MEC
Development Technical Consultants

GEO ENVIRONMENTAL

Land West of Fringford Road, Caversfield
Phase I Geo-Environmental Desk Study
December 2023

Report Ref: 27877-GEO-0401

Land West of Fringford Road, Caversfield
Phase I Geo-Environmental Desk Study
December 2023

REPORT REF: 27877-GEO-0401

CLIENT: Richborough

ENGINEER: MEC
The Old Chapel
Station Road
Hugglescote
Leicestershire
LE67 2GB

Tel: 01530 264 753
Email group@m-ec.co.uk

REGISTRATION OF AMENDMENTS

Date	Rev	Comment	Prepared By	Checked By	Approved By
December 2023	-	First issue	**Daniel Webb** **BSc (Hons) FGS** Geo-Environmental Engineer	**Chris Wall** **MSc BSc (Hons) FGS** Associate Geo-environmental Engineer	**David Torrance** **BSc (Hons) CGeol FGS** Associate Director

CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 MEC has been commissioned by Richborough (hereafter referred to as 'the Client') to undertake a Phase I Geo-Environmental Desk Study for a proposed residential development at Land West of Fringford Road, Caversfield, OX27 8TH (hereafter referred to as 'the Site'). A site location plan is provided in **Appendix A.**

Development Proposals

1.2 Demolition of existing structures and erection of up to 99 dwellings, access, open space and associated works (outline, all matters reserved save for access). An illustrative masterplan is presented in **Appendix A.**

Objectives

1.3 This desk study has been completed according to the general principles of BS5930:2015 'Code of Practice for Site Investigations,' BS10175:2011 (+A2:2017) and 'Investigation of Potentially Contaminated Sites, Code of Practice and Environment Agency 'Land Contamination: Risk Management (LC:RM).

1.4 The objectives of this desk study are to:

- Assess historical activities both on and off-site with respect to their potential impact on the site environment;
- Characterise the environmental setting of the site, identify migration pathways and receptors vulnerable to contamination;
- Summarise the risk relating to Unexploded Ordnance (UXO);
- Develop a preliminary Conceptual Site Model (CSM);
- Assess potential environmental liabilities associated with the site;
- Establish potential geotechnical constraints to the proposed development; and
- Produce a Geo-environmental Desk Study (this report) providing qualitative contamination and geotechnical risk assessments and a review of potential constraints to the proposed development.

1.5 This report has been commissioned to support a planning application for the proposed development and to provide preliminary information to inform the design of foundations, floor slabs and associated infrastructure.

Sources of Information

1.6 The following sources of information have been referenced to inform the contents of this report:

- Site walkover observations (photographic record provided in **Appendix B**):
- Historical Ordnance Survey Mapping (**Appendix C**);

- Environmental database report including but not restricted to the following data: environmental and hydrological, waste, hazardous substances register, geological, industrial, and sensitive land uses and pollution incidents (**Appendix D**);
- Oxfordshire Minerals and Waste Local Plan dated September 2017;
- British Geological Survey (BGS) online GeoIndex and borehole logs;
- Environment Agency website (www.environment-agency.gov.uk);
- MAGIC maps (www.magic.defra.gov.uk);
- 'Land at Aunt Ems Lane, Caversfield – Soil Infiltration Calculations', prepared by M-EC, report ref:27877-CALC-0401, dated 3rd August 2023;
- Detailed UXO Risk Assessment (**Appendix E**);
- Soil Infiltration Rate Testing by M-EC Ref: 27877-CALC-0401 dated 03 August 2023 **(Appendix F)**.

Limitations

1.7 MEC has completed this report for the benefit of the Client and any relevant statutory authority which may require reference in relation to approvals for the proposed development. Other third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from MEC.

1.8 MEC cannot accept responsibility or liability for:

a) The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
b) The issue of this document to any third party with whom approval for use has not been agreed.

1.9 This report should be read in its entirety, including all associated drawings and appendices. MEC cannot be held responsible for any misinterpretations arising from the use of extracts of this report that are taken out of context.

1.10 The findings and opinions conveyed are based on information obtained from a variety of sources, as detailed in Section 1.6 above, which MEC believes are reliable. All reasonable care and skill have been applied in examining the information obtained, nevertheless, MEC cannot and does not guarantee the authenticity or reliability of the information relied upon from external sources.

1.11 Should additional information become available which may affect the opinions expressed in this report, MEC reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.

1.12 It should be noted that the risks identified in this report are perceived based on the available information at the time of writing. The actual risks can only be established and quantified following intrusive investigation of the site.

2.0 SITE SETTING AND DESCRIPTION

Site and Setting A site walkover was undertaken on 1st August 2023. Reference is made to the photographic record in **Appendix B**.	
Site Address	Land West of Fringford Road, Caversfield, OX27 8TH
National Grid Coordinates	458378, 225039
Site Description	The site covers an approximate area of 6.87ha and comprises three undeveloped open fields laid to grass and used for grazing horses (Photos 1 and 2) and a residential property and barns associated with a riding school in the east. Access to the site is via gated entrances and tracks off Fringford Road to the south-east (Photo 3 and 4) and Aunt Ems Lane to the south-west. Topographically, the site is relatively level. Site surfacing around the riding school and site accesses predominantly comprise concrete. The barns are constructed of timber and metal and are primarily used as stables (Photo 5) and for the storage of hay bales, vehicles, and general equestrian items (Photo 6, 7 and 8). The largest barn in the east was noted to be used as a horse exercise area (Photo 9) and contained suspected asbestos sheet roofing. Two paddocks, separated by wooden fencing, are located in the north-western field (Photo 10) and a pile of manure was present in the eastern paddock adjacent to the riding school (Photo 11). Wooden telegraph poles and associated electricity cables are present in the south and south-east and generally run in a north-east to south-west and north-west to south-east direction (Photo 12). A wooden telegraph pole with an electric transformer and associated cables is also located in the west (Photo 13). The cables run in a north-west to south-east direction along the south-eastern boundary. Mature and semi-mature trees and hedgerows are located on-site and form the south-eastern, south-western, and north-western boundaries. Trees, hedgerows, and wooden fencing form the north-eastern boundary. The surrounding area comprises residential properties to the south-east and east and undeveloped land to the north-east and west. Commercial developments and St Laurence Church are present beyond the undeveloped land to the west and north-west respectively.
Historical Review The site history has been assessed by reviewing 1: 2,500 1:10,560, and 1: 10,000 scale historical Ordnance Survey maps included in **Appendix C** and more recent aerial photography. A summary of the salient information relating to the history of the site and surroundings is provided below.	

On-site Historical Summary	The earliest available mapping dated 1880, indicates that the site predominantly comprised undeveloped open land at this time, consisting of three separate fields with a quarry in the western corner and a pond between the boundaries of the south-eastern and eastern fields. By 1899, the quarry was labelled as an 'old quarry' and the boundary between the eastern and south-eastern fields was no longer recorded although the pond remained. By 1922, the quarry in the west was no longer recorded and may have been infilled. A track had been established in the east running in a north to south direction . The site thereafter remained unchanged until at least the early 1990's, by which time the existing riding school had been established and was labelled as South Lodge Riding Stables. The pond in the south-east was no longer recorded by this time and may have been infilled. Aerial imagery from 2004, indicates that the existing residential property with an associated pond had been constructed to the south of the farmyard area and the current access track had been established to Aunt Ems Lane.
Off-site Historical Summary	Mapping from 1880 indicates that the surrounding area predominantly comprised undeveloped open land with Caversfield House recorded 160m to the north-west. A fish pond was recorded in the grounds of this property approximately 80m to the north-west and appeared to have been fed by a watercourse flowing in a general north-east to south-west direction approximately 40m to the north-west of the site area. Ponds were also mapped approximately 60m west and 160m north. Residential properties were recorded 100m west (Home Farm) and 50m south-east (Vicarage House) and a barn (Bricknell's Barn) was mapped approximately 110m south-east. A quarry was mapped 180m to the north-east although, this was no longer recorded by 1899 and may have been infilled. By this time, a pump was recorded 70m south-east associated with Vicarage House and several buildings within the grounds of Caversfield House were no longer mapped and may have been demolished. By 1922, quarries had been established 90m and 150m north-east and a well associated with Bricknells Barn was recorded 120m to the south-east. At this time, the pump to the south-east was no longer mapped and Home Farm had expanded with an additional building constructed. RAF Bicester had been established approximately 700m to the south-east, with possible hanger buildings and RAF quarters noted 700m and 300m to the south-east respectively. By 1938, the RAF quarters had been redeveloped and new quarters had been established 500m to the south-east. By the mid-1950's the quarries to the north-east were no longer recorded.

	By the mid-1960's, residential properties had been constructed immediately to the south-east and the well associated with Bricknell's Barn was no longer recorded and may have been infilled. By 1976, the pond to the west was no longer recorded and may have been infilled. Between 1976 and 1995, additional residential properties had been constructed to the north-east, east, and south and an electricity sub-station was recorded 150m to the south-east. Aerial imagery between 2017 and 2023 indicates that residential and commercial properties and a school had been constructed during this period within 250m to the west.

3.0 GEOLOGICAL, GEO-ENVIRONMENTAL AND MINING SETTING

Geo-environmental Setting The geological, geo-environmental and mining setting of the site described in the following table is summarised based on information derived from various database and on-line information sources.	
Geology	British Geological Survey (BGS) mapping indicates that the site is directly underlain by bedrock limestone strata of the Cornbrash Formation. The Forest Marble Formation, comprising interbedded limestone and mudstone is located within 10m to the north-west and may extend onto site. MEC excavated four trial pits on 31st July 2023 to undertake soil infiltration rate testing (**Appendix F**). The ground conditions comprised topsoil overlying weathered limestone bedrock of the Cornbrash Formation to the maximum depth of excavation (1.74m bgl). A thickness of Made Ground is anticipated given the presence of South Lodge Riding Stables in the north-east, the infilled quarry in the west and the pond in the south-east respectively.
Natural Ground Subsidence Risk	The natural ground subsidence risk at the site is recorded to be generally very low.
Hydrogeology	The Environment Agency (EA) classifies the Cornbrash and Forest Marble Formations as Secondary A aquifers. During the soil infiltration rate testing, perched groundwater or damp soils were encountered towards the base of the test pits. The site is not located in a groundwater Source Protection Zone (SPZ) and groundwater abstractions are not recorded within 500m. The site is recorded to be at a negligible risk of groundwater flooding.
Hydrology	The nearest surface water feature is the watercourse 42m to the north-west. Surface water abstractions are not recorded within 500m. The site is located within Flood Zone 1 and is generally considered to be at a very low risk of surface water flooding. Areas at higher risk are recorded in the south-west and south-east of the site.
Mining and Mineral Extraction	The site is not located within a coal mining reporting area as defined by the Coal Authority. Three mineral extraction sites have been recorded on-site and within 500m. These relate to the extraction of limestone at the quarries identified by historical mapping.
Mineral Safeguarding	The site is not located within a Mineral Safeguarding Area as defined within the Oxfordshire Minerals and Waste Local Plan.

Ground Gases	Surface ground workings are recorded within 250m relating to the infilled pits and ponds, a filter bed 150m to the west and a grave yard 150m to the north-west. These are likely to represent significant sources of ground gas generation. The site lies within an area where between 1% and 3% of properties are estimated to be above the Radon Action Level. On this basis, Radon protection measures will not be required for the proposed development.

4.0 REGULATORY INFORMATION

Regulatory Information A summary of pertinent information from the environmental data report **(Appendix D)** relating to permits, consents, authorisations, and landfilling is provided below.	
Current and Historical Industrial Uses	Four current industrial land uses are recorded within 250m relating to a motorsport service company 109m west, a filter bed 157m west and electrical sub-stations 183m south-east and 202m east. Six records of historical industrial land use are recorded within 250m including the quarries in the western corner of the site and 73m and 157m to the north-east. Other entries include the former RAF Bicester to the east, the filter bed 153m to the west and the grave yard 153m to the north-west.
Historical Tanks	Historical tanks are not recorded within 250m.
Fuel Stations and Historical Garages	Fuel stations and historical garages are not recorded within 250m.
National Grid	National Grid high-pressure gas transmission pipelines or high-voltage underground electricity transmission cables are not recorded within 250m.
Part 2A EPA 1990	Sites determined as Contaminated Land under section 78R of the Environmental Protection Act are not recorded within 250m.
Industrial Licenses and Authorisations	The following licenses or authorisations are not recorded within 250m: • COMAH, NIHHS and dangerous substance; • Regulated explosive sites; • Hazardous substance storage and usage; • Historical IPC authorisations; • Licensed industrial activities (Part A (1)); • Radioactive substance authorisations; • Red list discharge consents; • Pollutant release to public sewer; • List 1 and 2 dangerous substances; and • Pollution inventory substances, waste transfers and radioactive waste. A licensed pollutant release (Part A(2)/B) was recorded 107m to the west relating to a waste oil burner at Teslayne Engineering. Two licensed discharges consents to controlled waters are recorded within 250m of the site. The closest entry was located 147m to the south-east relating to the discharge of sewage, although the consent was revoked in 2007. The second entry similarly relates to the discharge of sewage to The Town Brook 151m to the west.
Pollution Incidents	Pollution incidents have not been recorded within 250m.

Landfill and Waste	Landfill sites and waste management facilities are not recorded within 250m. Twenty-eight waste exemptions are recorded within 250m. Four records relate to the storage and use of waste at H B Timber Yard to the south-east. One record relates to the use of waste at a construction site, 95m to the west and the remaining records relate to the burning, deposition, treatment, screening, spreading and use of waste at Home Farm Cottage, approximately 70m to the west.
Unexploded Ordnance	A Detailed UXO Risk Assessment has been commissioned and is included in **Appendix E**. The report indicates that the site was situated within the rural district of Ploughley, which was subject to a very low density of bombing during World War II, with an average of 3.5 items of ordnance dropped per 1,000 acres. The relatively few bombs that fell within the district were likely targeting airfields with the adjacent RAF Bicester recorded as a Luftwaffe target. 150 incendiary bombs fell near Caversfield House on 15th November 1940, causing damage to nearby structures. Given the low bombing density of the district, it was considered that the incident would have been thoroughly inspected and the likelihood of an item of German UXO being present is assessed to be low. The risk of encountering Allied UXO was similarly assessed to be low, given that accommodation blocks were situated between the airfield and the site area and the improper disposal of UXO close to these blocks would have been unlikely.

5.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

5.1 The information sources noted in Section 1.0 have been reviewed in order to provide a summary of potential geotechnical considerations for the proposed development presented in the following table. The comments and recommendations provided are based on the qualitative findings of this Geo-environmental Desk Study and may not be representative of actual engineering properties of on-site soils which can only be confirmed by intrusive investigation

Made Ground	Based on the site history, a thickness of Made Ground is anticipated around the existing South Lodge Riding Stables and the infilled quarry and pond.
Topsoil	Based on the recorded history, topsoil is likely to be present at the near surface across most the open areas of the site. Subject to appropriate testing, this may be suitable for re-use within proposed gardens and landscaped areas.
Foundation and Floor Slab Design	An intrusive ground investigation will be required to determine if the underlying geology will provide competent bearing strata for foundation design. Given that the site is directly underlain by limestone bedrock, it is considered likely that traditional strip/trench fill foundations will be feasible for the proposed development, ensuring full penetration of any Made Ground. Ground bearing floor slabs may be feasible for the proposed development; however, suspended floor slabs will be required where the required thickness of sub-slab fill is greater than 600mm and where ground gas protection measures are required.
Buried Obstructions	Buried anthropogenic obstructions may be encountered associated with the existing structures and potential coarse infill to the pond and quarry.
Trees	Trees and hedgerows are present within the site and form the site boundaries; however, given that the site is directly underlain by limestone bedrock of the Cornbrash Formation, it is unlikely that foundation and floor slab designs will need to be adjusted to account for volume change potential of cohesive soils, subject to confirmation by intrusive investigation and classification testing.
Pyritic Geology	Pyritic deposits are not anticipated beneath the site.
Drainage and Soakaways	The results of soil infiltration rate testing indicate that infiltration was dependent on the extent of weathering and fracturing within the limestone bedrock and impacted by the presence of perched groundwater or damp soils at shallow depth. Tentative infiltration rates were derived for SA02-SA04 ranging between 1.53 and 3.79 x 10^{-5} m/s, reflecting lateral infiltration into the pits sides, however, these cannot be used for design purposes given the presence of groundwater at shallow depth restricting infiltration into the base of the pits.

	The results suggest that the limestones near surface are potentially underlain by impermeable clay strata which has resulted the ponding of percolating water. Further deeper investigation was recommended to confirm the potential for infiltration at greater depth.
Roads and Pavements	The bedrock strata encountered will likely provide a CBR Design value in excess of 5%. Where Made Ground is encountered, the materials will need to be excavated to a depth of at least 500mm below formation, sorted, supplemented as necessary and re-compacted to provide a CBR Design value within the range 2-5%.

6.0 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

Background

6.1 This section assesses the significance of the environmental issues that have been identified on site or in the surrounding area in previous sections of this report by developing a preliminary Conceptual Site Model (CSM). The objective of the CSM is to identify contaminant sources, pathways and receptors relating to the site and surrounding area to evaluate the potential for a pollution event to occur using a risk classification tool. The level of risk is assessed by comparing the likelihood of a pollution event to occur, versus the consequence of a pollution occurrence. The consequence is essentially a measurement of the severity of a hazard (or source) and sensitivity of the receptor (controlled waters and human health).

6.2 The risk assessment methodology detailing the classes of significance is detailed after the preliminary CSM below.

Preliminary Contamination Risk Assessment

6.3 Based on the reported history of the site and surrounding area, a low to moderate risk is identified associated with the following potential sources of contamination:

- Made Ground on-site and in the surrounding area, including the infilled quarry and pond;
- Storage of vehicles at the site;
- Asbestos sheet roofing on the barns on-site;
- Ground gas generation from the Made Ground sources on-site and in the surrounding area.

6.4 Off-site records relating to the current and historical industrial land uses, electricity sub-stations and waste exemptions are at sufficient distance such that the subject site would be unlikely to be impacted.

6.5 It is therefore considered that the following potential contaminants may impact the site:

- Asbestos;
- Heavy metals;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Total Petroleum Hydrocarbons (TPHs);
- Ground gases including carbon dioxide and methane.

