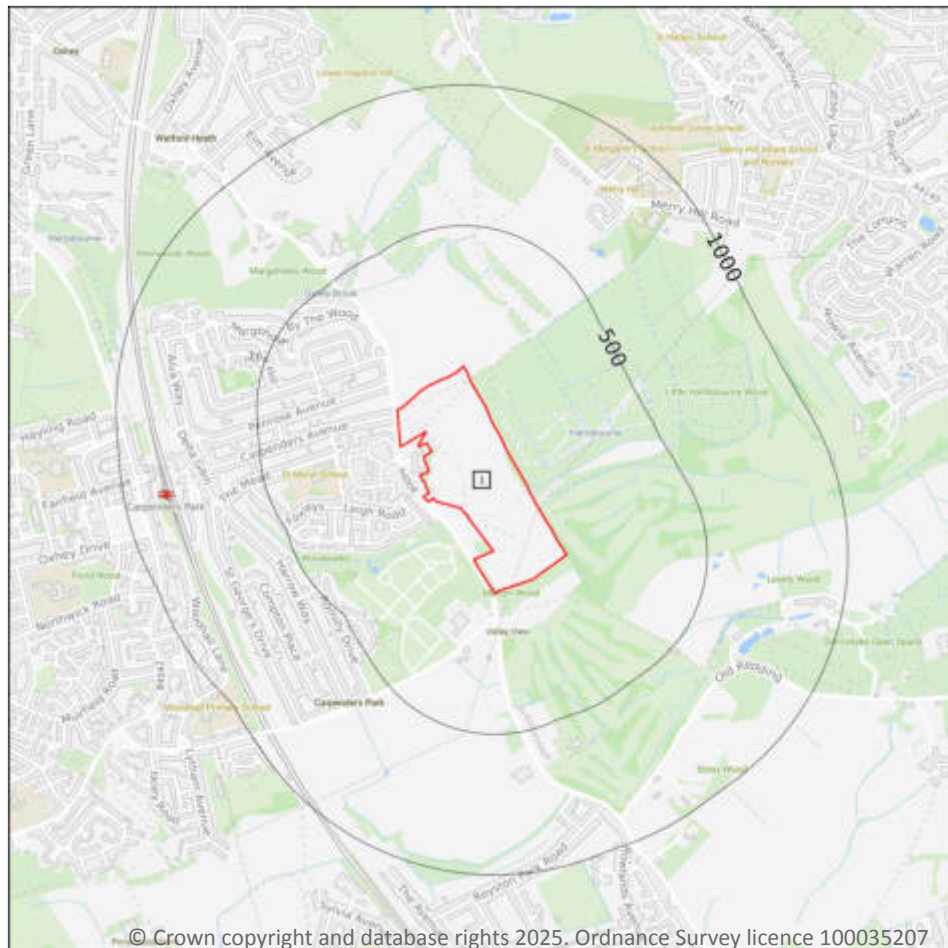
0

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

*This data is sourced from the British Geological Survey.*



## 15 Geology 1:50,000 scale - Availability



— Site Outline

Search buffers in metres (m)

□ Geological map tile

### 15.1 50k Availability

#### Records within 500m

1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

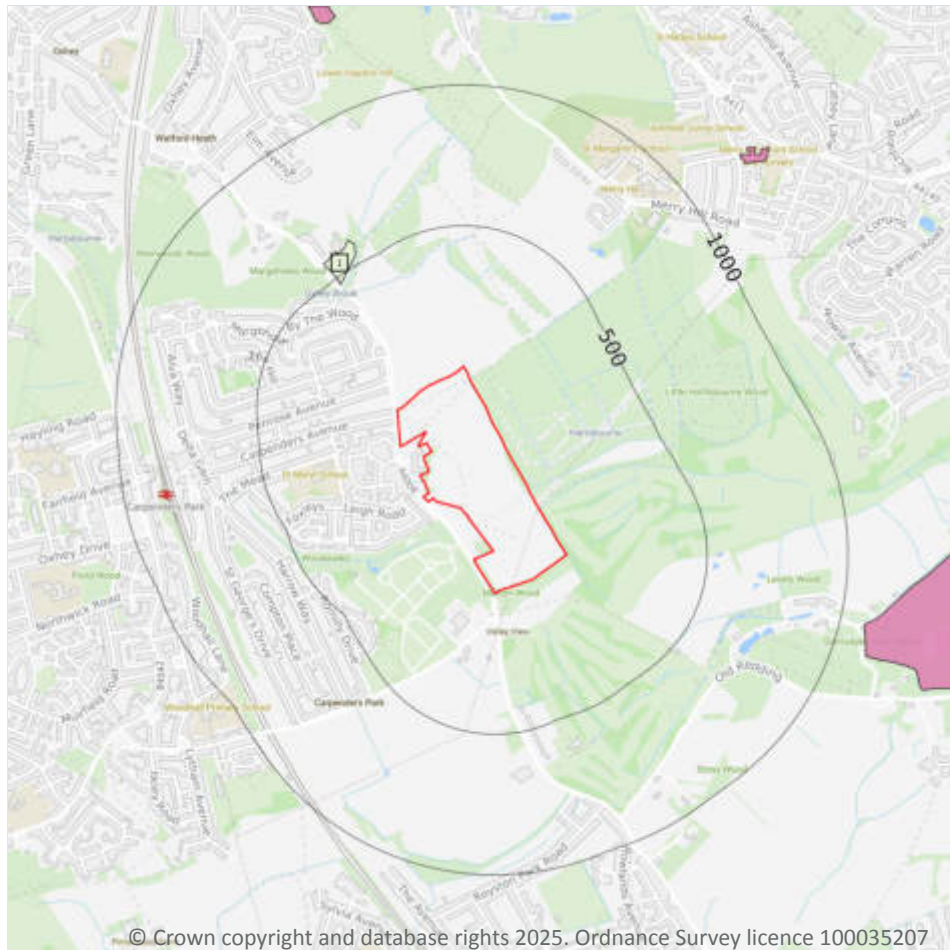
Features are displayed on the Geology 1:50,000 scale - Availability map on [page 77](#) >

| ID | Location | Artificial | Superficial | Bedrock | Mass movement | Sheet No.             |
|----|----------|------------|-------------|---------|---------------|-----------------------|
| 1  | On site  | Full       | Full        | Full    | Full          | EW256_north_london_v4 |

*This data is sourced from the British Geological Survey.*



## Geology 1:50,000 scale - Artificial and made ground



- Site Outline**
- Search buffers in metres (m)
- Made ground
  - Worked ground
  - Infilled ground
  - Disturbed ground
  - Landscaped ground

### 15.2 Artificial and made ground (50k)

#### Records within 500m

1

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on [page 78](#) >

| ID | Location | LEX Code   | Description     | Rock description   |
|----|----------|------------|-----------------|--------------------|
| 1  | 474m NW  | WMGR-ARTDP | INFILLED GROUND | ARTIFICIAL DEPOSIT |

*This data is sourced from the British Geological Survey.*

## 15.3 Artificial ground permeability (50k)

Records within 50m

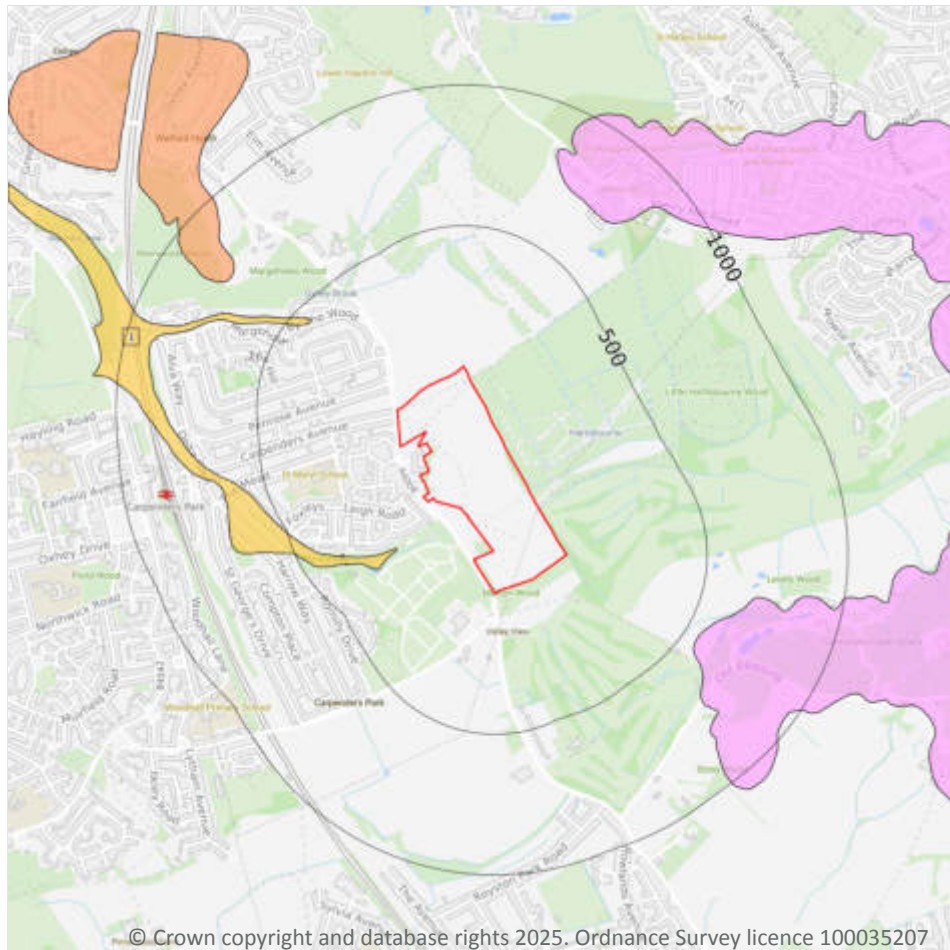
0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

*This data is sourced from the British Geological Survey.*



## Geology 1:50,000 scale - Superficial



— Site Outline

Search buffers in metres (m)

▣ Landslip (50k)

Superficial geology (50k)  
Please see table for more details.