Preliminary Conceptual Site Model

6.6 The pollutant linkages pertaining to the site and the assessed significance are summarised in the CSM table below:

Source	Pathway	Receptor	Pollutant Linkage Risk
Potential contamination in shallow soils on site	Direct contact and accidental ingestion/inhalation of contaminated soils and dust.	Construction Workers.	**Low to Moderate:** Intrusive investigation is required to confirm if contaminant concentrations within the shallow soils pose a risk to human health receptors.
		Future Site Users.	
	Vertical and lateral migration through shallow soils or via surface and groundwater.	Nearby Controlled Waters	**Low to Moderate:** The underlying bedrock strata of the Cornbrash Formation is likely to be permeable and may allow vertical and lateral migration of contamination. Further investigation is required to confirm the risk to controlled waters and third-party property.
		Underlying Aquifers.	
		Third-party property.	
	Direct contact/soil leaching.	Buried utilities	**Low to Moderate:** Hydrocarbons may be encountered within the near surface soils and appropriate designs may be required to protect service corridors. Further investigation is required to confirm the risk to buried utilities.
		Buried concrete	**Low to Moderate:** Pyritic deposits are not anticipated beneath the site, however, aggressive contaminants within the anticipated Made Ground may pose a risk. Further investigation is required to confirm the risk to buried concrete.
Potential Asbestos Containing Materials (ACM's)	Direct contact and inhalation	Construction workers	**Low to Moderate:** Potential ACM's have been identified on the existing barns. An asbestos survey should be carried out by a suitably qualified professional and arrangements made for the removal of any identified ACMs prior to demolition.
Off-site contamination sources	Lateral migration onto site via shallow soils and groundwater	Construction workers.	**Low**: Potentially contaminative land uses have been identified in the surrounding area and the risk of migration of contaminants is assessed to be low to moderate.
		Future Site Users.	
		Buried utilities and concrete structures	

Source	Pathway	Receptor	Pollutant Linkage Risk
Ground gas	Migration through porous soils and accumulation in confined spaces	Construction Workers	**Low to Moderate:** Ground gas generation from Made Ground sources on-site and in the surrounding area is possible however, the migration will be determined by the fracturing within the underlying limestone bedrock. Protection measures may be required for the proposed development. A ground gas monitoring programme is likely to be required to determine if protection measures will be required for the proposed development. Radon protection measures will not be required.
		Future Site Users	

Preliminary CSM and Environmental Risk Assessment

6.7 The significance of the potential source-pathway-receptor linkages identified in the conceptual site model should be assessed using the following criteria:

- **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 to a designated receptor is currently happening. Investigation and remedial measures are required.
- **High** – Harm is likely to arise to a designated receptor from an identified hazard. Investigation and remedial measures are required.
- **Moderate** – It is possible that harm could arise to a designated receptor from an identified hazard. Investigation and remedial measures may be required.
- **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. Remedial measures are not normally required.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Summary

7.1 Based on the findings of this desk study and the initial conceptual site model, it is considered that the environmental risk at the site is low to moderate with the principal risk drivers relating to Made Ground around the existing stables, former quarry in the west and the infilled pond in the south-east.

7.2 Based on existing information, and subject to confirmation, it is not considered that remediation will be required for most of the proposed development although there may be a requirement for localised removal and/or capping of contaminated material within the quarry, pond, and developed areas.

7.3 Given the anticipated ground conditions, it is considered likely that traditional strip/trench fill foundations will be feasible for the proposed development, ensuring full penetration of any Made Ground deposits.

7.4 Ground bearing floor slabs may be feasible; however, suspended floor slabs will be required where the thickness of sub-slab fill exceeds 600mm and where ground gas protection measures are required within the anticipated Made Ground areas.

7.5 The results of soil infiltration tests suggests that shallow soakaways will not provide a feasible drainage option for the site, due to the presence of perched groundwater.

Recommendations

7.6 Given the findings of this Desk Study, it is recommended that a Phase II Intrusive Investigation is undertaken to confirm; the underlying geology and associated foundation design requirements; the extent of any contamination within the shallow soils; and the generation and migration of ground gases from the identified sources. Further soil infiltration rate testing will be required to assess the feasibility of deeper soakaways.

7.7 It is recommended that a copy of this report is submitted to the Local Planning Authority to support the planning application for the site. Review of this report will enable the contaminated land or environmental health officer to comment as consultee to the Local Planning Officer. Future ground investigation will likely be conditioned as part of a planning permission.

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APPENDICES

APPENDIX A

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The Old Chapel
Station Road
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Leicestershire
LE67 2GB

Development Technical Consultants

SITE LOCATION PLAN

Project: Aunt Ems Lane

File Ref: 27877

O.S. Grid Ref: 458372, 225038

Postcode: OX27 8TH

PLANNING

- Site boundary
- 1 Proposed vehicular/cycle/pedestrian access
- 2 Proposed emergency/pedestrian & cycle access
- 3 Primary tree lined street
- 4 Secondary street
- 5 Village mews
- 6 Private lane/drive
- 7 Shared surface
- 8 Informal courtyard with agricultural theme
- 9 Historic track alignment
- 10 Cycle way
- 11 Play space (LEAP)
- 12 Natural play/ trail space
- 13 Sustainable drainage
- 14 Entrance green (wildflower planting)
- 15 Planted swale corridor
- 16 Existing vegetation retained and enhanced as necessary
- 17 Mown path
- 18 Open grassland
- 19 Community orchard
- 20 Garden Common
- 21 Natural open space
- 22 Soft development edge
- 23 Area to be fenced off for ecology/ wildlife
- 24 Drop bollards

Rev.	Date	Description

Land West of Fringford Road
CAVERSFIELD

Illustrative Masterplan

Job ref:	Drawing number:	Revision:
501	P07	-
Scale: 1:1,500 @ A3	Date: December 2023	

edge URBAN DESIGN

part of
edge Placemaking Group Ltd

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enquiries@edgeUD.co.uk
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Development Technical Consultants

APPENDICES

APPENDIX B

Appendix B – Photographic Record

<table>
<tr>
<td>  </td>
<td>  </td>
<td rowspan="3"><u>Site Name</u>
Land West of Fringford Road, Caversfield

<u>Project No.:</u>
27877

<u>Client:</u>
Richborough

<u>Walkover Date:</u>
01-08-2023</td>
</tr>
<tr>
<td>Photo 1: View looking south across the southern field. Photo taken from the centre of the field.</td>
<td>Photo 2: View looking north-east across the south-eastern field. Photo taken from the south-west of the field.</td>
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<tr>
<td>Photo 3: View looking south-west at the gated entrance off Fringford Road to the south-east.</td>
<td>Photo 4: View of the access track in the south-east upon entering from Fringford Road.</td>
</tr>
</table>

Appendix B – Photographic Record

<table>
<tr>
<td>  </td>
<td>  </td>
<td rowspan="4"><u>Site Name</u>
Land West of Fringford Road, Caversfield

<u>Project No.:</u>
27877

<u>Client:</u>
Richborough

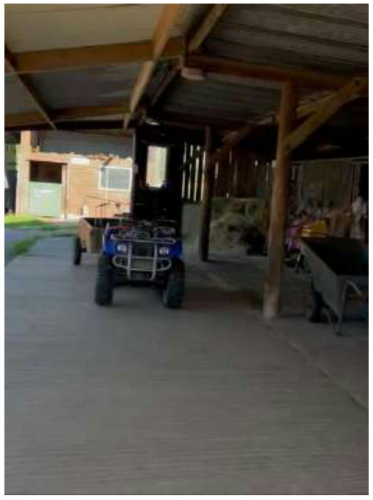
<u>Walkover Date:</u>
01-08-2023</td>
</tr>
<tr>
<td>Photo 5: View of a barn in the centre of the riding school. The barn is used as a stable.</td>
<td>Photo 6: View in the north-eastern barn. Vehicles, hay bales and general equestrian items are stored within the barn.</td>
</tr>
<tr>
<td>  </td>
<td> 
</td>
</tr>
<tr>
<td>Photo 7: View in the north-eastern barn. Vehicles, hay bales and general equestrian items are stored within the barn.</td>
<td>Photo 8: View inside the northern barn used for the storage of vehicles.</td>
</tr>
</table>

Photo 9: View inside the large barn in the east that was used as an horse exercise barn.

Photo 10: View looking west across the northern field. The paddocks are separated by wooden fencing.

Photo 11: View looking south-east in the northern field. A pile of manure is located adjacent to the riding school.

Photo 12: View looking north-west from the south-eastern access track. Photo shows overhead services.

Site Name
Land West of Fringford Road, Caversfield

Project No.:
27877

Client:
Richborough

Walkover Date:
01-08-2023

Appendix B – Photographic Record

		**Site Name** Land West of Fringford Road, Caversfield **Project No.:** 27877 **Client:** Richborough **Walkover Date:** 01-08-2023
Photo 13: View of the wooden telegraph pole with an electric transformer and cables which run along the western boundary.		

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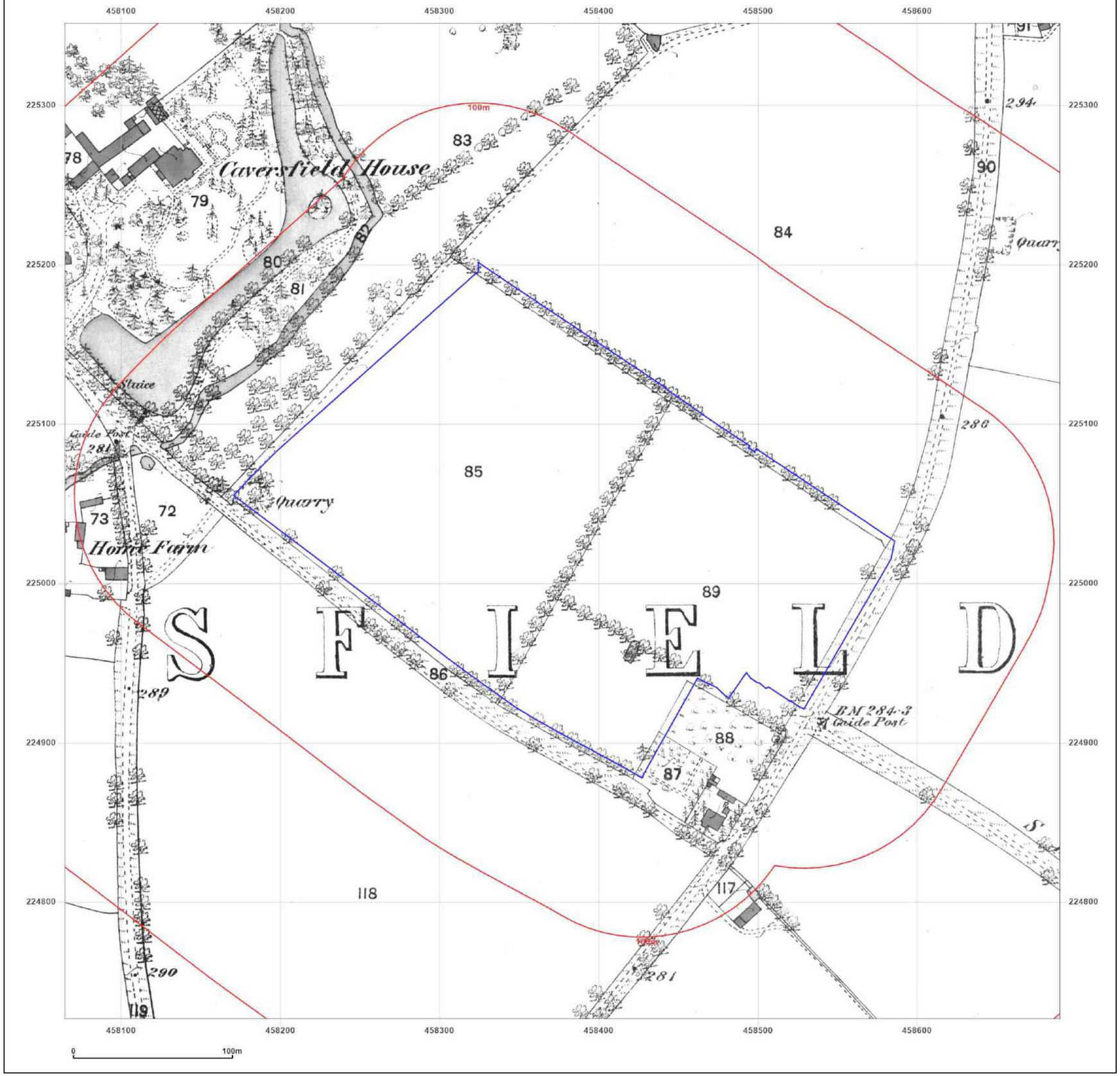
APPENDICES

APPENDIX C



Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: County Series
Map date: **1881**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

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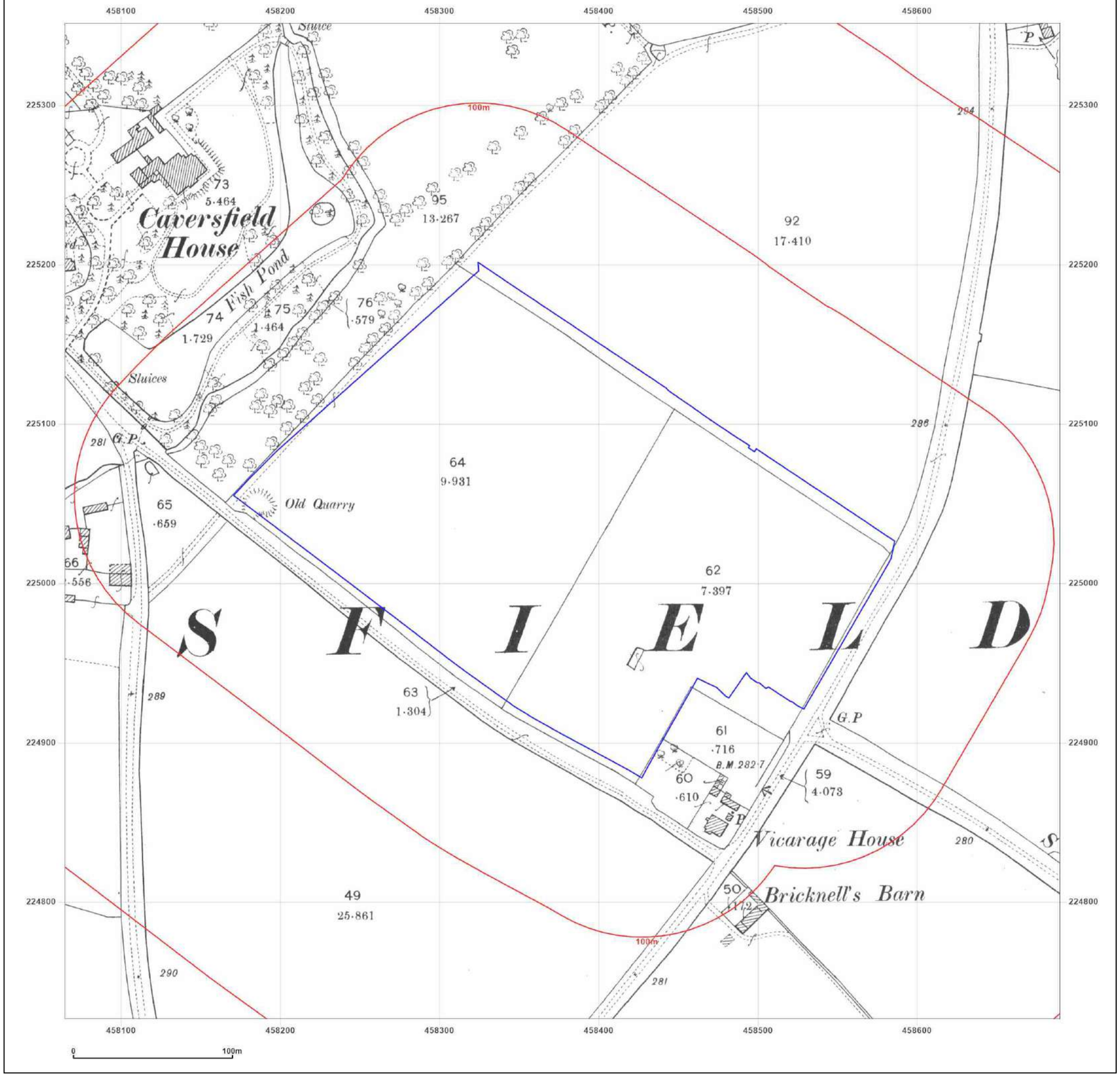
Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 12 July 2023

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: County Series
Map date: **1899**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1899
Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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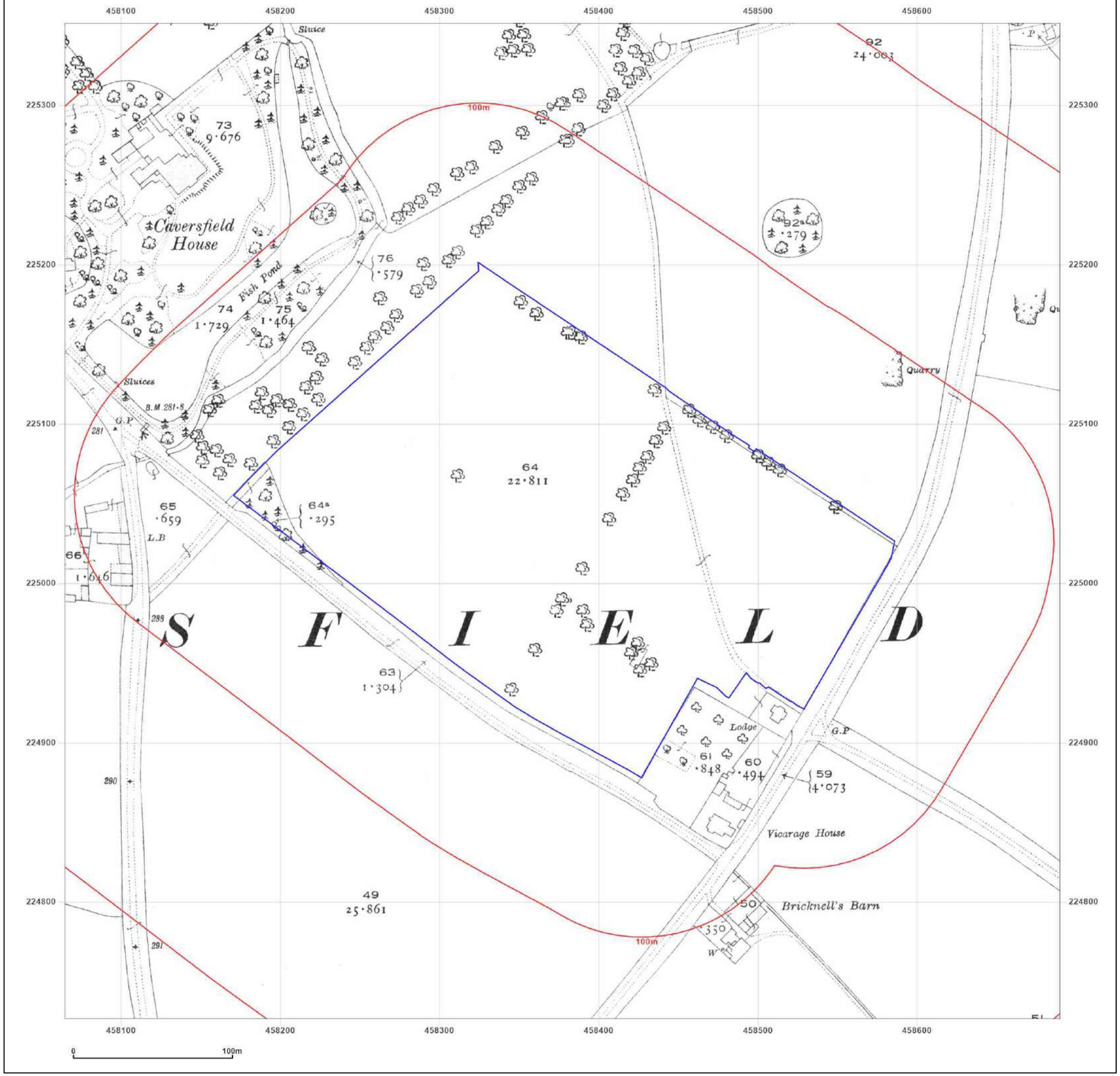