### 15.4 Superficial geology (50k)

#### Records within 500m

1

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on [page 80](#) >

| ID | Location | LEX Code | Description              | Rock description |
|----|----------|----------|--------------------------|------------------|
| 1  | 200m SW  | SHGR-XSV | SHEPPERTON GRAVEL MEMBER | SAND AND GRAVEL  |

*This data is sourced from the British Geological Survey.*

## 15.5 Superficial permeability (50k)

Records within 50m

0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

*This data is sourced from the British Geological Survey.*

## 15.6 Landslip (50k)

Records within 500m

0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

*This data is sourced from the British Geological Survey.*

## 15.7 Landslip permeability (50k)

Records within 50m

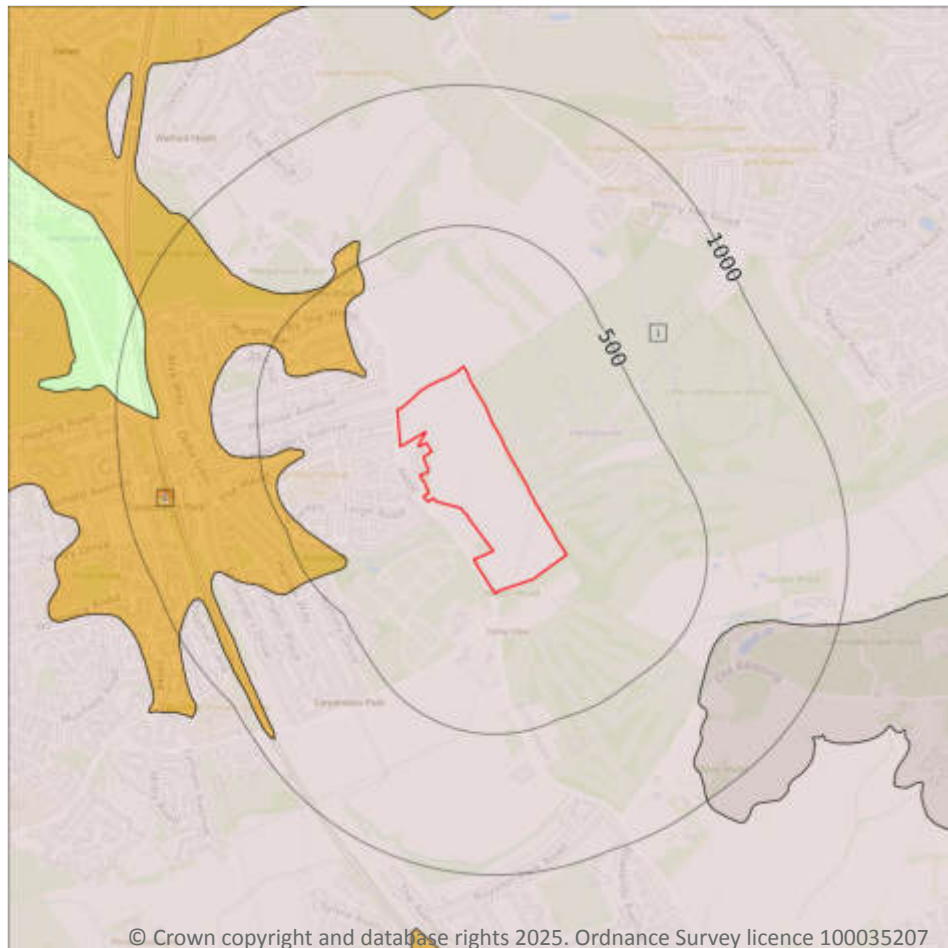
0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

*This data is sourced from the British Geological Survey.*



## Geology 1:50,000 scale - Bedrock



**— Site Outline**

Search buffers in metres (m)

**.... Bedrock faults and other linear features (50k)**

**Bedrock geology (50k)**  
Please see table for more details.

### 15.8 Bedrock geology (50k)

#### Records within 500m

2

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on [page 82 >](#)

| ID | Location | LEX Code  | Description                                 | Rock age  |
|----|----------|-----------|---------------------------------------------|-----------|
| 1  | On site  | LC-XCZS   | LONDON CLAY FORMATION - CLAY, SILT AND SAND | YPRESIAN  |
| 2  | 163m NW  | LMBE-XCZS | LAMBETH GROUP - CLAY, SILT AND SAND         | THANETIAN |

*This data is sourced from the British Geological Survey.*



## 15.9 Bedrock permeability (50k)

**Records within 50m****1**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

| Location | Flow type | Maximum permeability | Minimum permeability |
|----------|-----------|----------------------|----------------------|
| On site  | Mixed     | Moderate             | Very Low             |

*This data is sourced from the British Geological Survey.*

## 15.10 Bedrock faults and other linear features (50k)

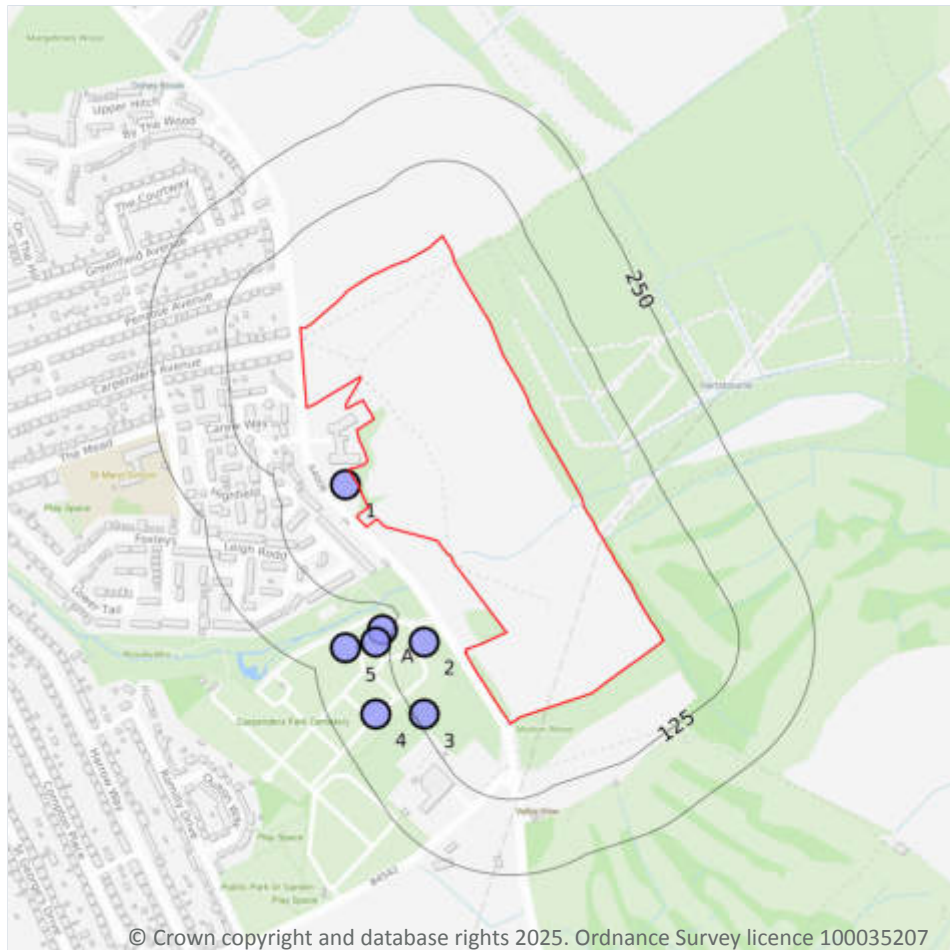
**Records within 500m****0**

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

*This data is sourced from the British Geological Survey.*



## 16 Boreholes



— Site Outline  
Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

### 16.1 BGS Boreholes

#### Records within 250m

7

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on [page 84](#) >

| ID | Location | Grid reference | Name                              | Length | Confidential | Web link                 |
|----|----------|----------------|-----------------------------------|--------|--------------|--------------------------|
| 1  | 16m W    | 512740 193380  | CARPENDERS PARK BHS1-4 WATFORD    | 4.87   | N            | <a href="#">582963</a> ↗ |
| 2  | 70m S    | 512870 193120  | CEMETRY SITE CARPENDERS PARK NO.2 | 4.87   | N            | <a href="#">582942</a> ↗ |
| 3  | 111m S   | 512870 193000  | CEMETRY SITE CARPENDERS PARK NO.1 | 4.87   | N            | <a href="#">582947</a> ↗ |