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: County Series
Map date: **1922**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1922
Revised 1922
Edition N/A
Copyright N/A
Levelled N/A

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1968**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1966
Revised 1966
Edition N/A
Copyright 1968
Levelled 1962

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Production date: 12 July 2023

Map legend available at:
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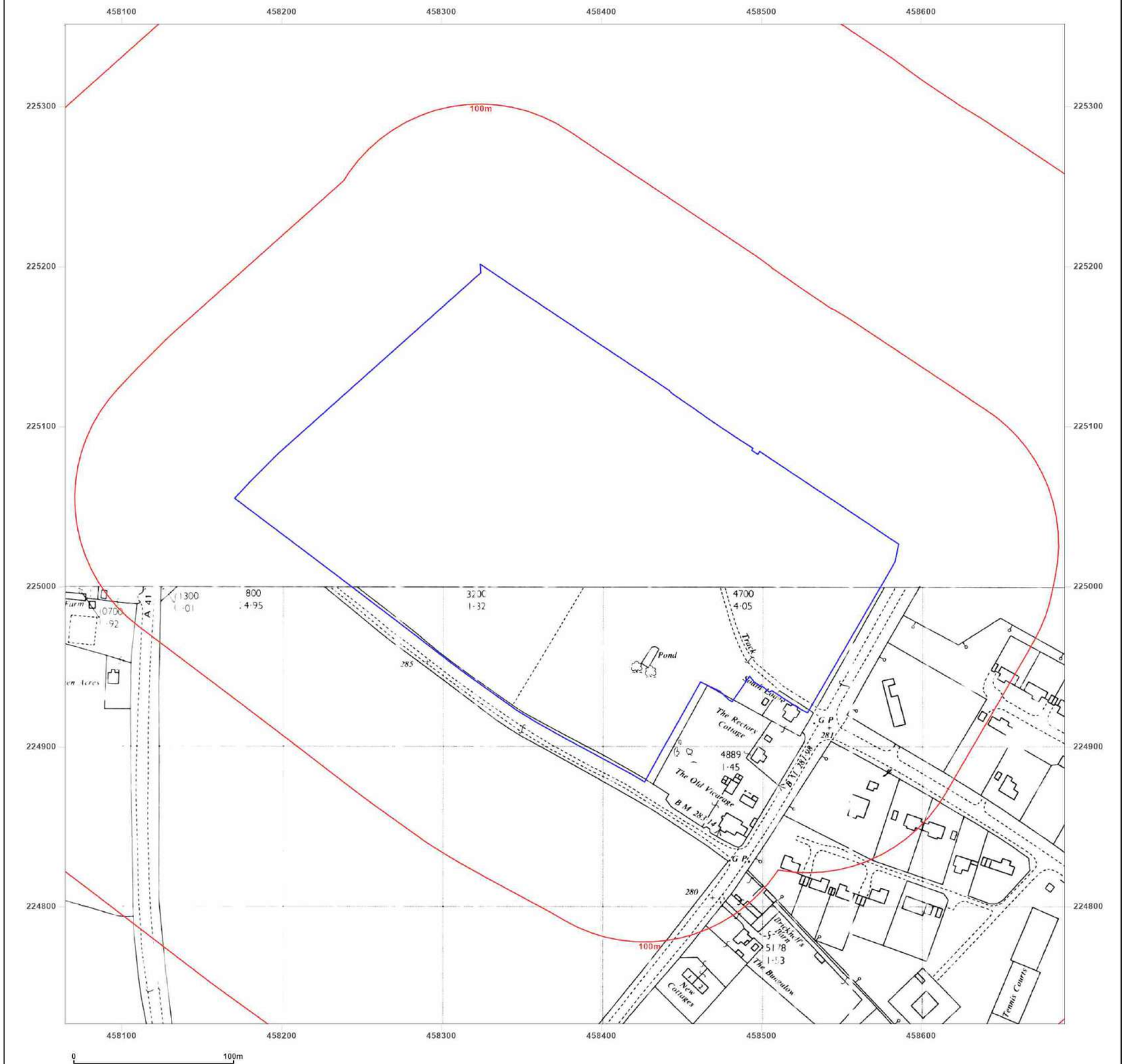

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1968**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1976**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1970

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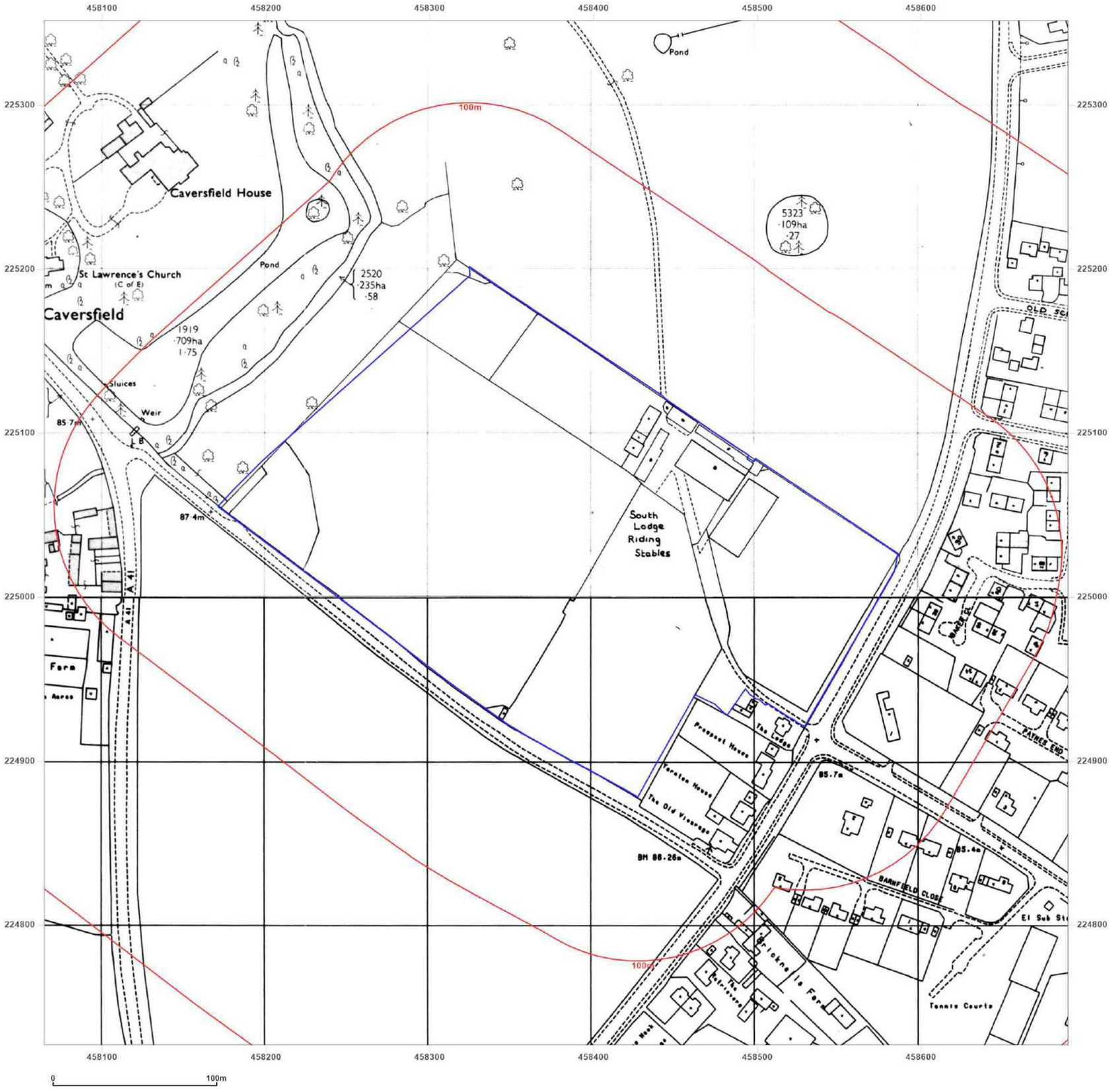

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1990-1991**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1970
Revised 1990
Edition N/A
Copyright 1990
Levelled 1970

Surveyed 1966
Revised 1966
Edition N/A
Copyright 1991
Levelled N/A

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1992**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

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Production date: 12 July 2023

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid
Map date: **1993**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

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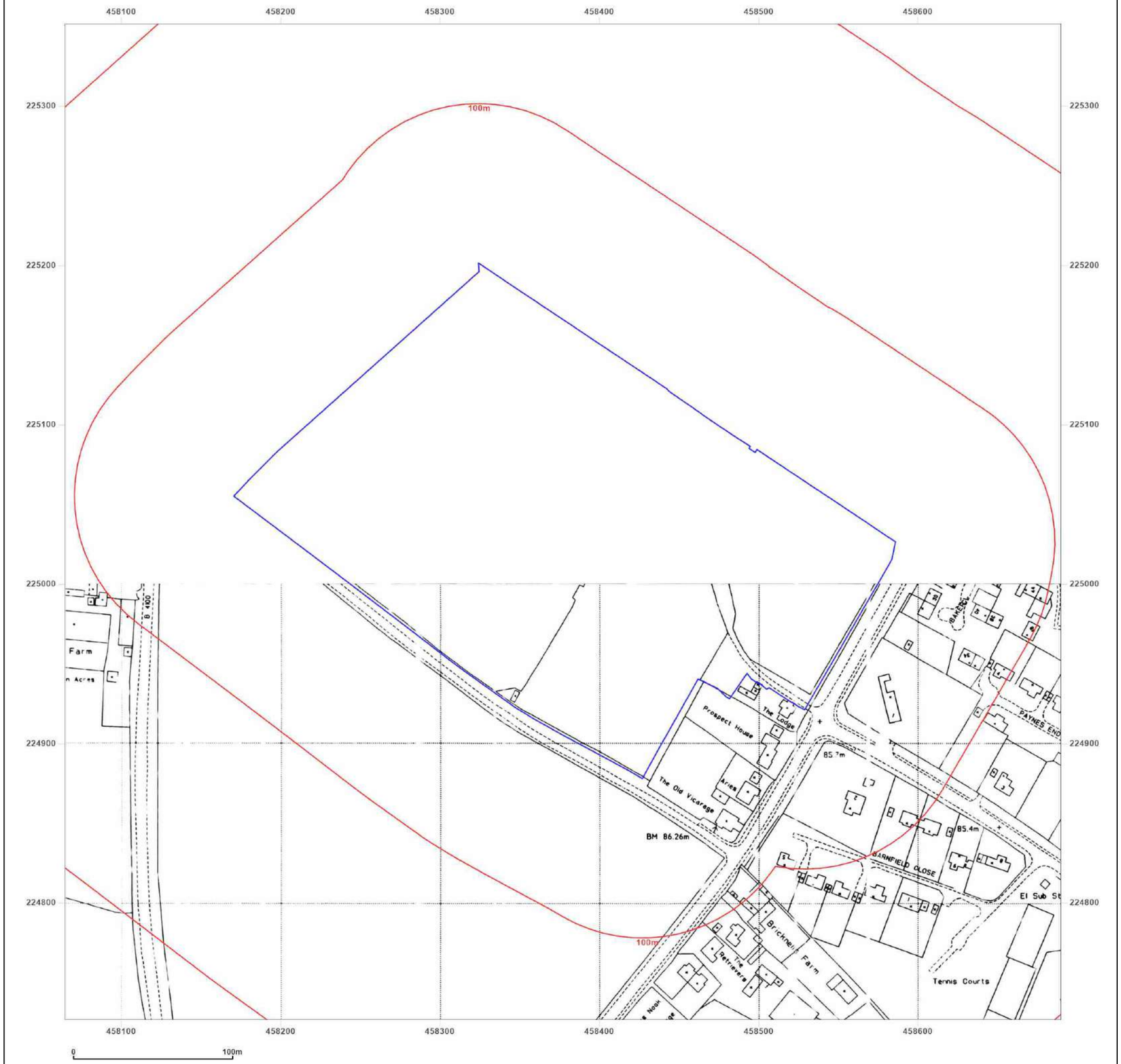

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid
Map date: **1994**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

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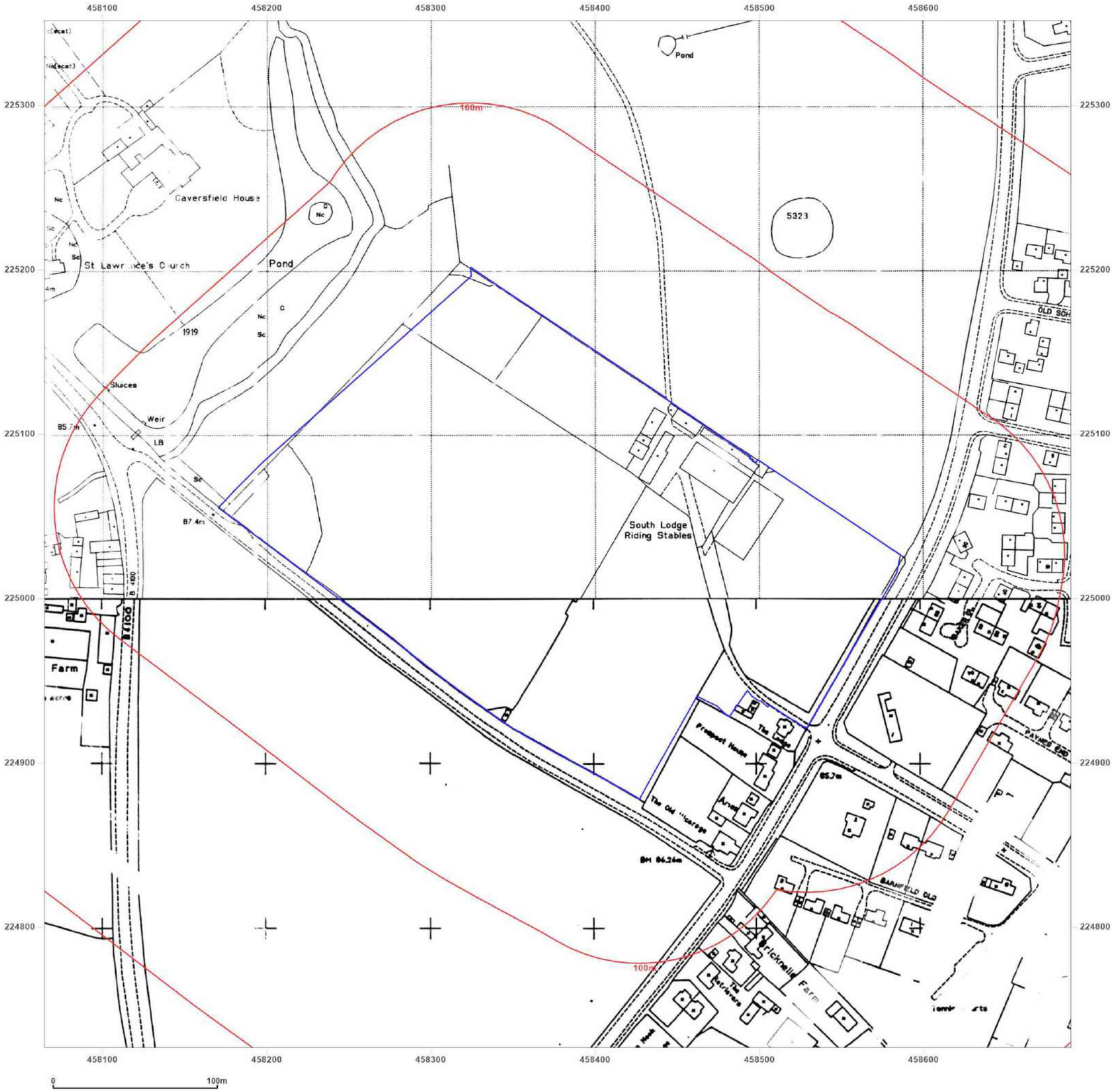

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1992-1994**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1992
Revised 1992
Edition N/A
Copyright 1992
Levelled N/A

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid

Map date: **1995**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1995
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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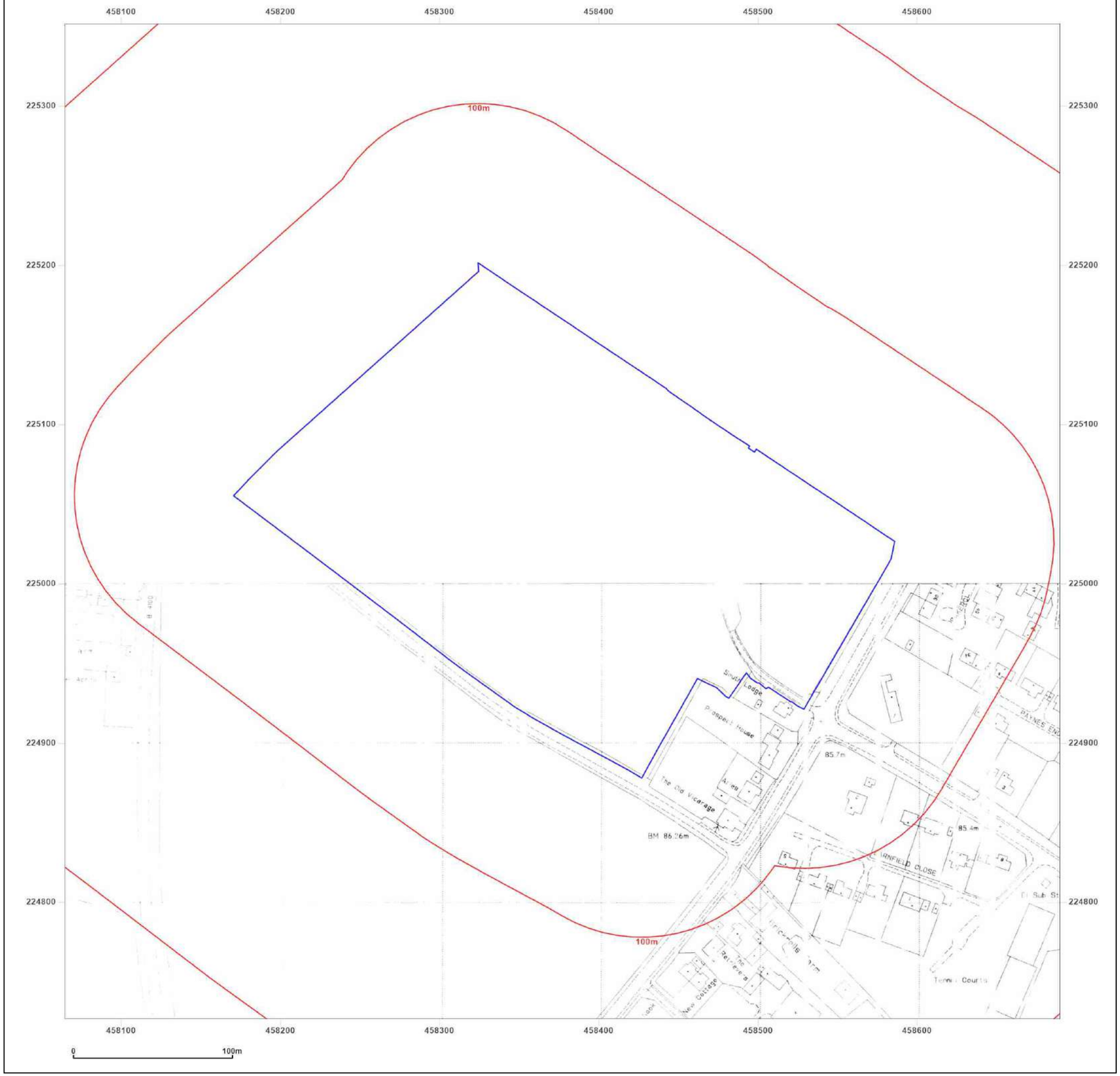