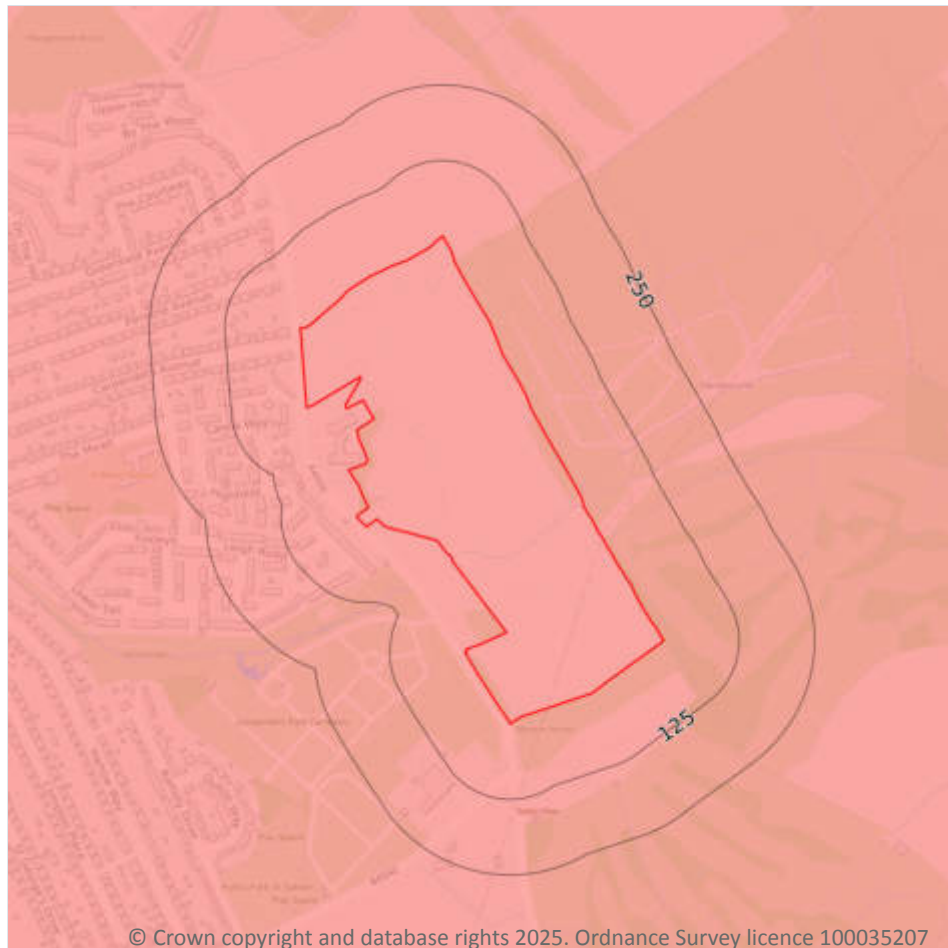


| ID | Location | Grid reference | Name                              | Length | Confidential | Web link                 |
|----|----------|----------------|-----------------------------------|--------|--------------|--------------------------|
| A  | 143m SW  | 512800 193140  | CEMETRY SITE CARPENDERS PARK NO.8 | 4.87   | N            | <a href="#">582940</a> ↗ |
| A  | 149m SW  | 512790 193120  | CEMETRY SITE CARPENDERS PARK NO.3 | 4.87   | N            | <a href="#">582941</a> ↗ |
| 4  | 179m SW  | 512790 193000  | CEMETRY SITE CARPENDERS PARK NO.4 | 4.87   | N            | <a href="#">582943</a> ↗ |
| 5  | 198m SW  | 512740 193110  | CEMETRY SITE CARPENDERS PARK NO.9 | 4.87   | N            | <a href="#">582939</a> ↗ |

*This data is sourced from the British Geological Survey.*



## 17 Natural ground subsidence - Shrink swell clays



- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☐ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

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### 17.1 Shrink swell clays

#### Records within 50m

1

The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

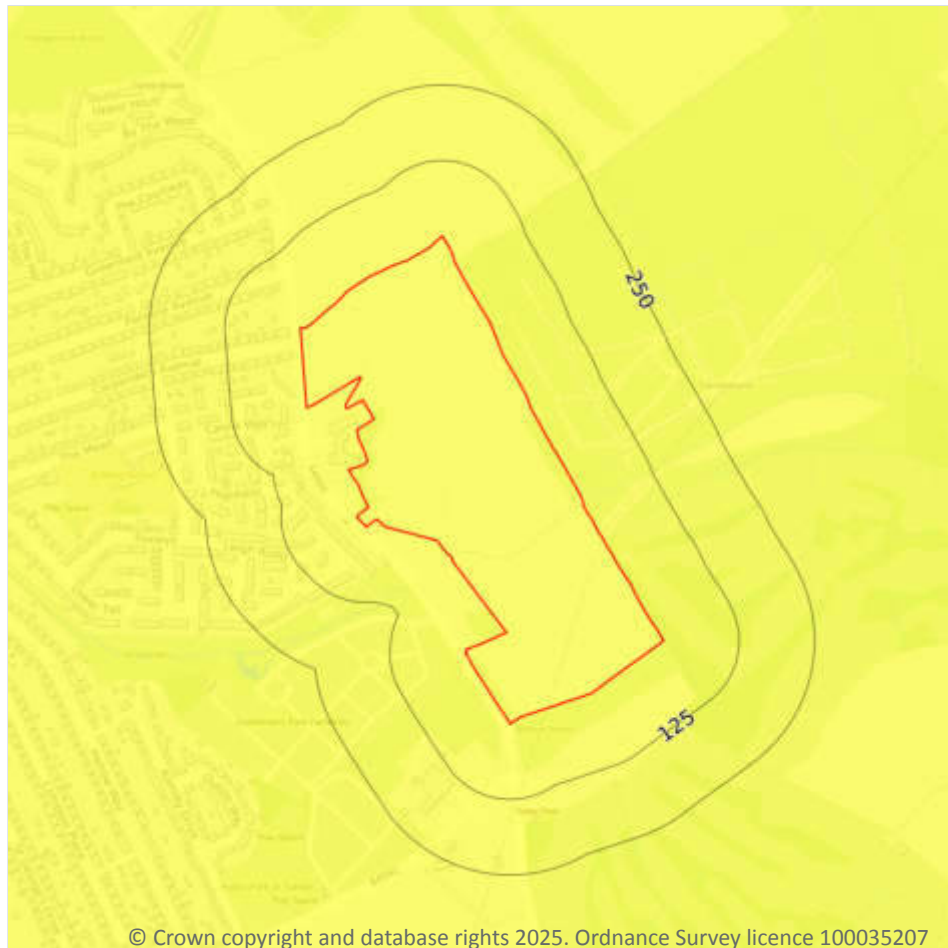
Features are displayed on the Natural ground subsidence - Shrink swell clays map on [page 86](#) >

| Location | Hazard rating | Details                                          |
|----------|---------------|--------------------------------------------------|
| On site  | Moderate      | Ground conditions predominantly high plasticity. |

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Running sands



- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☒ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

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### 17.2 Running sands

#### Records within 50m

1

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

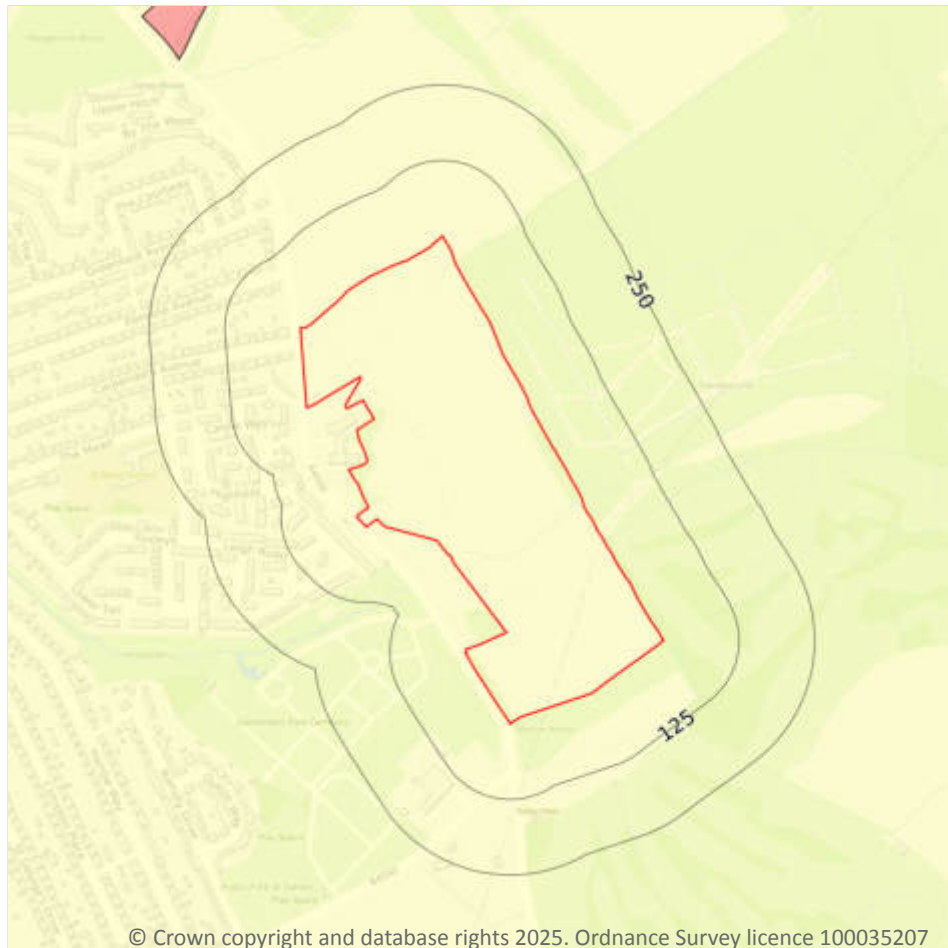
Features are displayed on the Natural ground subsidence - Running sands map on [page 87 >](#)

| Location | Hazard rating | Details                                                                                                                                 |
|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| On site  | Very low      | Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly. |

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Compressible deposits



- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☐ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

### 17.3 Compressible deposits

#### Records within 50m

1

The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

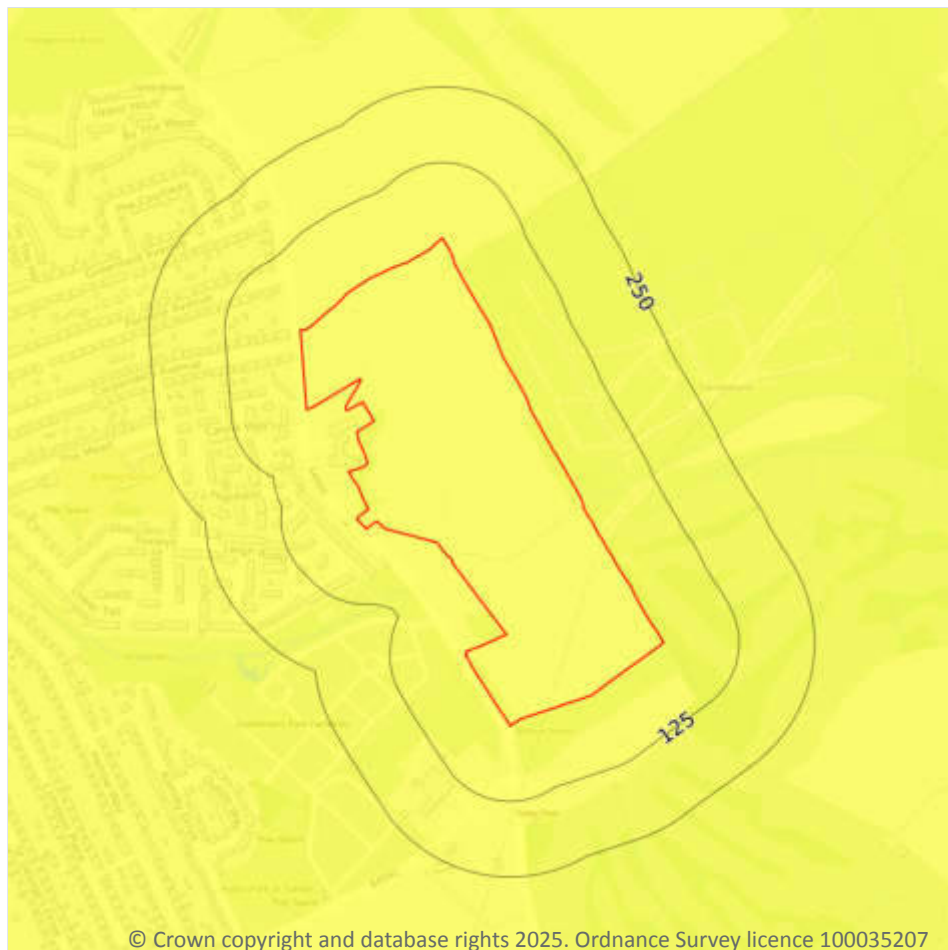
Features are displayed on the Natural ground subsidence - Compressible deposits map on [page 88](#) >

| Location | Hazard rating | Details                                       |
|----------|---------------|-----------------------------------------------|
| On site  | Negligible    | Compressible strata are not thought to occur. |

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Collapsible deposits



- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☒ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

### 17.4 Collapsible deposits

#### Records within 50m

1

The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

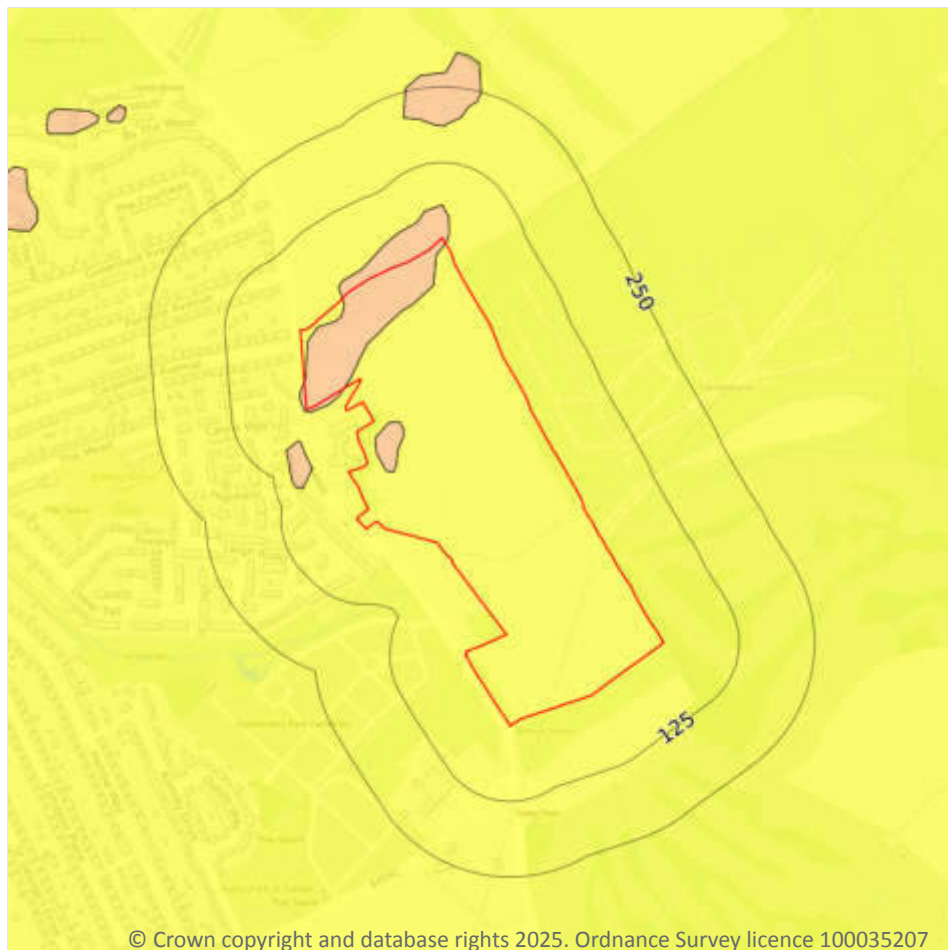
Features are displayed on the Natural ground subsidence - Collapsible deposits map on [page 89 >](#)

| Location | Hazard rating | Details                                                                                   |
|----------|---------------|-------------------------------------------------------------------------------------------|
| On site  | Very low      | Deposits with potential to collapse when loaded and saturated are unlikely to be present. |

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Landslides



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- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☒ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

### 17.5 Landslides

#### Records within 50m

2

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on [page 90](#) >

| Location | Hazard rating | Details                                                                                                                                                         |
|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On site  | Very low      | Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered. |

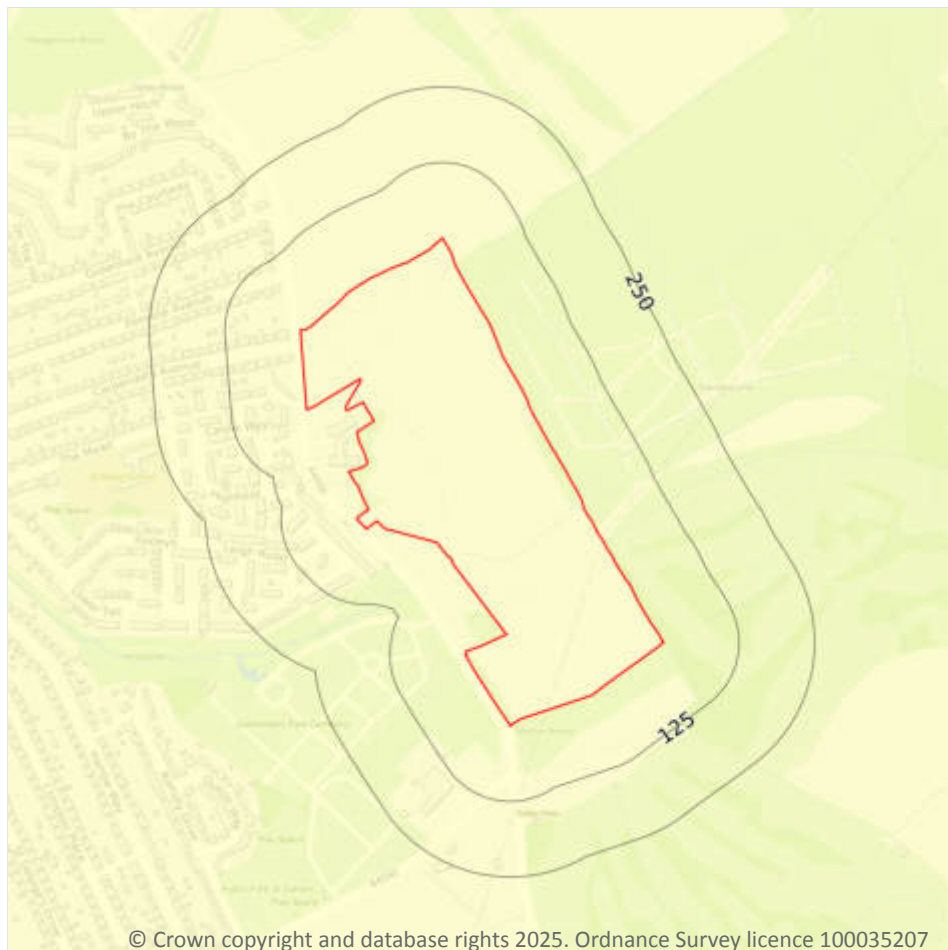


| Location | Hazard rating | Details                                                                                                                                    |
|----------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| On site  | Low           | Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site. |

*This data is sourced from the British Geological Survey.*



## Natural ground subsidence - Ground dissolution of soluble rocks



- Site Outline
- Search buffers in metres (m)
- ☐ No data
  - ☐ Negligible
  - ☐ Very low
  - ☐ Low
  - ☐ Moderate
  - ☐ High

### 17.6 Ground dissolution of soluble rocks

#### Records within 50m

1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on [page 92](#)

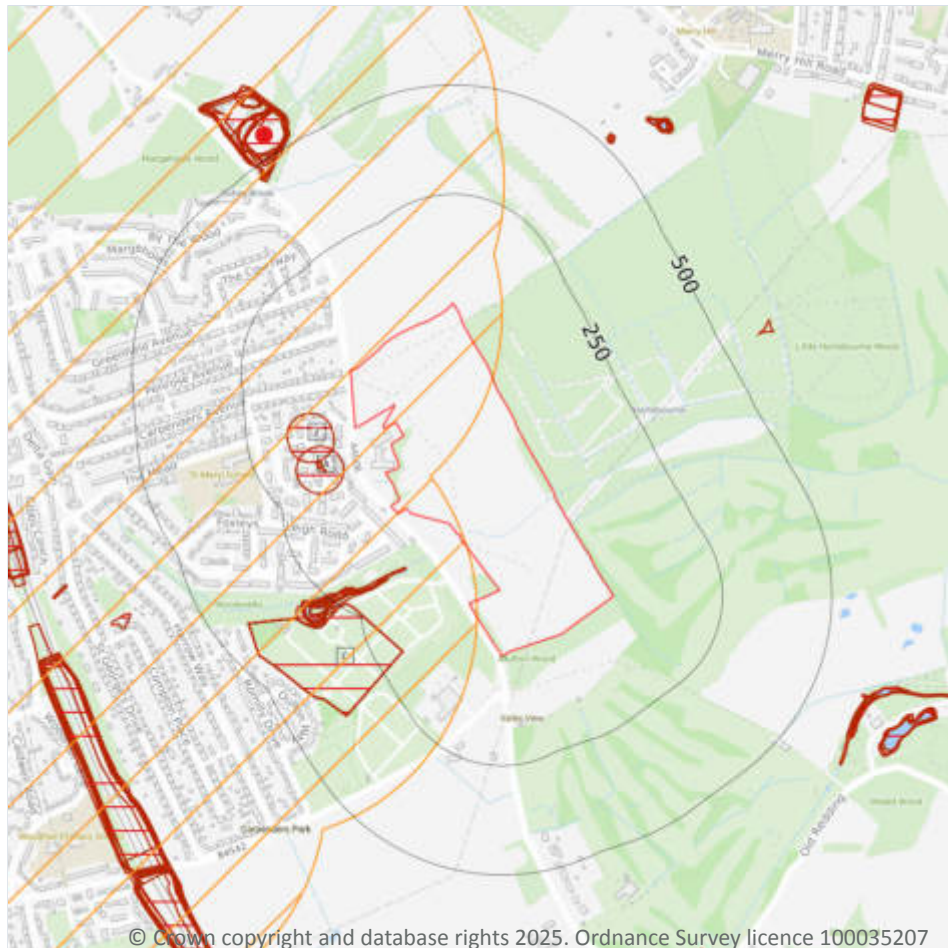
| Location | Hazard rating | Details                                                                                                                                             |
|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| On site  | Negligible    | Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present. |