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB_2500
Grid Ref: 458377, 225039

Map Name: National Grid
Map date: **1995**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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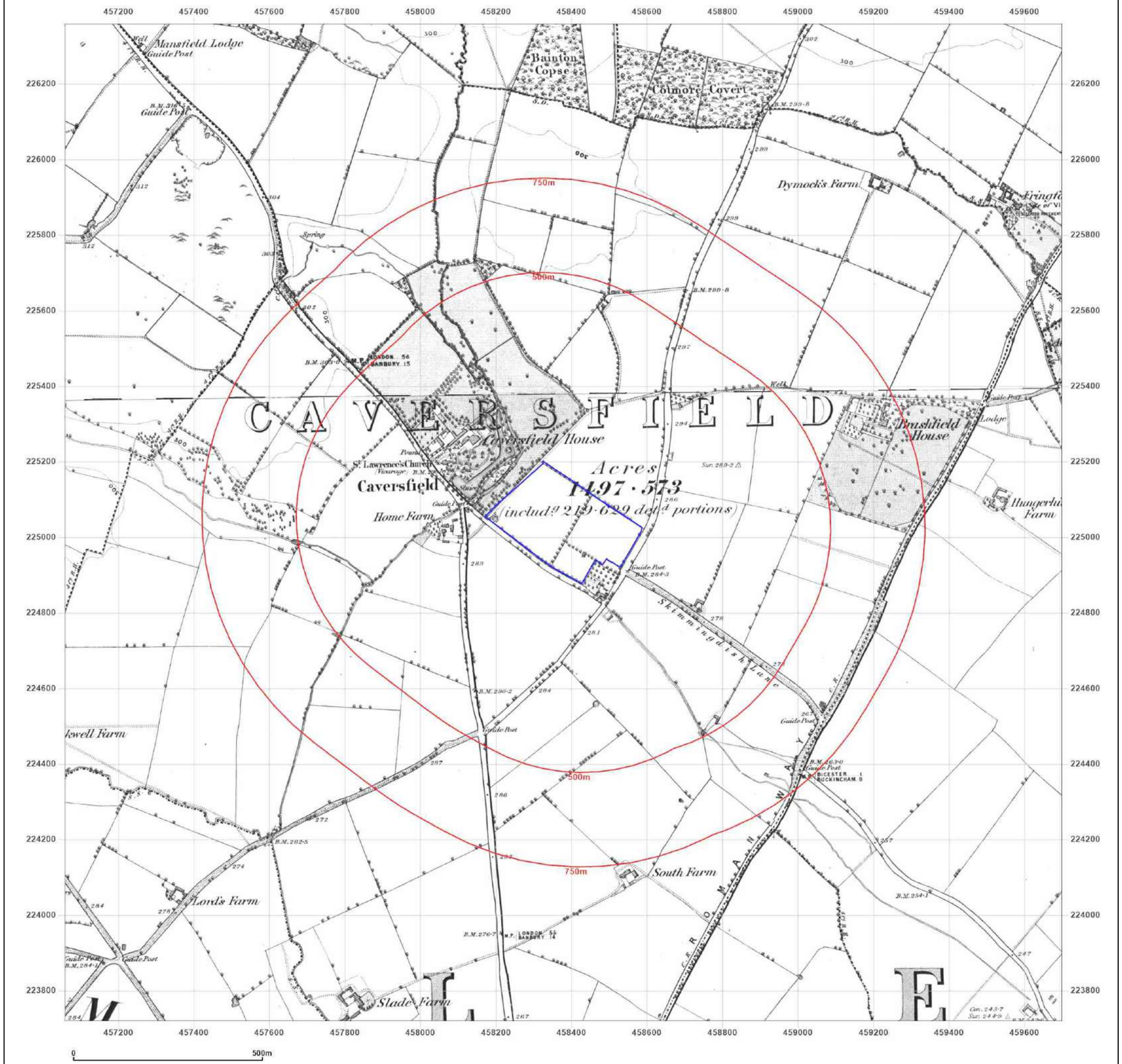


Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

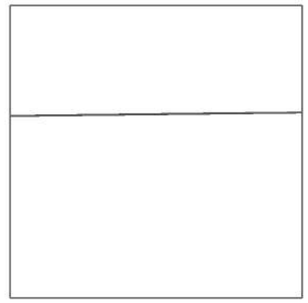
Map date: **1880**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1880
Revised 1880
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1880
Revised 1880
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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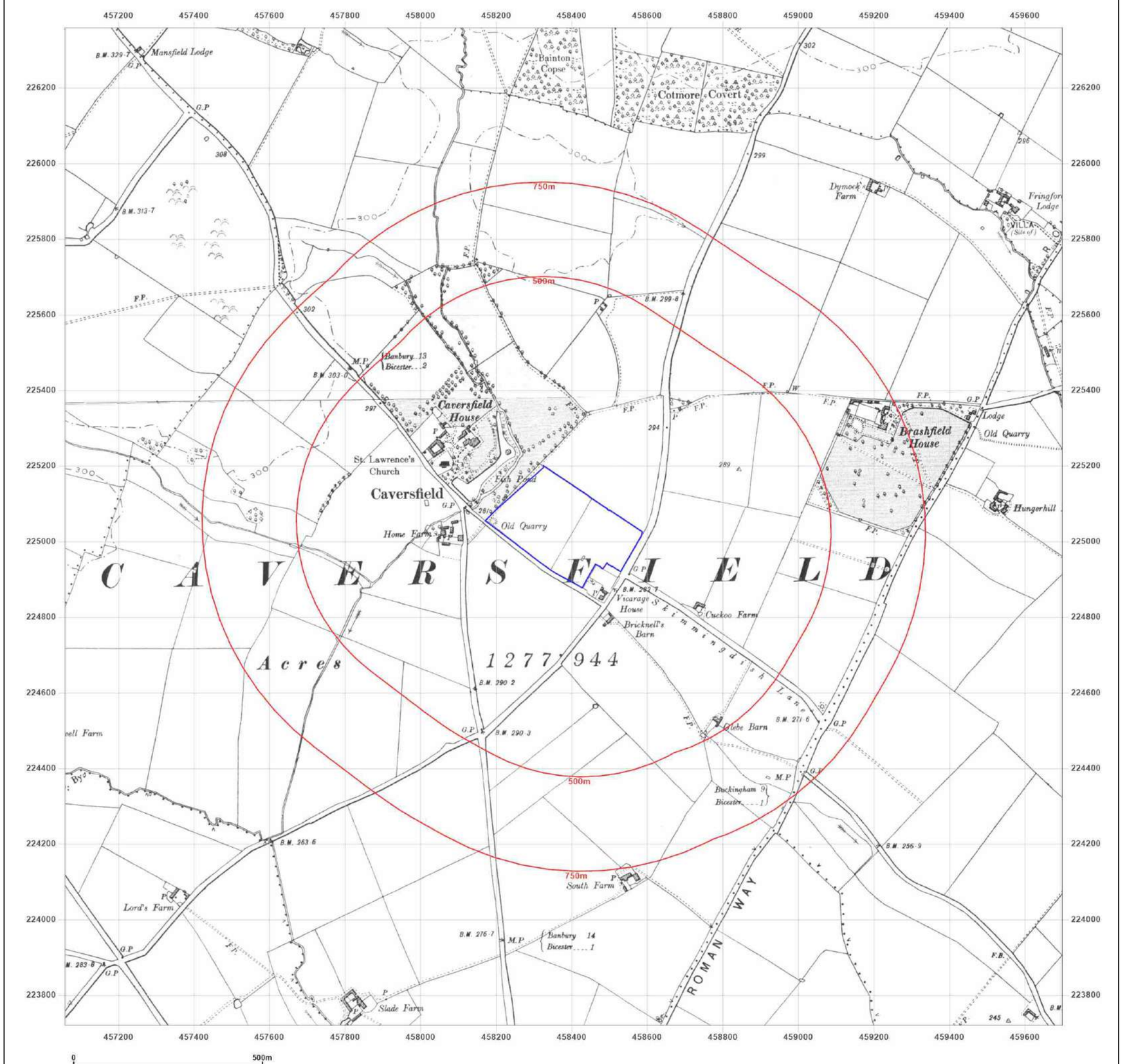

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

Map date: **1898**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1879
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1879
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

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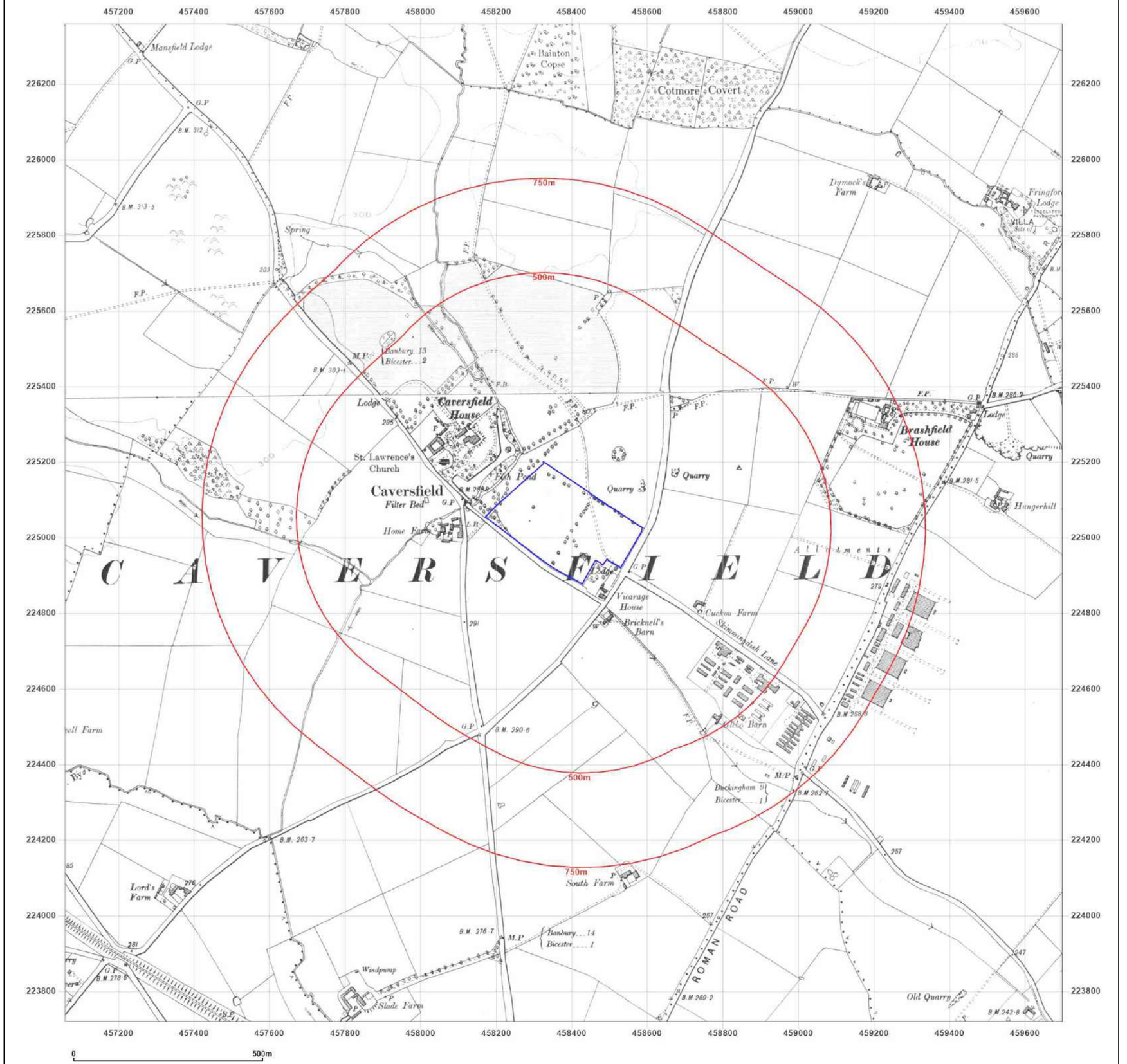


Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

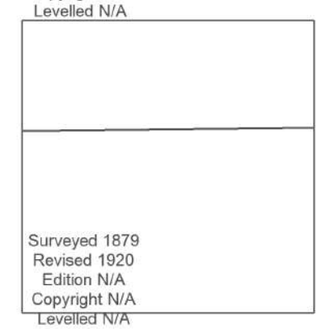
Map date: **1920**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1879
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A



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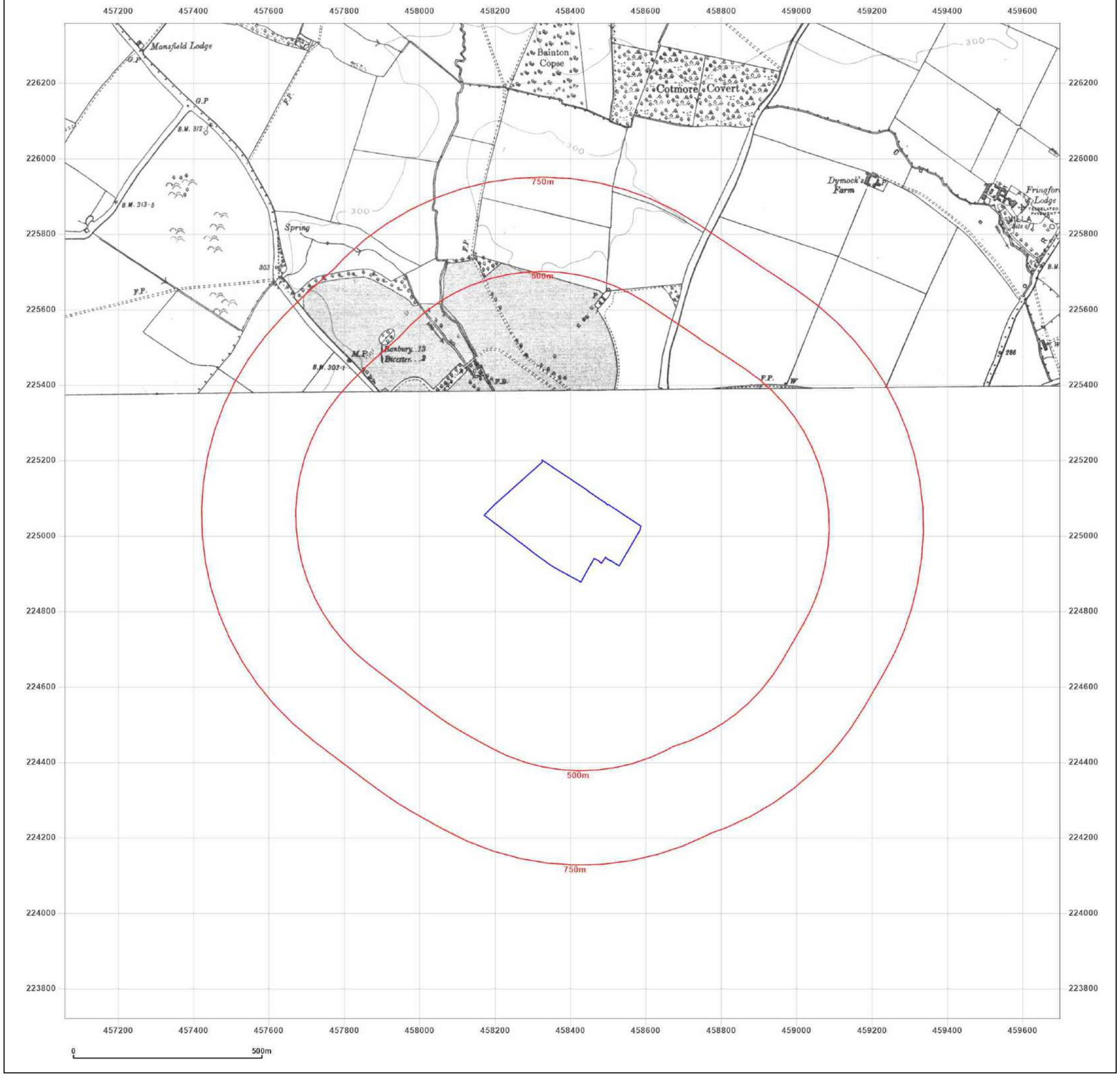

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

Map date: **1920**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1879
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