*This data is sourced from the British Geological Survey.*



## 18 Mining and ground workings



- Site Outline
- Search buffers in metres (m)
- BritPits
- Surface ground workings
- Underground workings
- Underground mining extents
- Historical mineral planning areas
- TCA non-coal mining
- Non Coal Mining
- Sporadic underground mining of restricted extent possible
- Localised small scale underground mining possible
- Small scale mining possible
- Underground mining known or likely within or in close proximity
- Underground mining known within or in very close proximity

### 18.1 BritPits

Records within 500m

0

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

*This data is sourced from the British Geological Survey.*

## 18.2 Surface ground workings

Records within 250m

15

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on [page 94](#) >

| ID | Location | Land Use  | Year of mapping | Mapping scale |
|----|----------|-----------|-----------------|---------------|
| 2  | 52m W    | Pool      | 1938            | 1:10560       |
| A  | 72m W    | Reservoir | 1895            | 1:10560       |
| A  | 111m W   | Reservoir | 1938            | 1:10560       |
| A  | 111m W   | Reservoir | 1935            | 1:10560       |
| A  | 118m W   | Reservoir | 1920            | 1:10560       |
| A  | 118m W   | Reservoir | 1913            | 1:10560       |
| B  | 122m SW  | Fish Pond | 1895            | 1:10560       |
| B  | 151m SW  | Pond      | 1935            | 1:10560       |
| C  | 187m SW  | Cemetery  | 1992            | 1:10000       |
| C  | 187m SW  | Cemetery  | 1976            | 1:10000       |
| C  | 187m SW  | Cemetery  | 1968            | 1:10560       |
| C  | 187m SW  | Cemetery  | 1959            | 1:10560       |
| B  | 194m SW  | Fish Pond | 1883            | 1:10560       |
| B  | 197m SW  | Fish Pond | 1899            | 1:10560       |
| B  | 199m SW  | Fish Pond | 1896            | 1:10560       |

*This is data is sourced from Ordnance Survey/Groundsure.*

## 18.3 Underground workings

Records within 1000m

0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

*This is data is sourced from Ordnance Survey/Groundsure.*



## 18.4 Underground mining extents

Records within 500m

0

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

*This data is sourced from Groundsure.*

## 18.5 Historical Mineral Planning Areas

Records within 500m

0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

*This data is sourced from the British Geological Survey.*

## 18.6 Non-coal mining

Records within 1000m

3

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining and ground workings map on [page 94 >](#)

| ID | Location | Name          | Commodity | Class | Likelihood                                                                                                                                                                                                                                                 |
|----|----------|---------------|-----------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | On site  | Not available | Chalk     | C     | <b>Underground mine workings may have occurred in the past, or current mines may be operating to modern engineering standards. Potential for difficult ground conditions should be considered.</b>                                                         |
| -  | 753m S   | Not available | Chalk     | C     | Underground mine workings may have occurred in the past, or current mines may be operating to modern engineering standards. Potential for difficult ground conditions should be considered.                                                                |
| -  | 851m W   | Not available | Chalk     | B     | Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered. |

*This data is sourced from the British Geological Survey.*



## 18.7 JPB mining areas

### Records on site

**0**

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

*This data is sourced from Johnson Poole and Bloomer.*

## 18.8 The Coal Authority non-coal mining

### Records within 500m

**0**

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

*This data is sourced from The Coal Authority.*

## 18.9 Researched mining

### Records within 500m

**0**

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

*This data is sourced from Groundsure.*

## 18.10 Mining record office plans

### Records within 500m

**0**

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

*This data is sourced from Groundsure.*



### 18.11 BGS mine plans

**Records within 500m****0**

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

*This data is sourced from Groundsure.*

### 18.12 Coal mining

**Records on site****0**

Areas which could be affected by past, current or future coal mining.

*This data is sourced from the Coal Authority.*

### 18.13 Brine areas

**Records on site****0**

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

*This data is sourced from the Cheshire Brine Subsidence Compensation Board.*

### 18.14 Gypsum areas

**Records on site****0**

Generalised areas that may be affected by gypsum extraction.

*This data is sourced from British Gypsum.*

### 18.15 Tin mining

**Records on site****0**

Generalised areas that may be affected by historical tin mining.

*This data is sourced from Groundsure.*

## 18.16 Clay mining

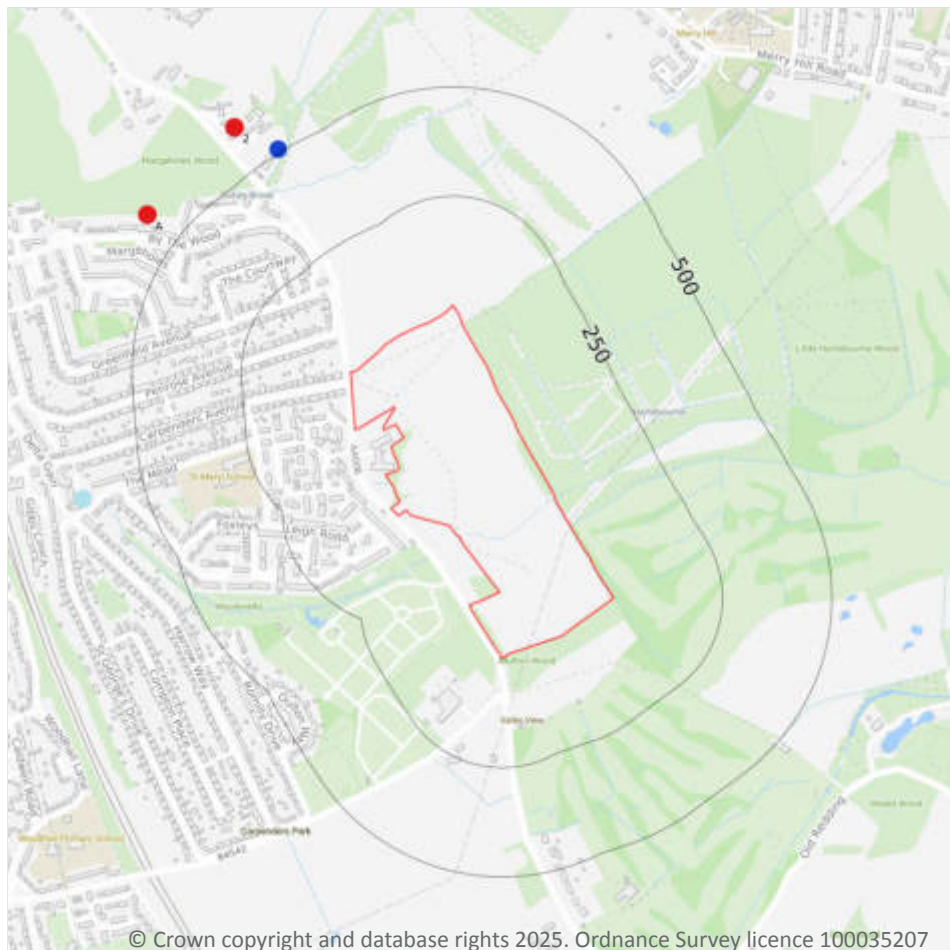
|                 |   |
|-----------------|---|
| Records on site | 0 |
|-----------------|---|

Generalised areas that may be affected by kaolin and ball clay extraction.

*This data is sourced from the Kaolin and Ball Clay Association (UK).*



## 19 Ground cavities and sinkholes



- Site Outline
- Search buffers in metres (m)
- Natural cavities (Area)
- Natural cavities (Point)
- Mining cavities
- Reported recent incidents
- Historical incidents

### 19.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

*This data is sourced from Stantec UK Ltd.*

## 19.2 Mining cavities

### Records within 1000m

**3**

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

Features are displayed on the Ground cavities and sinkholes map on [page 100](#) >

| ID | Location | Mine Address                                | Mineral | Data source | Publisher |
|----|----------|---------------------------------------------|---------|-------------|-----------|
| A  | 589m NW  | Margeholes Wood, South Oxhey, Hertfordshire | Chalk   | -           | -         |
| A  | 589m NW  | Margeholes Wood, South Oxhey, Hertfordshire | Chalk   | -           | -         |
| 2  | 605m NW  | Watford, Hertfordshire                      | Chalk   | -           | -         |

*This data is sourced from Stantec UK Ltd.*

## 19.3 Reported recent incidents

### Records within 500m

**0**

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

*This data is sourced from Groundsure.*

## 19.4 Historical incidents

### Records within 500m

**0**

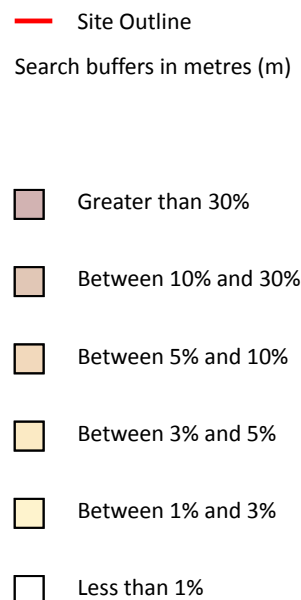
This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.

*This data is sourced from Groundsure.*



## 20 Radon



### 20.1 Radon

#### Records on site

1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on [page 102](#) >

| Location | Estimated properties affected | Radon Protection Measures required |
|----------|-------------------------------|------------------------------------|
| On site  | Less than 1%                  | None                               |



*This data is sourced from the British Geological Survey and UK Health Security Agency.*



## 21 Soil chemistry

### 21.1 BGS Estimated Background Soil Chemistry

Records within 50m

16

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km<sup>2</sup>. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km<sup>2</sup>; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

| Location | Arsenic       | Bioaccessible Arsenic | Lead      | Bioaccessible Lead | Cadmium   | Chromium       | Nickel        |
|----------|---------------|-----------------------|-----------|--------------------|-----------|----------------|---------------|
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| On site  | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |



| Location | Arsenic       | Bioaccessible Arsenic | Lead      | Bioaccessible Lead | Cadmium   | Chromium       | Nickel        |
|----------|---------------|-----------------------|-----------|--------------------|-----------|----------------|---------------|
| 2m S     | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| 2m S     | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| 2m S     | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |
| 2m S     | 15 - 25 mg/kg | No data               | 100 mg/kg | 60 mg/kg           | 1.8 mg/kg | 90 - 120 mg/kg | 15 - 30 mg/kg |

*This data is sourced from the British Geological Survey.*

## 21.2 BGS Estimated Urban Soil Chemistry

|                           |           |
|---------------------------|-----------|
| <b>Records within 50m</b> | <b>24</b> |
|---------------------------|-----------|

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km<sup>2</sup>).

| Location | Arsenic (mg/kg) | Bioaccessible Arsenic (mg/kg) | Lead (mg/kg) | Bioaccessible Lead (mg/kg) | Cadmium (mg/kg) | Chromium (mg/kg) | Copper (mg/kg) | Nickel (mg/kg) | Tin (mg/kg) |
|----------|-----------------|-------------------------------|--------------|----------------------------|-----------------|------------------|----------------|----------------|-------------|
| On site  | 15              | 2.6                           | 74           | 51                         | 0.7             | 81               | 26             | 22             | 7           |
| On site  | 15              | 2.6                           | 76           | 52                         | 0.7             | 81               | 26             | 22             | 8           |
| On site  | 15              | 2.6                           | 79           | 54                         | 0.7             | 82               | 27             | 22             | 8           |
| On site  | 15              | 2.6                           | 68           | 47                         | 0.6             | 80               | 24             | 23             | 7           |
| On site  | 15              | 2.6                           | 72           | 49                         | 0.7             | 81               | 25             | 23             | 8           |
| On site  | 15              | 2.6                           | 76           | 52                         | 0.7             | 81               | 26             | 23             | 8           |
| On site  | 15              | 2.6                           | 71           | 49                         | 0.7             | 80               | 25             | 23             | 7           |
| On site  | 15              | 2.6                           | 76           | 52                         | 0.7             | 81               | 26             | 23             | 8           |
| On site  | 15              | 2.6                           | 73           | 50                         | 0.7             | 80               | 25             | 23             | 8           |
| On site  | 16              | 2.8                           | 79           | 54                         | 0.7             | 82               | 27             | 22             | 8           |
| On site  | 16              | 2.8                           | 81           | 56                         | 0.7             | 82               | 27             | 22             | 8           |
| On site  | 16              | 2.8                           | 79           | 54                         | 0.7             | 82               | 27             | 23             | 8           |



| Location | Arsenic (mg/kg) | Bioaccessible Arsenic (mg/kg) | Lead (mg/kg) | Bioaccessible Lead (mg/kg) | Cadmium (mg/kg) | Chromium (mg/kg) | Copper (mg/kg) | Nickel (mg/kg) | Tin (mg/kg) |
|----------|-----------------|-------------------------------|--------------|----------------------------|-----------------|------------------|----------------|----------------|-------------|
| On site  | 16              | 2.8                           | 81           | 56                         | 0.7             | 83               | 28             | 23             | 8           |
| On site  | 16              | 2.8                           | 80           | 55                         | 0.7             | 82               | 27             | 23             | 8           |
| On site  | 16              | 2.8                           | 82           | 56                         | 0.7             | 83               | 28             | 23             | 8           |
| On site  | 16              | 2.8                           | 78           | 54                         | 0.7             | 82               | 27             | 23             | 8           |
| On site  | 16              | 2.8                           | 82           | 56                         | 0.7             | 83               | 27             | 22             | 8           |
| 2m S     | 15              | 2.6                           | 71           | 49                         | 0.7             | 82               | 26             | 23             | 7           |
| 18m S    | 15              | 2.6                           | 66           | 45                         | 0.6             | 79               | 23             | 22             | 7           |
| 34m SE   | 16              | 2.8                           | 84           | 58                         | 0.8             | 82               | 28             | 23             | 8           |
| 35m E    | 16              | 2.8                           | 84           | 58                         | 0.7             | 84               | 27             | 21             | 8           |
| 38m S    | 15              | 2.6                           | 77           | 53                         | 0.7             | 82               | 27             | 22             | 8           |
| 38m S    | 16              | 2.8                           | 75           | 52                         | 0.7             | 83               | 27             | 24             | 7           |
| 41m SE   | 15              | 2.6                           | 81           | 56                         | 0.8             | 81               | 28             | 23             | 8           |

*This data is sourced from the British Geological Survey.*

## 21.3 BGS Measured Urban Soil Chemistry

Records within 50m

0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km<sup>2</sup>.

*This data is sourced from the British Geological Survey.*



## 22 Railway infrastructure and projects

### 22.1 Underground railways (London)

**Records within 250m****0**

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

*This data is sourced from publicly available information by Groundsure.*

### 22.2 Underground railways (Non-London)

**Records within 250m****0**

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

*This data is sourced from publicly available information by Groundsure.*

### 22.3 Railway tunnels

**Records within 250m****0**

Railway tunnels taken from contemporary Ordnance Survey mapping.

*This data is sourced from the Ordnance Survey.*

### 22.4 Historical railway and tunnel features

**Records within 250m****0**

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

*This data is sourced from Ordnance Survey/Groundsure.*

### 22.5 Royal Mail tunnels

**Records within 250m****0**

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.



*This data is sourced from Groundsure/the Postal Museum.*

## 22.6 Historical railways

**Records within 250m**

**0**

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

*This data is sourced from OpenStreetMap.*

## 22.7 Railways

**Records within 250m**

**0**

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

*This data is sourced from Ordnance Survey and OpenStreetMap.*

## 22.8 Crossrail 2

**Records within 500m**

**0**

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

*This data is sourced from publicly available information by Groundsure.*

## 22.9 HS2

**Records within 500m**

**0**

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

*This data is sourced from HS2 Ltd.*



## Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference> ↗.

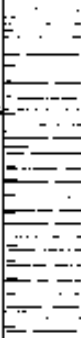
## Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: [www.groundsure.com/terms-and-conditions-april-2023/](https://www.groundsure.com/terms-and-conditions-april-2023/) ↗.



## **APPENDIX D**

### **BGS Exploratory Hole Records**

| Department of the Environment<br>SOILS SECTION OCED/SEG Cardington                                                                                                                                                    |                                                                                     | Investigation No.<br>SEG/72/033 |                           | Appendix A<br>Sheet No. 2 |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------|---------------------------|---------------------------|-----------------|
| Geotechnical Investigation into<br>Structural Damage to Married Quarters                                                                                                                                              |                                                                                     | <h2>CARPENDERS PARK</h2>        |                           |                           |                 |
| <b>BOREHOLE LOG</b> <span style="float: right; border: 1px solid black; padding: 2px;">SEG/Soils/729/2/72</span>                                                                                                      |                                                                                     |                                 |                           |                           |                 |
| Borehole No. <u>1</u>                                                                                                                                                                                                 |                                                                                     |                                 | Note: <u>TQ19 SW 187A</u> |                           |                 |
| Ground Level .....                                                                                                                                                                                                    |                                                                                     |                                 |                           |                           |                 |
| Date <u>29th June 1972</u>                                                                                                                                                                                            |                                                                                     |                                 |                           |                           |                 |
| Description of Strata                                                                                                                                                                                                 | Legend                                                                              | Sample                          | Depth (Imp)               | O.D.                      | Remarks         |
| CLAY; silty in places, brown and grey with patches of topsoil and fragments of brick and flint.<br>(DISTURBED GROUND)                                                                                                 |   | I                               | 0                         |                           |                 |
| CLAY; firm, brown with scattered small calcareous nodules. Rootlets present                                                                                                                                           |  | (9)                             | 3' 0"                     |                           |                 |
| CLAY; firm to stiff, fissured, brown (yellow mottled in places) with occasional laminations of yellow sandy silt and scattered aggregates of gypsum crystals. Organic patches (rootlet remains) noted at 9' 0" depth. |  | (10)                            | 6' 0"                     |                           |                 |
|                                                                                                                                                                                                                       |  |                                 | 10' 6"                    |                           | End of borehole |
|                                                                                                                                                                                                                       |  |                                 | 16' 0"                    |                           |                 |