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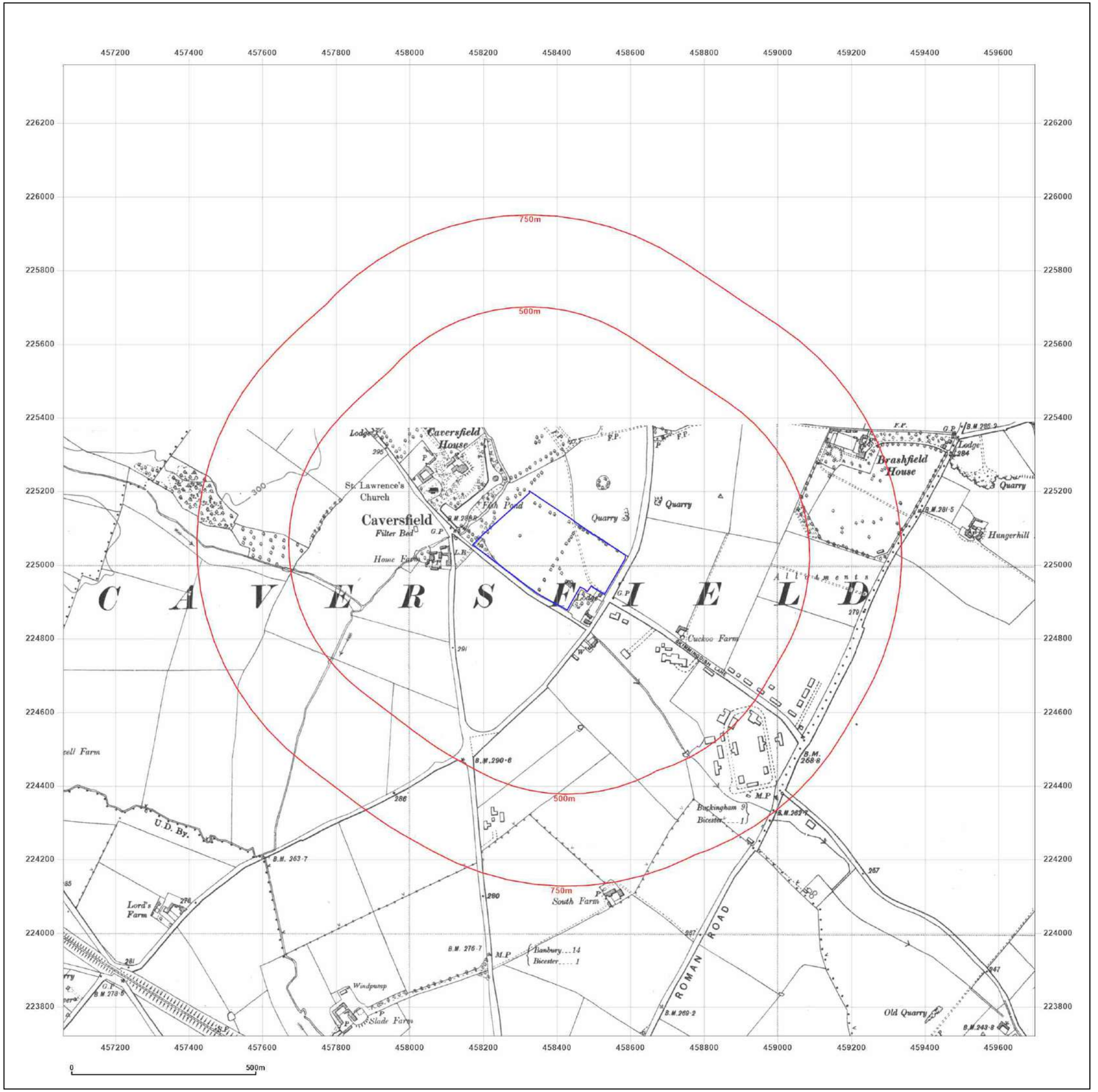

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1879
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A

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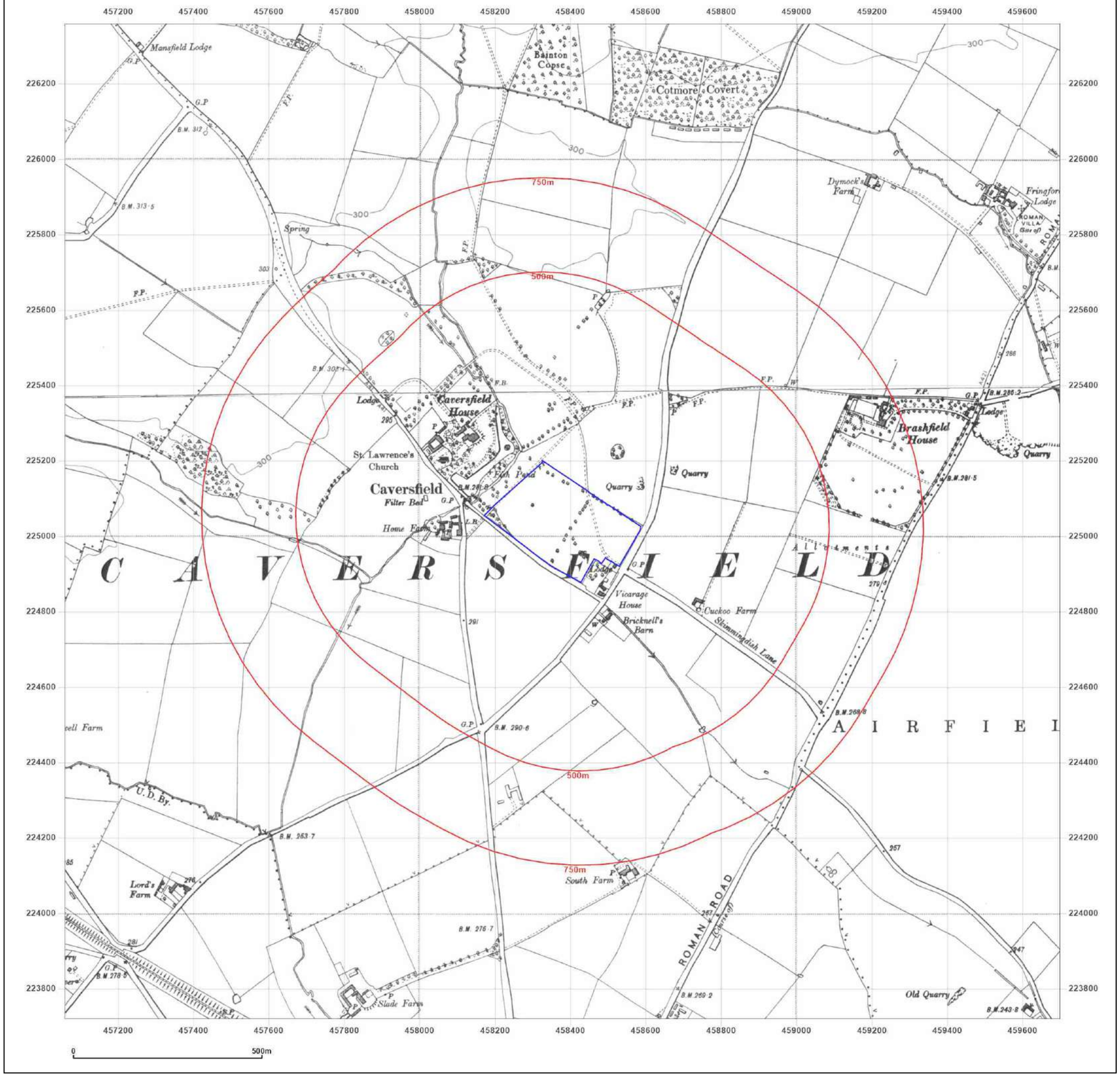

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: County Series

Map date: **1950**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1879
Revised 1950
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1879
Revised 1950
Edition N/A
Copyright N/A
Levelled N/A

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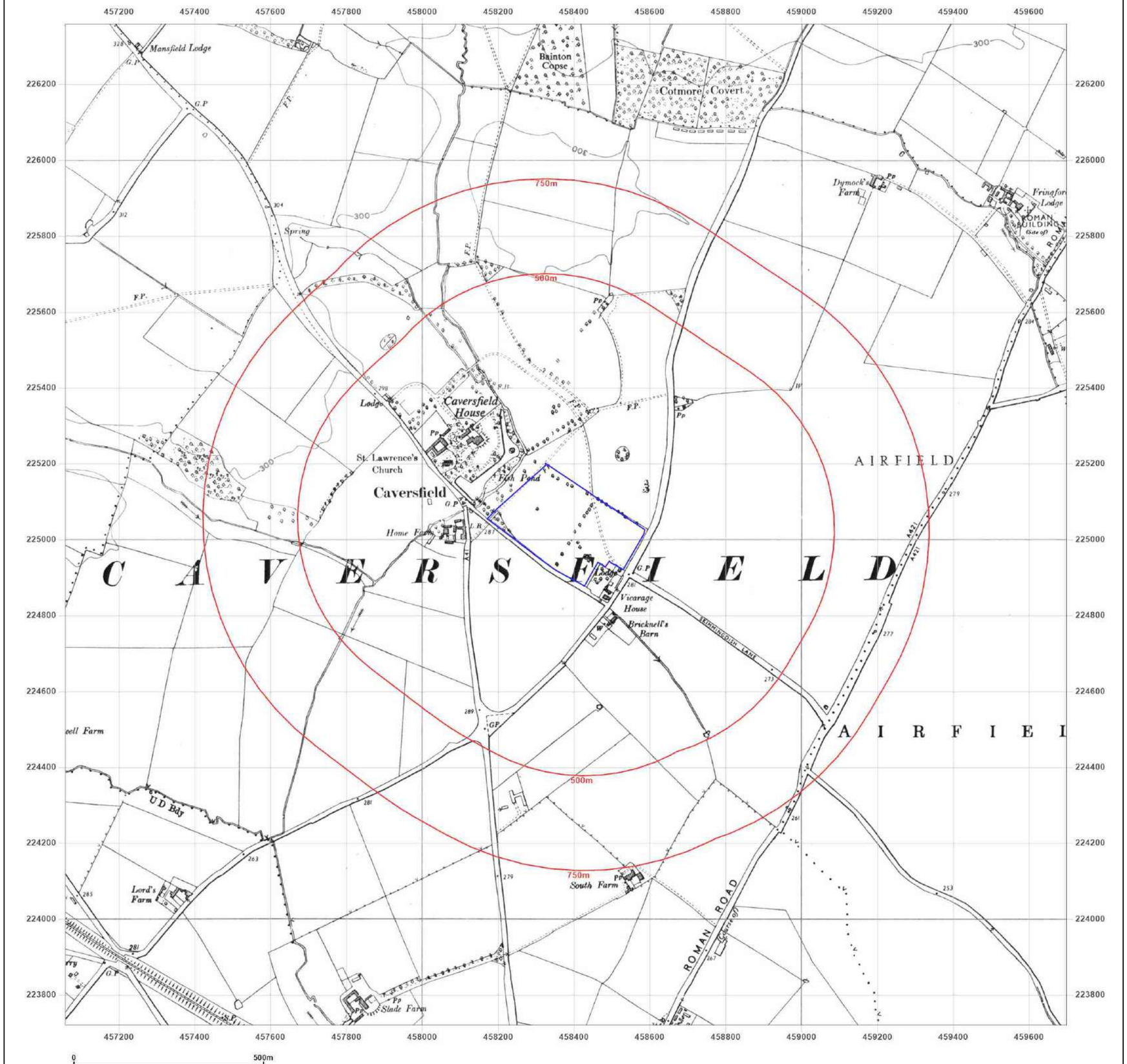

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: Provisional
Map date: **1950-1955**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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Surveyed 1950
Revised 1950
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1954
Edition N/A
Copyright 1955
Levelled N/A

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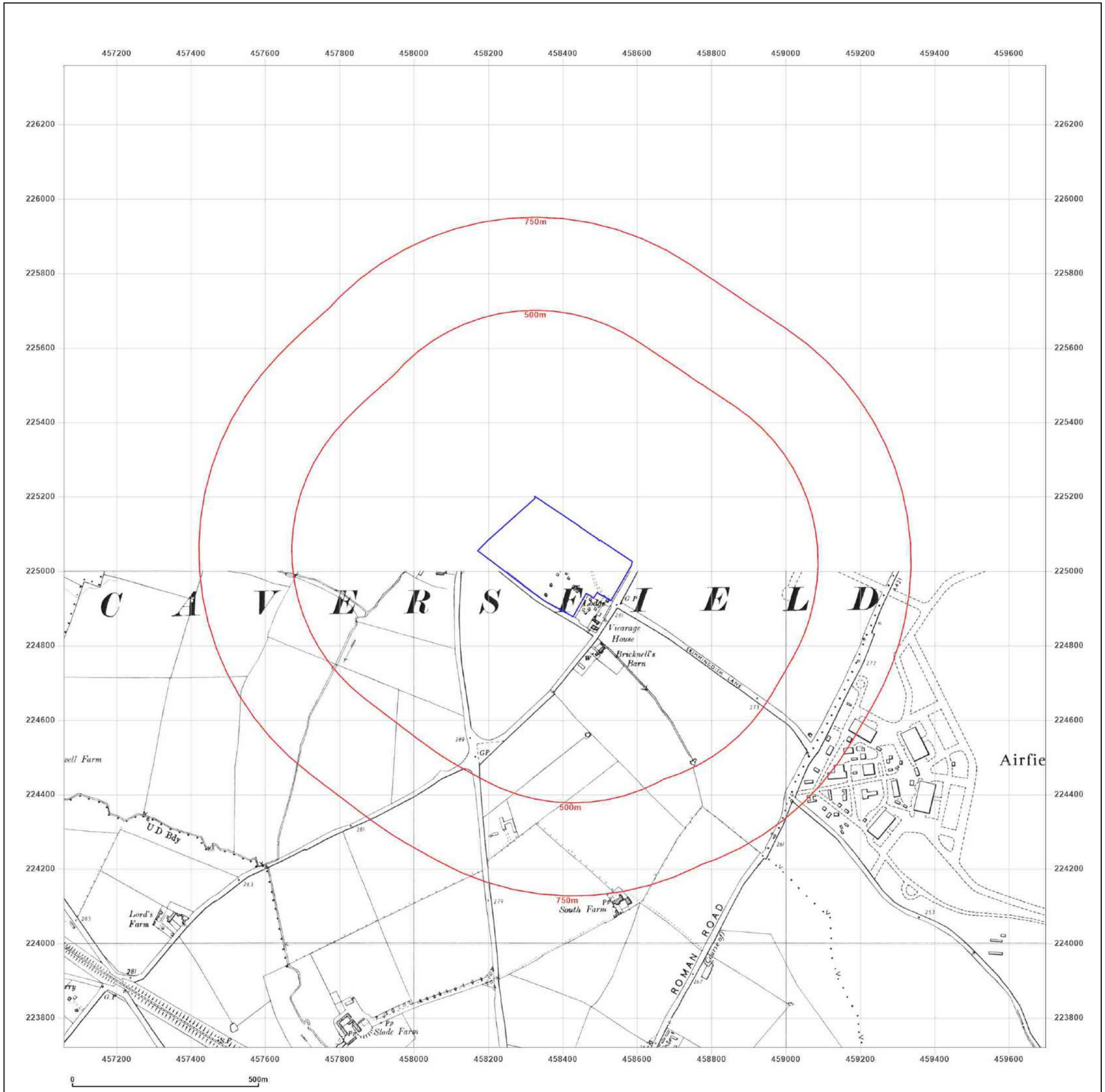

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: Provisional
Map date: **1966**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1966
Edition N/A
Copyright 1955
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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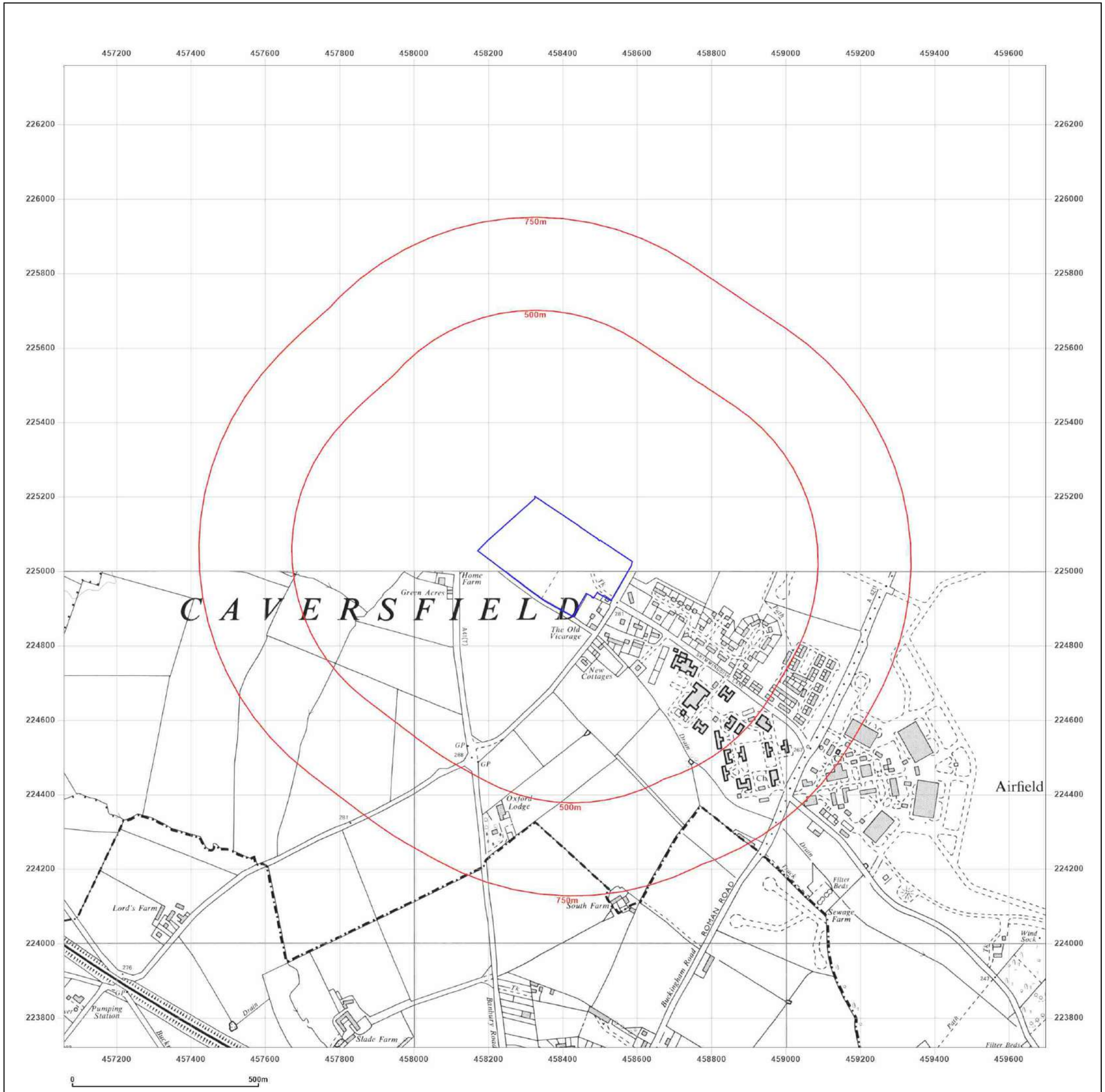

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: Provisional
Map date: **1970**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1968
Revised 1970
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 12 July 2023

Map legend available at:
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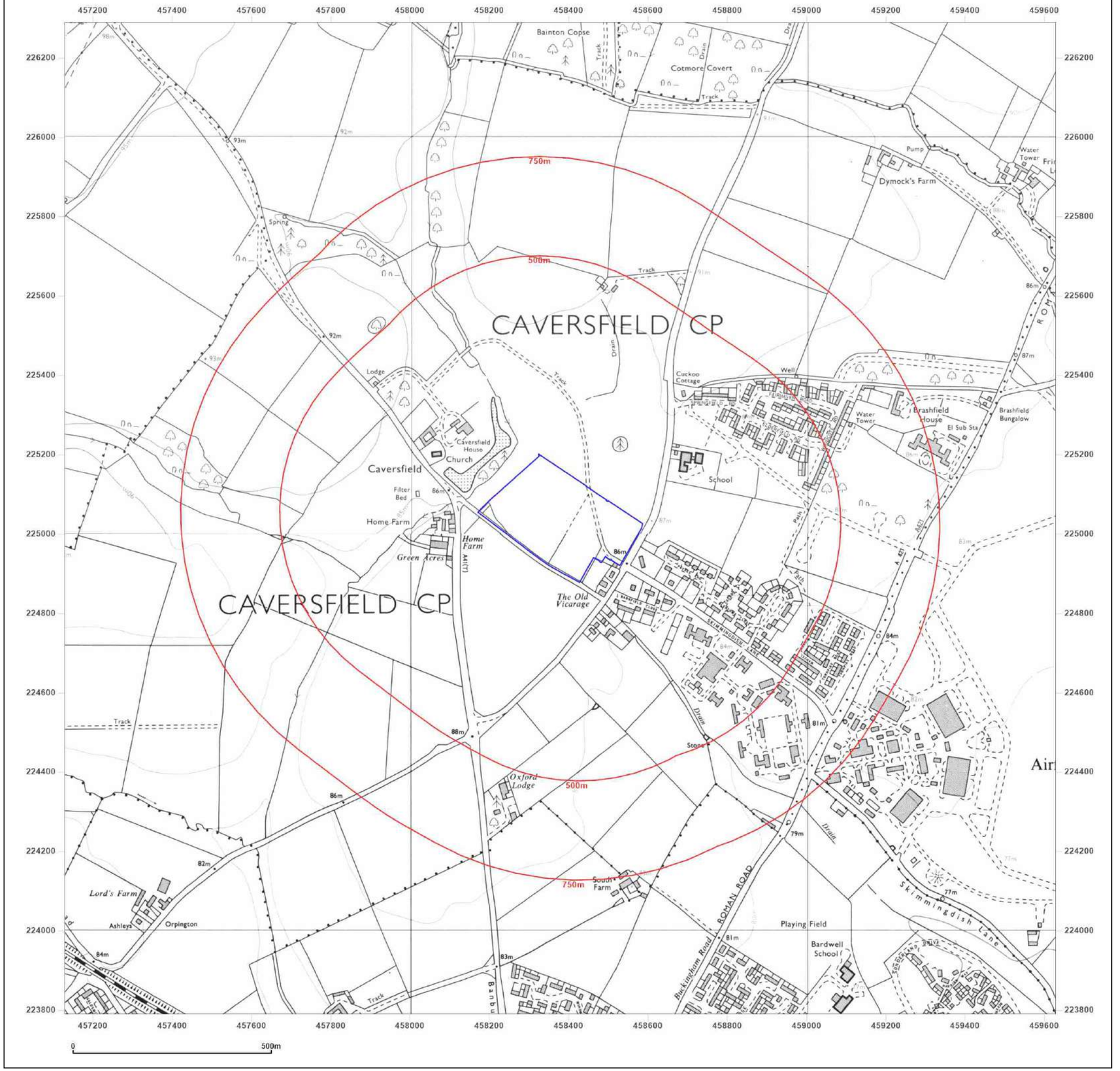

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: National Grid

Map date: **1980-1985**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1975
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1983
Revised 1985
Edition N/A
Copyright N/A
Levelled N/A

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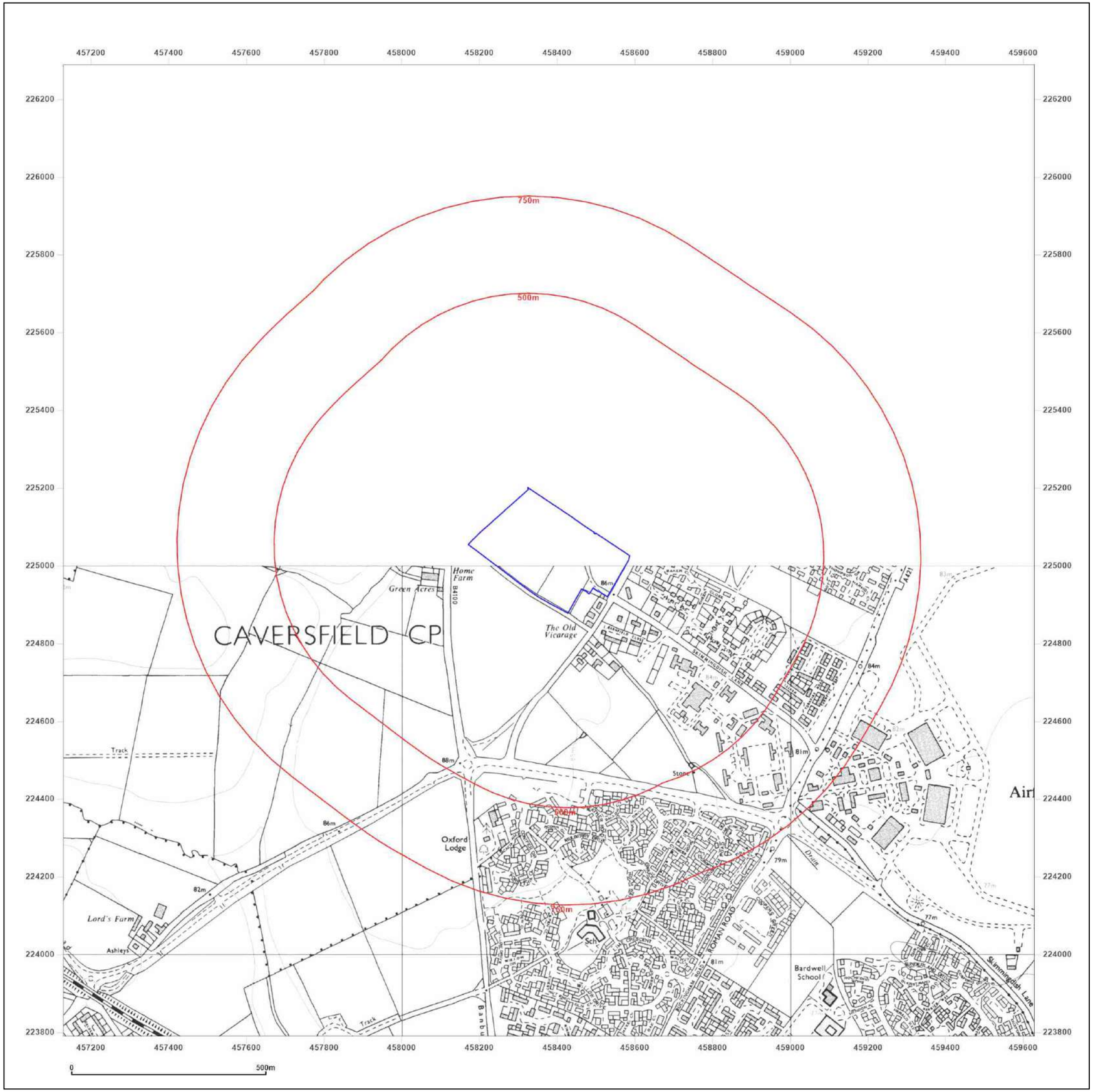

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: National Grid
Map date: **1995**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

Surveyed 1983
Revised 1995
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 12 July 2023

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Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2001

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Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 12 July 2023

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
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2010

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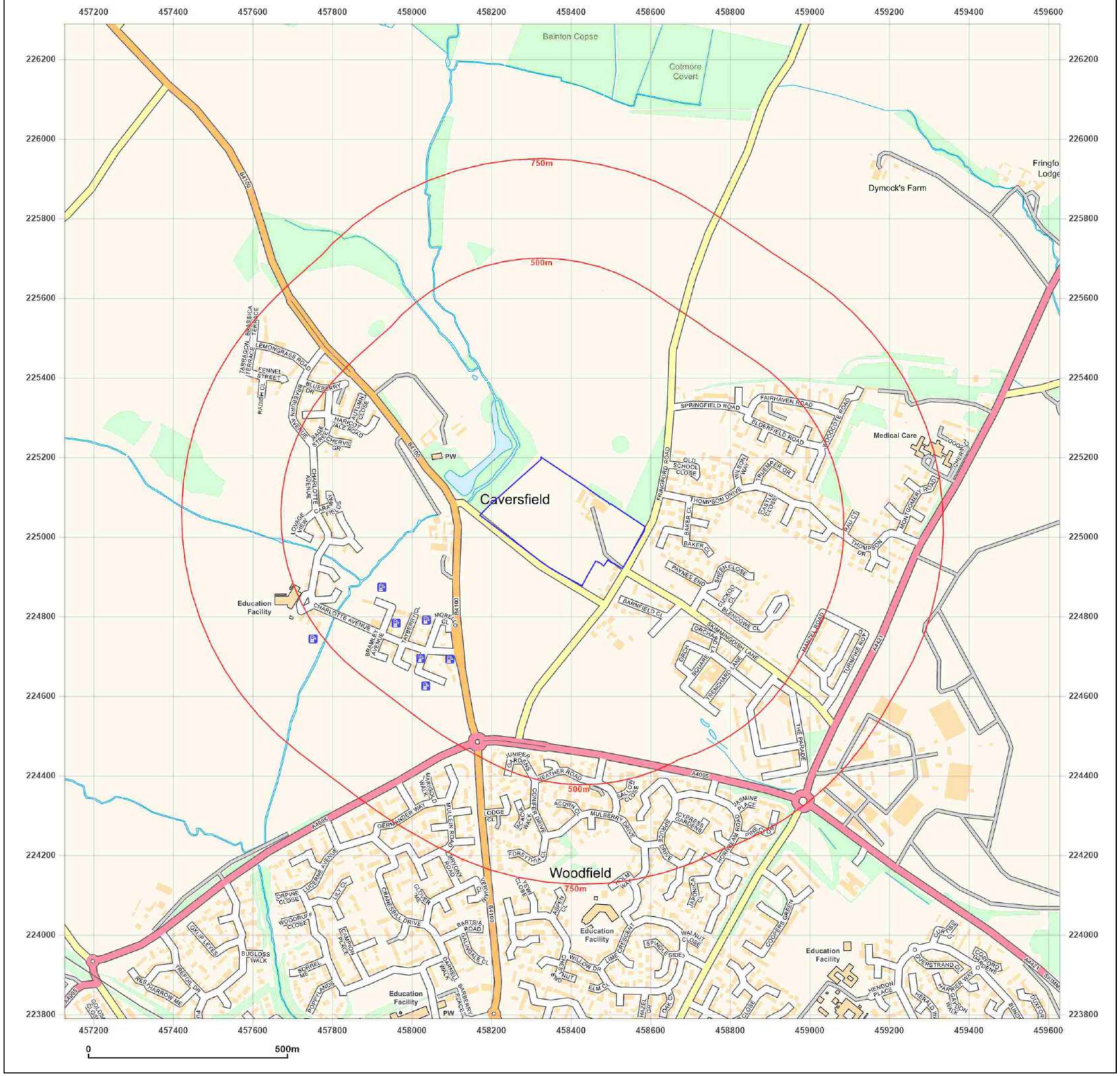

Groundsure INSIGHTS

Site Details:

AUNT EMS LANE,
CAVERSFIELD, OX27 8TH

Client Ref: POP006260
Report Ref: GS-I9Z-V55-M32-EEB
Grid Ref: 458378, 225039

Map Name: National Grid

Map date: **2023**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2023

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Production date: 12 July 2023

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

MEC
Development Technical Consultants

APPENDICES

APPENDIX D

Groundsure
LOCATION INTELLIGENCE

Enviro+Geo Insight

AUNT EMS LANE, CAVERSFIELD, OX27 8TH

Order Details

Date: 12/07/2023

Your ref: POP006260

Our Ref: GS-3LH-O4Z-7EB-4CA

Site Details

Location: 458371 225038

Area: 6.86 ha

Authority: Cherwell District Council ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
15 >	1.1 >	Historical industrial land uses >	2	1	6	2	-
16 >	1.2 >	Historical tanks >	0	0	0	1	-
16 >	1.3 >	Historical energy features >	0	0	2	1	-
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	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
18 >	2.1 >	Historical industrial land uses >	2	1	10	3	-
19 >	2.2 >	Historical tanks >	0	0	0	5	-
20 >	2.3 >	Historical energy features >	0	0	11	4	-
20	2.4	Historical petrol stations	0	0	0	0	-
21	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill >	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	-
23	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
23	3.5	Historical waste sites	0	0	0	0	-
23	3.6	Licensed waste sites	0	0	0	0	-
23 >	3.7 >	Waste exemptions >	0	2	26	0	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
27 >	4.1 >	Recent industrial land uses >	0	0	4	-	-
28	4.2	Current or recent petrol stations	0	0	0	0	-
28	4.3	Electricity cables	0	0	0	0	-
28	4.4	Gas pipelines	0	0	0	0	-
28	4.5	Sites determined as Contaminated Land	0	0	0	0	-

29	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
29	4.7	Regulated explosive sites	0	0	0	0	-
29	4.8	Hazardous substance storage/usage	0	0	0	0	-
29	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
29 >	**4.10 >**	**Licensed industrial activities (Part A(1)) >**	0	0	0	1	-
30 >	**4.11 >**	**Licensed pollutant release (Part A(2)/B) >**	0	0	1	0	-
30	4.12	Radioactive Substance Authorisations	0	0	0	0	-
30 >	**4.13 >**	**Licensed Discharges to controlled waters >**	0	0	2	0	-
31	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
31	4.15	Pollutant release to public sewer	0	0	0	0	-
31	4.16	List 1 Dangerous Substances	0	0	0	0	-
32	4.17	List 2 Dangerous Substances	0	0	0	0	-
32	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
32	4.19	Pollution inventory substances	0	0	0	0	-
32	4.20	Pollution inventory waste transfers	0	0	0	0	-
32	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	**Hydrogeology >**	On site	0-50m	50-250m	250-500m	500-2000m
33 >	**5.1 >**	**Superficial aquifer >**	Identified (within 500m)				
35 >	**5.2 >**	**Bedrock aquifer >**	Identified (within 500m)				
37 >	**5.3 >**	**Groundwater vulnerability >**	Identified (within 50m)				
38 >	**5.4 >**	**Groundwater vulnerability- soluble rock risk >**	Identified (within 0m)				
38	5.5	Groundwater vulnerability- local information	None (within 0m)				
39 >	**5.6 >**	**Groundwater abstractions >**	0	0	0	0	13
42	5.7	Surface water abstractions	0	0	0	0	0
43 >	**5.8 >**	**Potable abstractions >**	0	0	0	0	2
43	5.9	Source Protection Zones	0	0	0	0	-
44	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	**Hydrology >**	On site	0-50m	50-250m	250-500m	500-2000m
45 >	**6.1 >**	**Water Network (OS MasterMap) >**	0	2	4	-	-

46 >	6.2 >	Surface water features >	0	1	3	-	-
46 >	6.3 >	WFD Surface water body catchments >	2	-	-	-	-
47 >	6.4 >	WFD Surface water bodies >	0	0	0	-	-
47 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
49 >	7.1 >	Risk of flooding from rivers and the sea >	High (within 50m)				
50	7.2	Historical Flood Events	0	0	0	-	-
50	7.3	Flood Defences	0	0	0	-	-
50	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
50	7.5	Flood Storage Areas	0	0	0	-	-
51 >	7.6 >	Flood Zone 2 >	Identified (within 50m)				
52	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding >					
53 >	8.1 >	Surface water flooding >	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding >					
55 >	9.1 >	Groundwater flooding >	Negligible (within 50m)				
Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
56 >	10.1 >	Sites of Special Scientific Interest (SSSI) >	0	0	0	0	2
57	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
57	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
57	10.4	Special Protection Areas (SPA)	0	0	0	0	0
57	10.5	National Nature Reserves (NNR)	0	0	0	0	0
58 >	10.6 >	Local Nature Reserves (LNR) >	0	0	0	0	1
58 >	10.7 >	Designated Ancient Woodland >	0	0	0	0	6
58	10.8	Biosphere Reserves	0	0	0	0	0
59	10.9	Forest Parks	0	0	0	0	0
59	10.10	Marine Conservation Zones	0	0	0	0	0
59	10.11	Green Belt	0	0	0	0	0
59	10.12	Proposed Ramsar sites	0	0	0	0	0

59	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
60	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
60	10.15	Nitrate Sensitive Areas	0	0	0	0	0
60 >	10.16 >	Nitrate Vulnerable Zones >	2	0	0	0	2
61 >	10.17 >	SSSI Impact Risk Zones >	1	-	-	-	-
62 >	10.18 >	SSSI Units >	0	0	0	0	2
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	-	-
64	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
64	11.3	National Parks	0	0	0	-	-
64 >	11.4 >	Listed Buildings >	0	0	2	-	-
65 >	11.5 >	Conservation Areas >	0	1	0	-	-
65	11.6	Scheduled Ancient Monuments	0	0	0	-	-
65	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations >	On site	0-50m	50-250m	250-500m	500-2000m
66 >	12.1 >	Agricultural Land Classification >	Grade 3b (within 250m)				
67	12.2	Open Access Land	0	0	0	-	-
67 >	12.3 >	Tree Felling Licences >	1	0	0	-	-
67 >	12.4 >	Environmental Stewardship Schemes >	1	0	0	-	-
68	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations >	On site	0-50m	50-250m	250-500m	500-2000m
69 >	13.1 >	Priority Habitat Inventory >	2	1	3	-	-
70	13.2	Habitat Networks	0	0	0	-	-
70	13.3	Open Mosaic Habitat	0	0	0	-	-
70	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
71 >	14.1 >	10k Availability >	Identified (within 500m)				
72	14.2	Artificial and made ground (10k)	0	0	0	0	-
73 >	14.3 >	Superficial geology (10k) >	0	0	2	0	-

74	14.4	Landslip (10k)	0	0	0	0	-
75 >	14.5 >	Bedrock geology (10k) >	2	1	2	0	-
76	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
77 >	15.1 >	50k Availability >	Identified (within 500m)				
78	15.2	Artificial and made ground (50k)	0	0	0	0	-
78	15.3	Artificial ground permeability (50k)	0	0	-	-	-
79 >	15.4 >	Superficial geology (50k) >	0	0	1	0	-
80	15.5	Superficial permeability (50k)	None (within 50m)				
80	15.6	Landslip (50k)	0	0	0	0	-
80	15.7	Landslip permeability (50k)	None (within 50m)				
81 >	15.8 >	Bedrock geology (50k) >	1	1	0	0	-
82 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
82	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes >	On site	0-50m	50-250m	250-500m	500-2000m
83 >	16.1 >	BGS Boreholes >	1	0	3	-	-
Page	Section	Natural ground subsidence >					
85 >	17.1 >	Shrink swell clays >	Negligible (within 50m)				
86 >	17.2 >	Running sands >	Negligible (within 50m)				
87 >	17.3 >	Compressible deposits >	Negligible (within 50m)				
88 >	17.4 >	Collapsible deposits >	Very low (within 50m)				
89 >	17.5 >	Landslides >	Very low (within 50m)				
90 >	17.6 >	Ground dissolution of soluble rocks >	Very low (within 50m)				
Page	Section	Mining and ground workings >	On site	0-50m	50-250m	250-500m	500-2000m
92 >	18.1 >	BritPits >	1	0	2	0	-
93 >	18.2 >	Surface ground workings >	2	0	17	-	-
94	18.3	Underground workings	0	0	0	0	0
94	18.4	Underground mining extents	0	0	0	0	-
95	18.5	Historical Mineral Planning Areas	0	0	0	0	-