Department of the Environment  
SOILS SECTION D.C.E.D./S.E.G. Cardington

Investigation No.  
SEG/72/033

Appendix A  
Sheet No. 3

Geotechnical Investigation into  
Structural Damage to Married Quarters

## CARPENDERS PARK

### BOREHOLE LOG

SEG/Soils/720/3/72

Borehole No. 2  
Ground Level  
Date 30<sup>th</sup> June 1972

Note: TOP OF SOIL 1378

| Description of Strata                                                                                                                                          | Legend | Sample | Depth (m)           | O.D. | Remarks                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|---------------------|------|---------------------------------------------------------------------|
| CLAY, sandy, silty, brown and green grey with pebbles, bands and patches of ashes and pieces of brick, coke, wood etc.<br>Roots present.<br>(DISTURBED GROUND) |        | (11)   | 0<br>3' 0"<br>4' 0" |      |                                                                     |
| RUBBLE; broken bricks, concrete, slates etc. mixed with silty grey green clay. (DISTURBED GROUND)                                                              |        |        |                     |      |                                                                     |
| CLAY, soft to firm, brown, with scattered small calcareous nodules.<br>Roots present.                                                                          |        | *      |                     |      | * Standard Penetration Test - 4 blows for 1' 0" Penetration (N < 4) |
| CLAY, firm to stiff, fissured, brown with grey streaks and patches. Becomes silty, yellow brown at base with many pieces of soft silty claystone.              |        | (13)   | 7' 6"<br>0' 0"      |      | End of Borehole                                                     |



| Department of the Environment<br>SOILS SECTION DOED/SE&C Waddington                                                                                                                                        |        | Investigation No.<br>SE&C/72/033 |             | Appendix A<br>Sheet No. 4 |                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------|-------------|---------------------------|-------------------------------------------------------------------|
| Geotechnical Investigation into<br>Structural Damage to Married Quarters                                                                                                                                   |        | CARPENDERS PARK                  |             |                           |                                                                   |
| BOREHOLE LOG <span style="float: right;">SE&amp;C/Soils/729/4/72</span>                                                                                                                                    |        |                                  |             |                           |                                                                   |
| Borehole No. 3                                                                                                                                                                                             |        | Note: TQ19 SW 37                 |             |                           |                                                                   |
| Ground Level                                                                                                                                                                                               |        |                                  |             |                           |                                                                   |
| Date 2nd July 1972                                                                                                                                                                                         |        |                                  |             |                           |                                                                   |
| Description of Strata                                                                                                                                                                                      | Legend | Sample                           | Depth (Imp) | O.D.                      | Remarks                                                           |
| CLAY, variably silty with friable sandy patches, brown and green grey, containing rounded pebbles and pieces of brick, ash, soil concrete etc.<br>(DISTURBED GROUND)                                       |        |                                  | 0           |                           |                                                                   |
| CLAY, soft to firm, laminated, brown (grey mottled in places) with many thin partings of orange brown sand/silt. Rootlets present.                                                                         |        |                                  | 3' 6"       |                           | * Standard Penetration Test - Shows for 1' 6" Penetration (N < 5) |
| CLAY, firm to stiff, fissured, brown and grey mottled with scattered aggregates of gypsum crystals and occasional thin partings of sand/silt. Becomes silty at base with pieces of siltstone / clay stone. |        |                                  | 7' 6"       |                           |                                                                   |
|                                                                                                                                                                                                            |        |                                  | 10' 6"      |                           | End of borehole                                                   |
|                                                                                                                                                                                                            |        |                                  | 12' 0"      |                           |                                                                   |

Contact BGS: [ngdc@bgs.ac.uk](mailto:ngdc@bgs.ac.uk)

## **APPENDIX E**

### **UXO Screening Map**

# UNEXPLODED BOMB RISK MAP



## SITE LOCATION

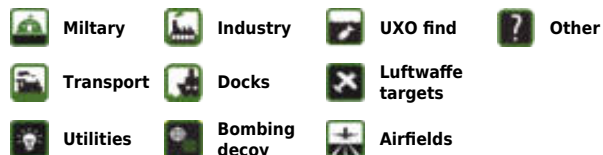
Location: WD19 5RJ,  
Map Centre: 512719,193452



This map principally indicates a hazard from Unexploded Bombs (UXB) due to WWII bombardment. Other sources of Unexploded Ordnance (UXO) may be present. It should be noted that this map does not represent UXO risk and should not be reported as such when reproduced.

## LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.



## How to use your Unexploded Bomb (UXB) risk map?

This map indicates the potential for UXBs to be present because of World War Two (WWII) bombing. It can be incorporated into a technical report, such as a Phase 1 Desk Study, or similar document as an indication of the potential for UXO encounter on a Site. Other sources of UXO may also be indicated, although note that these are not comprehensive and more detailed research is required to confirm their presence.

## What if my Site is in a moderate or high density area?

We typically recommend that a detailed UXO desk study and risk assessment is undertaken for sites in an area with a moderate or high bombing density. Additionally, if your site is in close proximity to a strategic target, military establishment, airfield or bombing decoy, then [additional detailed research](#) is recommended.

## If my site is in a low risk area, do I need to do anything?

If both the map and other research confirm that there is a low potential for UXO to be present on your site, then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

If you are unsure whether other sources of UXO may be present, you can request one of our [pre-desk study assessments \(PDSA\)](#) by emailing a site boundary and location to [pdsa@zetica.com](mailto:pdsa@zetica.com).

**You should never plan site work or undertake a risk assessment using these maps alone. More detail is required, to include an assessment of the likelihood of a source of UXO hazard from other military activity not reflected on these maps.**

## If I have any questions, who do I contact?

tel: [+44 \(0\) 1993 886682](tel:+44201993886682) email: [uxo@zetica.com](mailto:uxo@zetica.com) web: [www.zeticauxo.com](http://www.zeticauxo.com)

The information in this UXB risk map is derived from a range of sources and should be used with the [accompanying notes on our website](#).

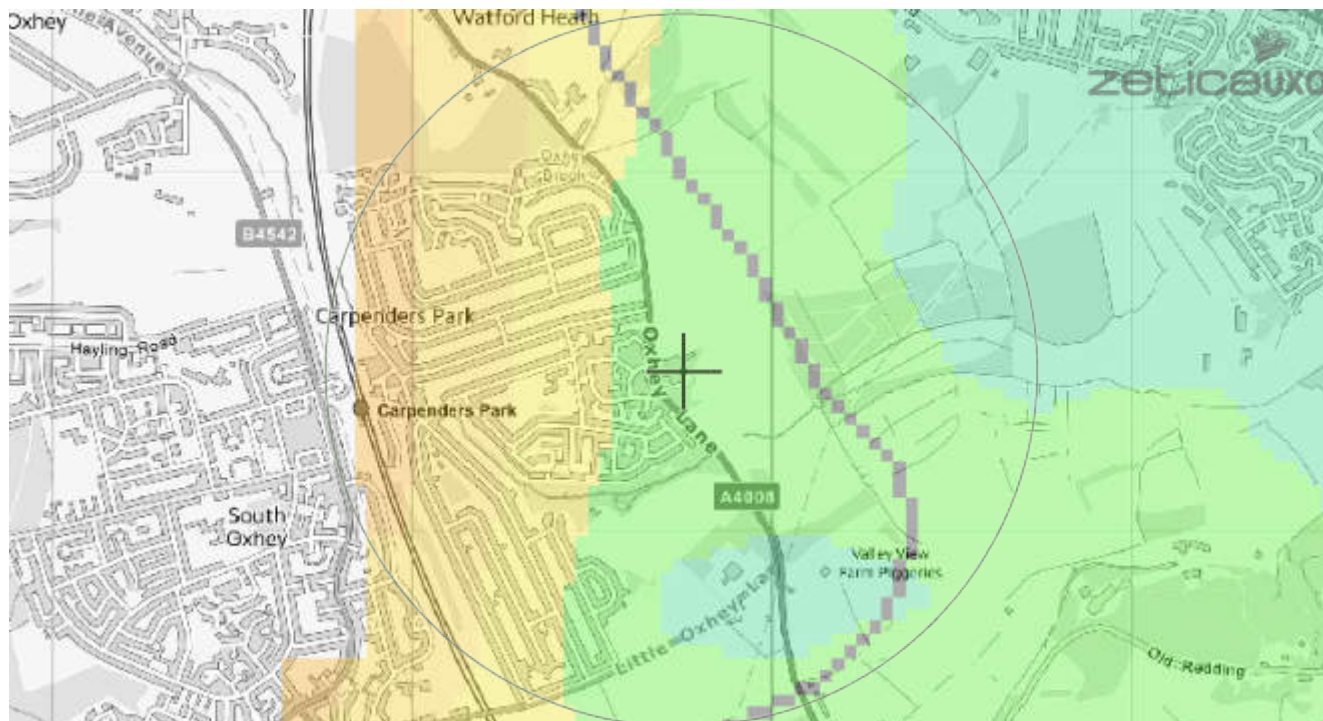
**Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgement. The copyright remains with Zetica Ltd.**

# UNEXPLODED BOMB RISK MAP



## SITE LOCATION

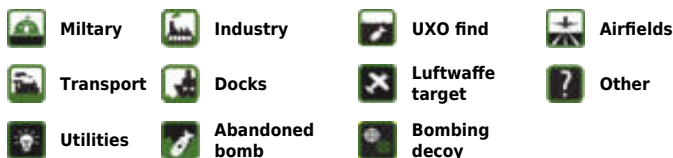
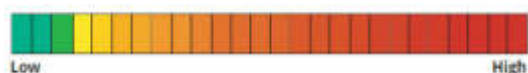
Location: WD19 5RJ,  
Map Centre: 512719,193452



This map principally indicates a hazard from Unexploded Bombs (UXB) due to WWII bombardment. Other sources of Unexploded Ordnance (UXO) may be present. It should be noted that this map does not represent UXO risk and should not be reported as such when reproduced.

## LEGEND

### London Bomb Risk



## How to use your Unexploded Bomb (UXB) risk map?

This map indicates the potential for UXBs to be present because of World War Two (WWII) bombing. It can be incorporated into a technical report, such as a Phase 1 Desk Study, or similar document as an indication of the potential for UXO encounter on a Site. Other sources of UXO may also be indicated, although note that these are not comprehensive and more detailed research is required to confirm their presence.

## What if my Site is in a moderate or high density area?

During WWII, London was bombed more times than any other city in the UK. The bombing densities across the city are generally moderate to high in comparison to the rest of the UK.

You will receive two map downloads for sites on the boundary of London: one to demonstrate the bombing density in relation to the rest of the UK, and another to reflect the bombing density of the site in relation to the rest of London.