95	18.6	Non-coal mining	0	0	0	0	0
95	18.7	JPB mining areas	None (within 0m)				
95	18.8	The Coal Authority non-coal mining	0	0	0	0	-
96	18.9	Researched mining	0	0	0	0	-
96	18.10	Mining record office plans	0	0	0	0	-
96	18.11	BGS mine plans	0	0	0	0	-
96	18.12	Coal mining	None (within 0m)				
96	18.13	Brine areas	None (within 0m)				
97	18.14	Gypsum areas	None (within 0m)				
97	18.15	Tin mining	None (within 0m)				
97	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
98	19.1	Natural cavities	0	0	0	0	-
98	19.2	Mining cavities	0	0	0	0	0
98	19.3	Reported recent incidents	0	0	0	0	-
98	19.4	Historical incidents	0	0	0	0	-
99	19.5	National karst database	0	0	0	0	-
Page	Section	**Radon** >					
100 >	**20.1** >	**Radon** >	Between 1% and 3% (within 0m)				
Page	Section	**Soil chemistry** >	On site	0-50m	50-250m	250-500m	500-2000m
102 >	**21.1** >	**BGS Estimated Background Soil Chemistry** >	6	1	-	-	-
102	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
103	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
104	22.1	Underground railways (London)	0	0	0	-	-
104	22.2	Underground railways (Non-London)	0	0	0	-	-
104	22.3	Railway tunnels	0	0	0	-	-
104	22.4	Historical railway and tunnel features	0	0	0	-	-
104	22.5	Royal Mail tunnels	0	0	0	-	-

105	22.6	Historical railways	0	0	0	-	-
105	22.7	Railways	0	0	0	-	-
105	22.8	Crossrail 1	0	0	0	0	-
105	22.9	Crossrail 2	0	0	0	0	-
105	22.10	HS2	0	0	0	0	-

Recent aerial photograph

Capture Date: 05/07/2019

Site Area: 6.86ha

Recent site history - 2018 aerial photograph

Capture Date: 29/10/2018

Site Area: 6.86ha

Recent site history - 2015 aerial photograph

Capture Date: 06/09/2015

Site Area: 6.86ha

Recent site history - 2009 aerial photograph

Capture Date: 19/08/2009

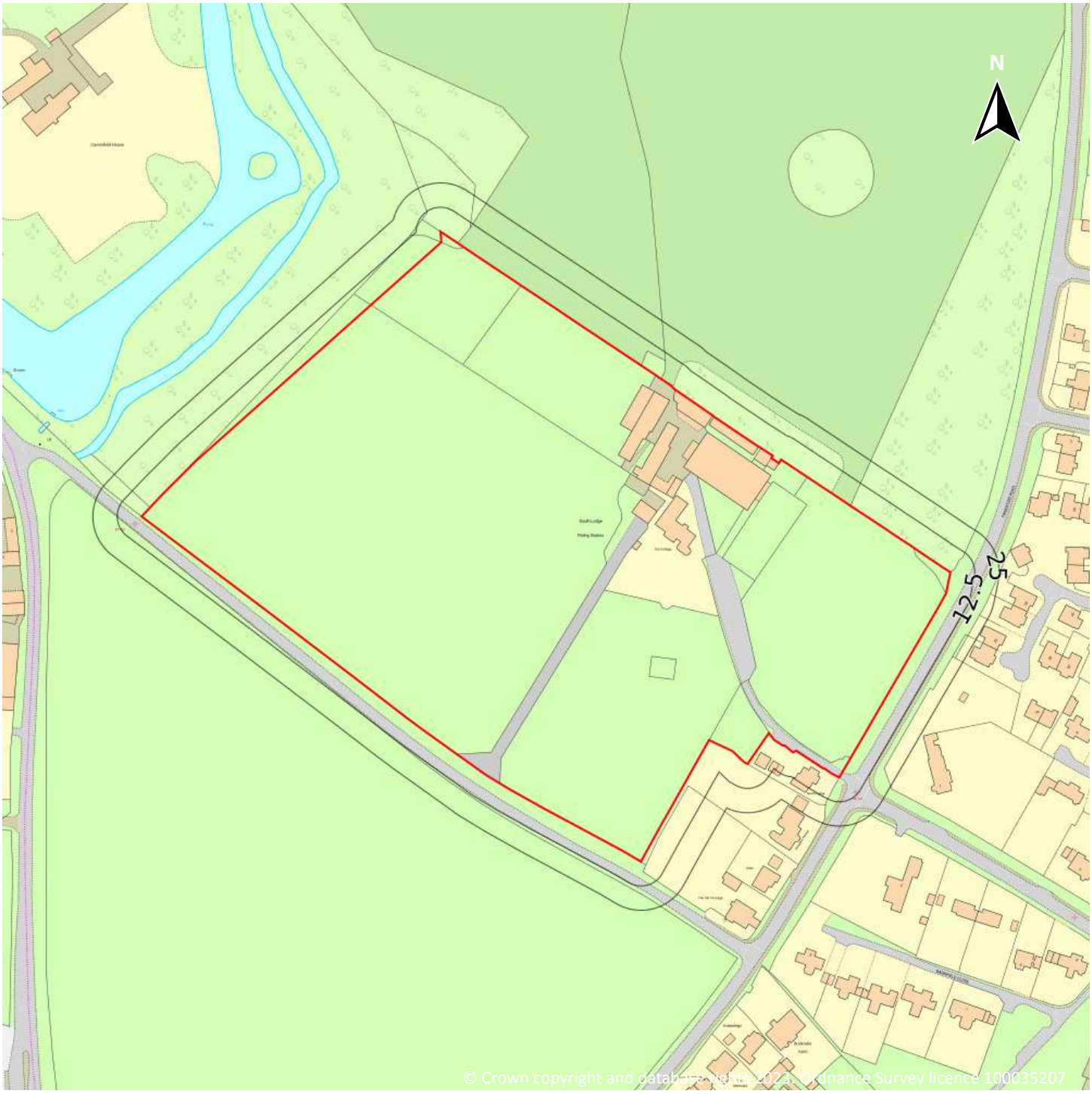
Site Area: 6.86ha

Recent site history - 1999 aerial photograph

Capture Date: 05/10/1999

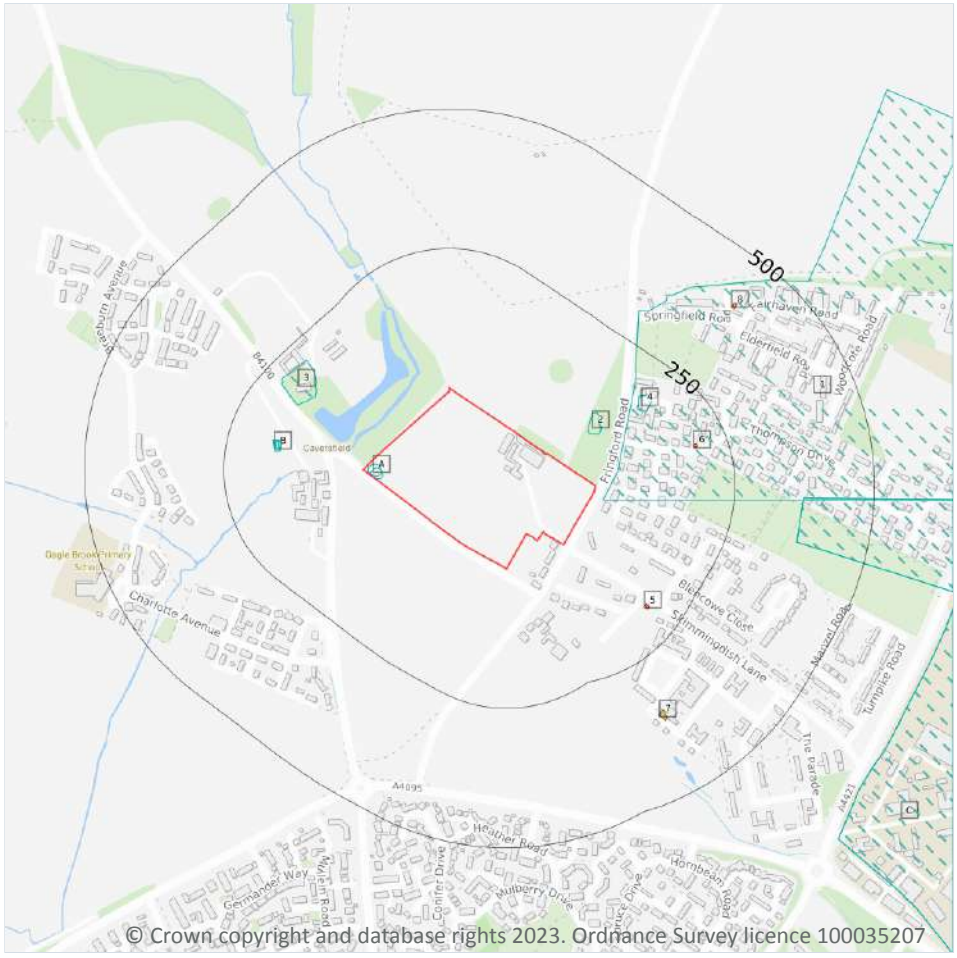
Site Area: 6.86ha

OS MasterMap site plan



Site Area: 6.86ha

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	11

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 15 >**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Unspecified Old Quarry**	**1898**	**1773014**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Unspecified Pit**	**1880**	**1778108**
1	21m E	Airfield	1950	1788215
2	73m NE	Unspecified Quarry	1938 - 1950	1823335
B	153m W	Filter Bed	1938	1834684
B	153m W	Filter Bed	1980	1824597
3	153m NW	Grave Yard	1880 - 1882	1814477
4	157m NE	Unspecified Quarry	1938 - 1950	1782754
B	157m W	Filter Bed	1950	1846281
C	372m E	Airfield	1982 - 1985	1783944
C	372m E	Airfield	1966 - 1970	1796876

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**1**

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 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 15 >**

ID	Location	Land use	Dates present	Group ID
7	346m SE	Tanks	1995 - 1999	289575

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**3**

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 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 15 >**

ID	Location	Land use	Dates present	Group ID
5	182m SE	Electricity Substation	1991 - 1999	179902
6	191m E	Electricity Substation	1990 - 1996	182706
8	403m NE	Electricity Substation	1975 - 1996	177272

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 un-grouped 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 un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

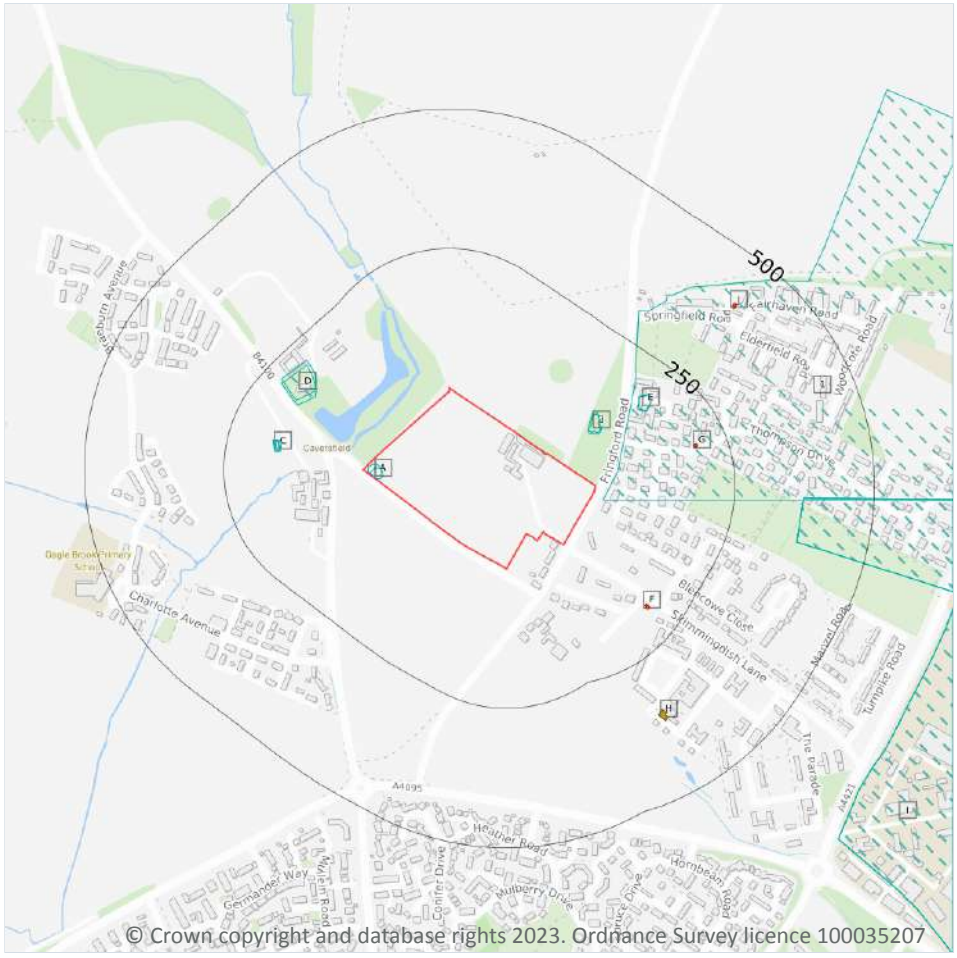
1.6 Historical military land

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	16

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
A	**On site**	**Unspecified Pit**	**1880**	**1778108**
A	**On site**	**Unspecified Old Quarry**	**1898**	**1773014**
1	21m E	Airfield	1950	1788215

ID	Location	Land Use	Date	Group ID
B	73m NE	Unspecified Quarry	1938	1823335
B	76m NE	Unspecified Quarry	1950	1823335
C	153m W	Filter Bed	1938	1834684
C	153m W	Filter Bed	1938	1834684
C	153m W	Filter Bed	1980	1824597
D	153m NW	Grave Yard	1880	1814477
E	157m NE	Unspecified Quarry	1938	1782754
C	157m W	Filter Bed	1950	1846281
E	157m NE	Unspecified Quarry	1950	1782754
D	161m NW	Grave Yard	1882	1814477
I	372m E	Airfield	1966	1796876
I	372m E	Airfield	1985	1783944
I	372m E	Airfield	1970	1796876

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	**5**

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
H	346m SE	Tanks	1995	289575
H	346m SE	Tanks	1999	289575
H	346m SE	Tanks	1996	289575
H	346m SE	Tanks	1996	289575
H	346m SE	Tanks	1995	289575

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	15

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
F	182m SE	Electricity Substation	1993	179902
F	183m SE	Electricity Substation	1991	179902
F	183m SE	Electricity Substation	1992	179902
F	186m SE	Electricity Substation	1995	179902
F	186m SE	Electricity Substation	1999	179902
F	186m SE	Electricity Substation	1996	179902
F	186m SE	Electricity Substation	1996	179902
F	186m SE	Electricity Substation	1995	179902
G	191m E	Electricity Substation	1990	182706
G	193m E	Electricity Substation	1996	182706
G	193m E	Electricity Substation	1994	182706
J	403m NE	Electricity Substation	1996	177272
J	403m NE	Electricity Substation	1994	177272
J	404m NE	Electricity Substation	1990	177272
J	405m NE	Electricity Substation	1975	177272

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.

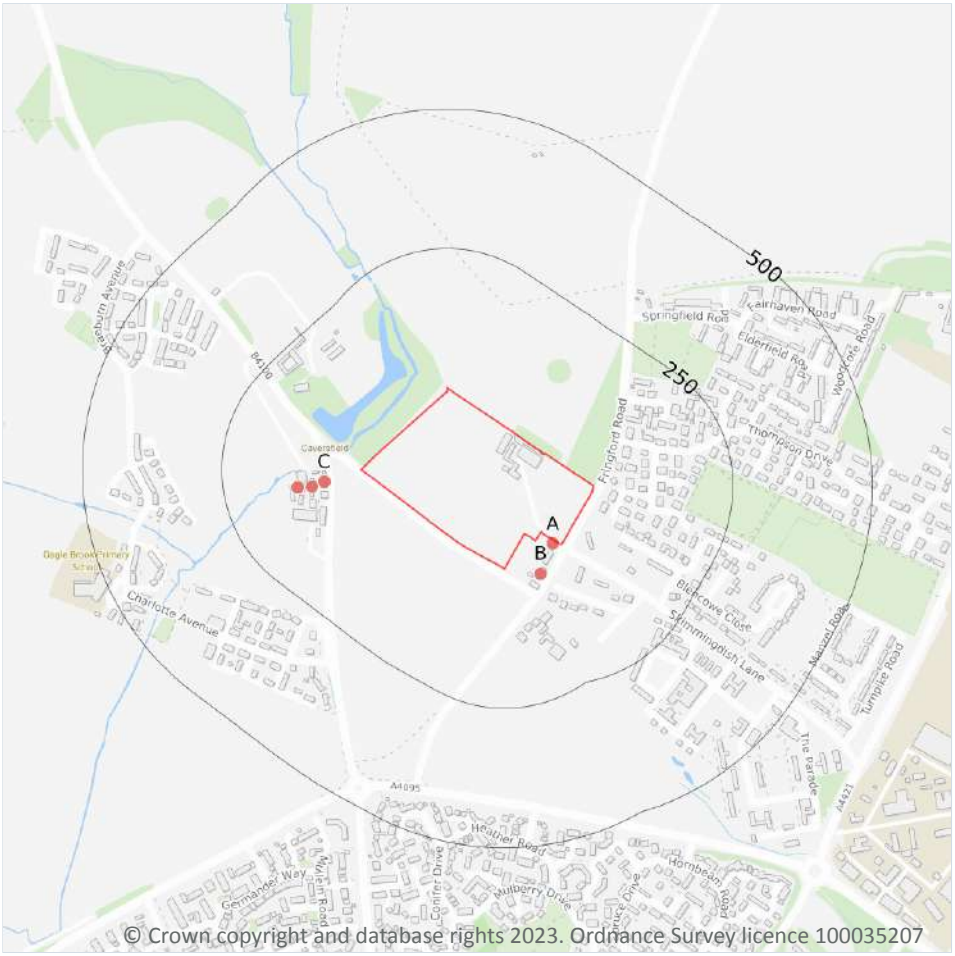
2.5 Historical garages

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)

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	0

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.

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	28

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 >**

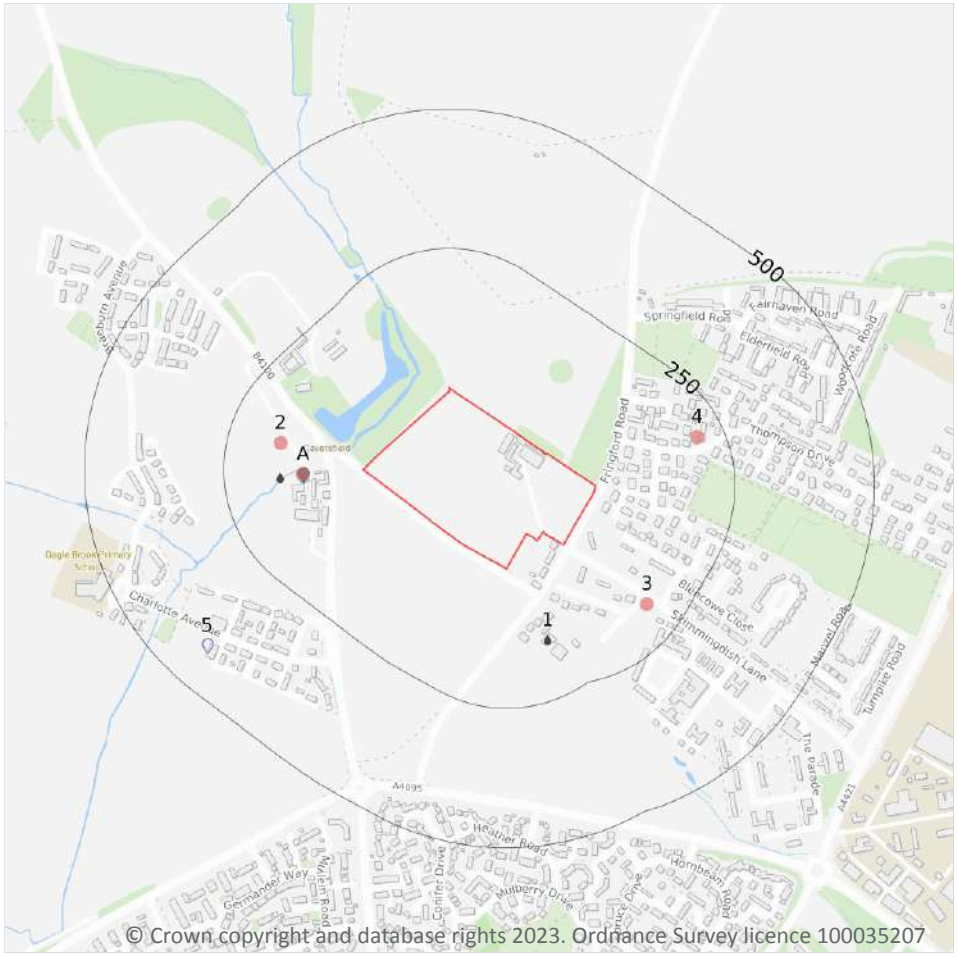
ID	Location	Site	Reference	Category	Sub-Category	Description
A	7m SE	H B Timber Yard, Buckingham Road, Caversfield, Bicester, OX27 8TH	WEX104011	Storing waste exemption	Not on a farm	Storage of waste in a secure place
A	7m SE	H B Timber Yard, Buckingham Road, Caversfield, Bicester, OX27 8TH	WEX104011	Using waste exemption	Not on a farm	Use of waste in construction
B	60m SE	H B Timber Yard, Buckingham Road, Caversfield, Bicester, OX27 8TH	WEX245970	Storing waste exemption	Not on a farm	Storage of waste in a secure place
B	60m SE	H B Timber Yard, Buckingham Road, Caversfield, Bicester, OX27 8TH	WEX245970	Using waste exemption	Not on a farm	Use of waste in construction
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Disposing of waste exemption	Agricultural Waste Only	Deposit of waste from dredging of inland waters
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Disposing of waste exemption	Agricultural Waste Only	Deposit of agricultural waste consisting of plant tissue under a Plant Health notice
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Disposing of waste exemption	Agricultural Waste Only	Burning waste in the open
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Treating waste exemption	Agricultural Waste Only	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Using waste exemption	Agricultural Waste Only	Use of waste in construction
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Using waste exemption	Agricultural Waste Only	Spreading waste on agricultural land to confer benefit
C	71m W	Home Farm Caversfield Oxon OX27 8TG	EPR/TH0073QH/A001	Using waste exemption	Agricultural Waste Only	Use of waste for a specified purpose
C	95m W	Kier Construction Site, Charlotte Avenue, Bicester, OX27 8TG	WEX102599	Using waste exemption	Not on a farm	Use of waste in construction

ID	Location	Site	Reference	Category	Sub-Category	Description
C	116m W	Home Farm Cottage Banbury Road BICESTER Oxfordshire OX27 8TG	EPR/UF0132QL/A001	Treating waste exemption	Both agricultural and non-agricultural waste	Screening and blending of waste
C	116m W	Home Farm Cottage Banbury Road BICESTER Oxfordshire OX27 8TG	EPR/UF0632QZ/A001	Using waste exemption	Both agricultural and non-agricultural waste	Use of waste in construction
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Using waste exemption	On a Farm	Use of waste in construction
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Using waste exemption	On a Farm	Use of waste for a specified purpose
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Using waste exemption	On a Farm	Spreading waste on agricultural land to confer benefit
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Treating waste exemption	On a Farm	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Disposing of waste exemption	On a Farm	Deposit of waste from dredging of inland waters
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Disposing of waste exemption	On a Farm	Deposit of agricultural waste consisting of plant tissue under a Plant Health notice
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX212982	Disposing of waste exemption	On a Farm	Burning waste in the open
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Disposing of waste exemption	On a farm	Deposit of waste from dredging of inland waters

ID	Location	Site	Reference	Category	Sub-Category	Description
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Disposing of waste exemption	On a farm	Deposit of agricultural waste consisting of plant tissue under a Plant Health notice
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Disposing of waste exemption	On a farm	Burning waste in the open
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Treating waste exemption	On a farm	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Using waste exemption	On a farm	Use of waste in construction
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Using waste exemption	On a farm	Spreading waste on agricultural land to confer benefit
C	119m W	HOME FARM COTTAGE, BANBURY ROAD, CAVERSFIELD, BICESTER, OX27 8TG	WEX058504	Using waste exemption	On a farm	Use of waste for a specified purpose

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

Part A(1) industrial activities

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

Licensed Discharges to controlled waters

4.1 Recent industrial land uses

Records within 250m	4

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 27 >**

ID	Location	Company	Address	Activity	Category
A	109m W	High Spec Composites Ltd	Unit 4 The Courtyard Home Farm, Banbury Road, Bicester, Oxfordshire, OX27 8TG	Motorsport Services	Sport and Entertainment Support Services
2	157m W	Filter Bed	Oxfordshire, OX27	Waste Storage, Processing and Disposal	Infrastructure and Facilities

ID	Location	Company	Address	Activity	Category
3	183m SE	Electricity Sub Station	Oxfordshire, OX27	Electrical Features	Infrastructure and Facilities
4	202m E	Electricity Sub Station	Oxfordshire, OX27	Electrical Features	Infrastructure and Facilities

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	1

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

Features are displayed on the Current industrial land use map on **page 27 >**

ID	Location	Details	
5	422m SW	Operator: SSE HEAT NETWORKS LIMITED Installation Name: Elmsbrook Energy Centre EPR/MP3809BM Process: NEW MEDIUM COMBUSTION PLANT Permit Number: MP3809BM Original Permit Number: MP3809BM	EPR Reference: EPR/MP3809BM Issue Date: 27/05/2020 Effective Date: 27/05/2020 Last date noted as effective: 25/05/2023 Status: Effective

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

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

Records within 500m **1**

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.

Features are displayed on the Current industrial land use map on **page 27 >**

ID	Location	Address	Details	
A	107m W	Teslayne Engineering, Unit 4, The Courtyard, Caversfield, Bicester, OX27 8TG	Process: Waste Oil Burner 0.4 MW Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

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 **2**

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 27 >**

ID	Location	Address	Details	
1	147m SE	THE OLD VICARAGE, CAVERSFIELD, NEAR, THE OLD VICARAGE, CAVERSFIELD, N, EAR BICESTER, OXON	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: CTWC.1546 Permit Version: 1 Receiving Water: CORNBRASH	Status: TRANSFERRED FROM COPA 1974 Issue date: 27/03/1987 Effective Date: 27/03/1987 Revocation Date: 30/01/2007
A	151m W	HOME FARM COMPLEX, HOME FARM, BANBURY ROAD, CAVERSFIELD, BICESTER, OXFORDSHIRE, OX27 0TG	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: CAWM.0566 Permit Version: 1 Receiving Water: THE TOWN BROOK	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 16/01/2003 Effective Date: 19/11/2002 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	0

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

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

Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

Records within 500m	2

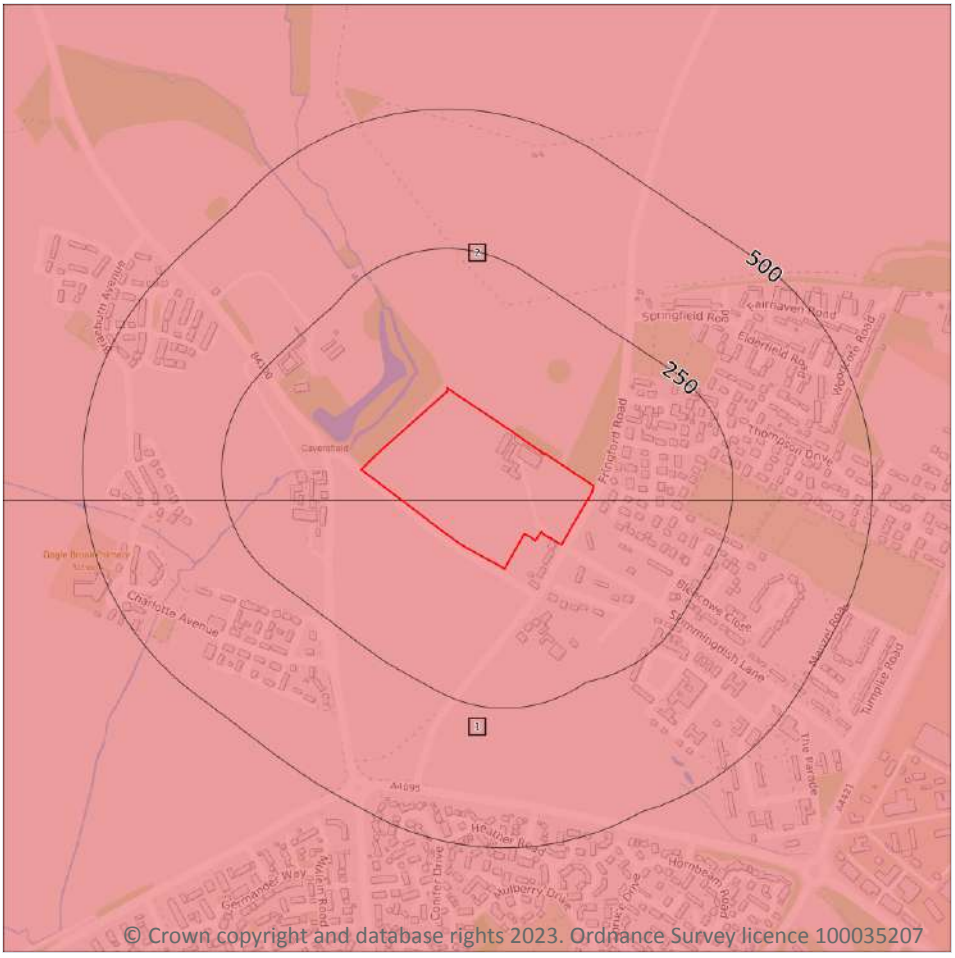
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 33 >**

ID	Location	Designation	Description
1	56m W	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
2	205m W	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

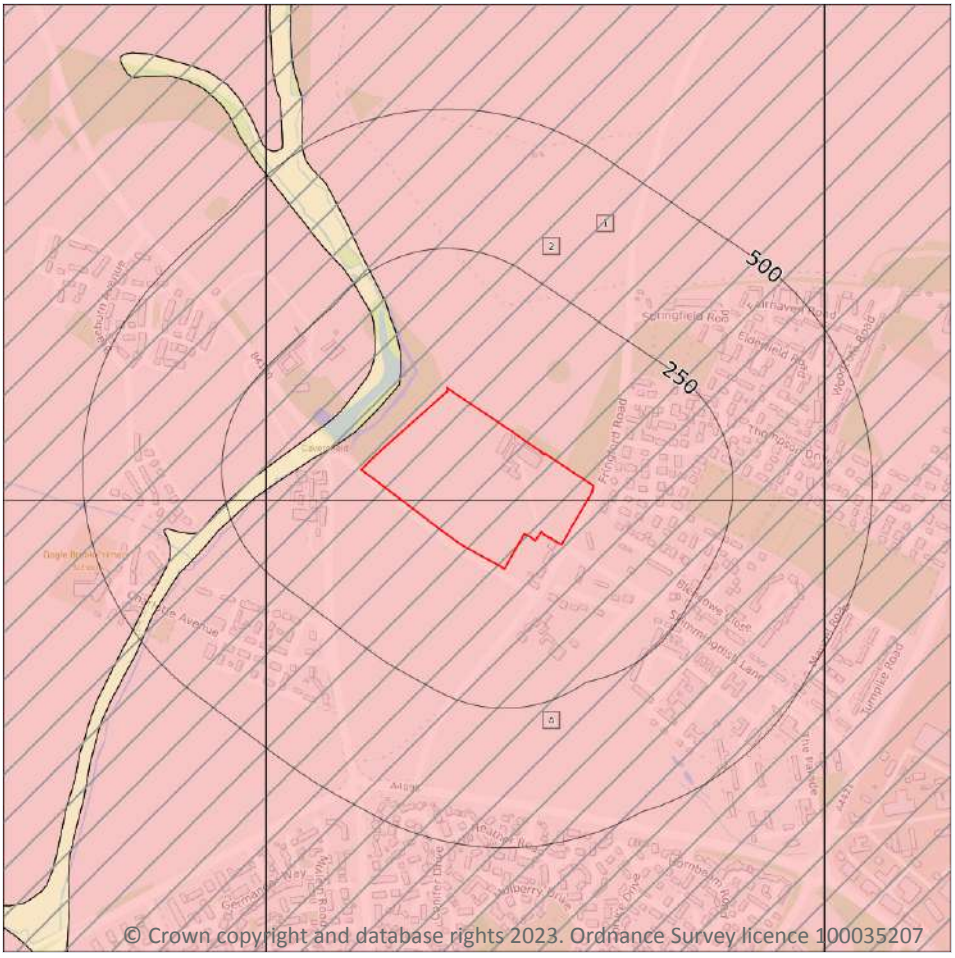
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 35 >**

ID	Location	Designation	Description
1	On site	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
2	On site	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



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	2

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 37 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
A	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

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	2

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
2	Significant soluble rocks are likely to be present. Problems unlikely except with considerable surface or subsurface water flow.	91.0%
A	Significant soluble rocks are likely to be present. Problems unlikely except with considerable surface or subsurface water flow.	97.0%

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

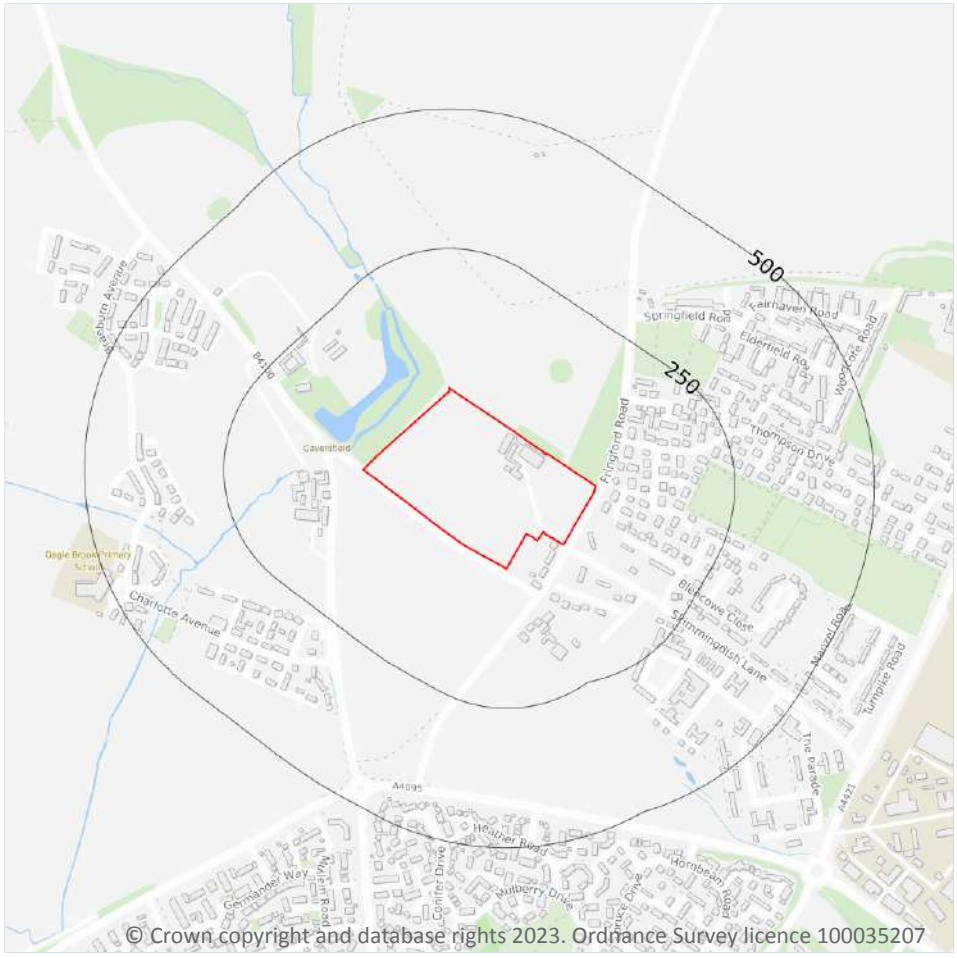
5.5 Groundwater vulnerability- local information

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 ↗.

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
- 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	13

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 39 >**

ID	Location	Details	
-	764m E	Status: Historical Licence No: 28/39/14/0291 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: THAMES GROUNDWATER Point: BRASHFIELD HOUSE, NR BICESTER, OXON Data Type: Point Name: BRASHFIELD MANAGEMENT LTD Easting: 459300 Northing: 225300	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 17/11/1980 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1987 Version End Date: -
-	1108m SW	Status: Historical Licence No: 28/39/14/0348 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LORDS FARM - BOREHOLE Data Type: Point Name: W V MALINS & SON Easting: 457441 Northing: 224221	Annual Volume (m^3): 17520 Max Daily Volume (m^3): 48 Original Application No: - Original Start Date: 22/03/2004 Expiry Date: 31/03/2018 Issue No: 1 Version Start Date: 01/04/2008 Version End Date: -
-	1108m SW	Status: Active Licence No: 28/39/14/0348/R01 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LORDS FARM - BOREHOLE Data Type: Point Name: W V MALINS & SON Easting: 457441 Northing: 224221	Annual Volume (m^3): 17520 Max Daily Volume (m^3): 48 Original Application No: NPS/WR/024301 Original Start Date: 01/04/2018 Expiry Date: 31/03/2027 Issue No: 1 Version Start Date: 01/04/2018 Version End Date: -
-	1151m SW	