Typically, we recommend that a detailed UXO desk study and risk assessment is commissioned for sites in London.

Additionally, if your site is in close proximity to a strategic target, military establishment, airfield or bombing decoy, then [additional detailed research](#) is recommended.

## If my site is in a low risk area, do I need to do anything?

If both the map and other research confirm that there is a low potential for UXO to be present on your site, then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

If you are unsure whether other sources of UXO may be present, you can request one of our [pre-desk study assessments \(PDSA\)](#) by emailing a site boundary and location to [pdsa@zetica.com](mailto:pdsa@zetica.com).

**You should never plan site work or undertake a risk assessment using these maps alone. More detail is required, to include an assessment of the likelihood of a source of UXO hazard from other military activity not reflected on these maps.**

## If I have any questions, who do I contact?

tel: +44 (0) 1993 886682 email: [uxo@zetica.com](mailto:uxo@zetica.com) web: [www.zeticauxo.com](http://www.zeticauxo.com)

The information in this UXB risk map is derived from a range of sources and should be used with the [accompanying notes on our website](#).

Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgement. The copyright remains with Zetica Ltd.

## **APPENDIX F**

### **Preliminary UXO Assessment**

# Preliminary Unexploded Ordnance (UXO) Risk Assessment

|                   |                                            |
|-------------------|--------------------------------------------|
| Project Name      | Land at Carpenders Park, Watford           |
| Client            | Brownfield Solutions Ltd                   |
| Site Address      | Land at Carpenders Park, Watford, WD19 5RJ |
| Report Reference  | PA21381-00                                 |
| Date              | 3 <sup>rd</sup> February 2025              |
| Author            | AL                                         |
| Quality Assurance | AB                                         |

## 1<sup>st</sup> Line Defence

3 Maple Park, Essex Road, Hoddesdon. EN11 0EX

Tel +44 (0) 1992 245 020 Email [info@1stlinedefence.co.uk](mailto:info@1stlinedefence.co.uk)

Web [www.1stlinedefence.co.uk](http://www.1stlinedefence.co.uk) Company Reg No. 07717863



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### Assessment Objective

This preliminary unexploded ordnance (UXO) risk assessment is a qualitative screening exercise to assess the likely potential of encountering UXO at the Land at Carpenders Park, Watford site. The assessment involves the consideration of the basic factors that affect the potential for UXO to be present at a site as outlined in Stage One of the UXO risk management process.

### Background

This assessment uses the sources of information available in-house to 1st Line Defence Ltd to enable the placement of a development site in context with events that may have led to the presence of German air-delivered or Allied military UXO. The report will identify any immediate necessity for risk mitigation or additional research in the form of a Detailed UXO Risk Assessment. It makes use of 1st Line Defence's extensive historical archives, library and unique geo-databases, as well as internet resources, and is researched and compiled by UXO specialists and graduate researchers.

The assessment directly follows CIRIA C681 guidelines "Unexploded Ordnance, a Guide for the Construction Industry". The document will therefore assess the following factors:

- Basic Site Data
- Previous Military Use
- Indicators of potential aerial delivered UXO threat
- Consideration of any Mitigating Factors
- Extent of Proposed Intrusive Works
- Any requirement for Further Work

It should be noted that the vast majority of construction sites in the UK will have a low or negligible risk of encountering UXO and should be able to be screened out at this preliminary stage. The report is meant as a common sense 'first step' in the UXO risk management process. The content of the report and conclusions drawn are based on basic, preliminary research using the information available to 1st Line Defence at the time this report was produced. It should be noted that the only way to entirely negate risk from UXO to a project would be to support the works proposed with appropriate UXO risk mitigation measures. It is rarely possible to state that there is absolutely 'no' risk from UXO to a project.

### Site Boundary



| Risk Assessment Considerations                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site location and description/current use                                              | <p>The site is located in Watford, Hertfordshire.</p> <p>Recent aerial imagery indicates that the site is occupied by entirely open, vegetated land.</p> <p>It is bound to the north by open vegetated land, to the east by further open land / vegetation and part of a golf course, and to the south by an area of woodland. It is bordered to the west by Oxhey Lane (the A4008) and various structures and driveways associated with Carpenders Park Care Home.</p> <p>The site is approximately centred on the OS grid reference: <b>TQ 12943 93417</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Are there any indicators of current/historical military activity on/close to the site? | <p>Online information suggests that Carpenders Park Mansion (later Highfield), directly adjacent to the site on the opposite side of Oxhey Lane, was requisitioned by the military and became part of the headquarters of anti-aircraft command. It is unknown at this stage as to how their activities may have affected the site.</p> <p>The closest recorded Heavy Anti-Aircraft (HAA) battery was approximately 8.8km east of the site. The conditions in which unexploded anti-aircraft ordnance may have fallen within the proposed site are analogous to that of aurally delivered Luftwaffe bombs.</p>                                                                                                                                                                                                                                                                                                                                                                                          |
| What was the pre- and post-WWII history of the site?                                   | <p>Pre-war OS mapping, dated 1935, indicates that the site was occupied by open fields. It was bound to the north and east by further open fields, to the south by <i>Mutton Wood</i>, and to the west by <i>Oxhey Lane</i> and structures associated with <i>Carpenders Park Farm</i>. <i>Carpenders Avenue</i> is situated immediately adjacent to the north-western corner of the site, and the area west of Oxhey Lane is labelled <i>Carpenders Park</i>.</p> <p>Post-war OS mapping, dated 1930-1955, depicts little discernible change on-site since the previous mapping edition, with the site remaining undeveloped. Development can be seen in the wider surrounds to the west of <i>Oxhey Lane</i>; this includes additional small structures surrounding a neighbouring pre-war property (now named <i>Highfield</i>), as well as further roadways and a residential estate, a <i>school</i>, and a <i>cemetery</i>.</p>                                                                   |
| Was the area subject to bombing during WWII?                                           | <p>During WWII, the site was situated within the Rural District of Watford. According to official Home Office bombing statistics, this district was subject to an overall low bombing density, with an average of 19.4 items of ordnance recorded per 1,000 acres. This consisted of 334 high-explosive (HE) bombs, 14 oil bombs, and five V-1 flying bomb strikes, totalling 353 incidents across 18,179 acres.</p> <p>Online information indicates that Oxhey Lane, Carpenders Avenue, and the St. Meryl Estate (Carpenders Park) sustained numerous HE bomb strikes across multiple air raids in October and November 1940, and January 1941.<sup>1</sup> A V-1 flying bomb was also noted on Oxhey Lane adjacent to the site in July 1944.</p> <p>Considering the site was occupied by open land immediately adjacent to these roadways/developments, further research will be required to determine the exact location of these bombing incidents and whether they may have impacted the site.</p> |
| Is there any evidence of bomb damage on/close to the site?                             | <p>Given that the site was occupied by undeveloped land, it has not been possible to assess whether the site sustained any damage during the war. The acquisition of high-resolution aerial imagery would thus be required at a detailed stage.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

<sup>1</sup> <https://www.watfordobserver.co.uk/news/nostalgia/444327.bombs-fell-on-carpenders-park/>

|                                                                |                                                                                                                                                                                                                 |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| To what degree would the site have been subject to access?     | Considering the site was undeveloped during WWII, it likely experienced an infrequent and irregular level of access. Infrequent access can increase the likelihood that items of UXO could have gone unnoticed. |
| To what degree has the site been developed post-WWII?          | There appears to have been a minimal level of development on-site since WWII; most of the site remains occupied by open vegetated land.                                                                         |
| What is the nature and extent of the intrusive works proposed? | The scope of the proposed works was not available at the time of writing.                                                                                                                                       |

### Summary and Conclusions

During WWII, the site was situated within the Rural District of Watford. According to official Home Office bombing statistics, this district was subject to an overall low bombing density, with an average of 19.4 items of ordnance recorded per 1,000 acres.

Numerous bombing incidents were recorded within this part of Watford. Several incidents were sustained in the immediate site vicinity, in the area surrounding Oxhey Lane, Carpenders Avenue, and the St. Meryl Estate (Carpenders Park). Considering their proximity to the site, further research will be required to determine the exact location of these incidents and whether they impacted the site itself.

### Recommendations

Given the findings of this preliminary report, it is recommended that **further research** is undertaken in the form of a **Detailed UXO Risk Assessment**. This is recommended in order to better assess the wartime conditions within the proposed area of works, and to better determine the locations and effects of bombing incidents recorded across the site's locality. Further research would allow for a more comprehensive analysis of the risk of UXO contamination on site. This would involve the attempted acquisition of any available written local bombing records, WWII-era aerial photography, and other archival material.

**Prior to or in lieu of a Detailed Assessment, it is recommended that appropriate UXO Risk Mitigation Measures are provided for intrusive works proposed.**

If the client has any anecdotal or empirical evidence of UXO risk on site, please contact 1st Line Defence.

This report has been prepared by 1st Line Defence Limited with all reasonable care and skill. The report contains historical data and information from third party sources. 1st Line Defence Limited has sought to verify the accuracy and comprehensiveness of this information where possible but cannot be held accountable for any inherent errors. Furthermore, whilst every reasonable effort has been made to locate and access all relevant historical information, 1st Line Defence cannot be held responsible for any changes to risk level or mitigation recommendations resulting from documentation or other information which may come to light at a later date.

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## 1st Line Defence

Unit 3, Maple Park  
Essex Road, Hoddesdon  
Hertfordshire EN11 0EX

**Call** +44 (0) 1992 245 020

**Email** [info@1stlinedefence.co.uk](mailto:info@1stlinedefence.co.uk)

**Web** [www.1stlinedefence.co.uk](http://www.1stlinedefence.co.uk)



**1ST LINE DEFENCE**

## **North**

**William Smith House  
173 – 183 Witton Street  
Northwich  
Cheshire  
CW9 5LP**

**Tel: 01606 334 844**

## **South**

**Unit 5, Alfred Court  
Saxon Business Park  
Stoke Prior  
Bromsgrove  
Worcestershire  
B60 4AD**

**Tel: 01215 729 014**

**[www.brownfield-solutions.com](http://www.brownfield-solutions.com)**

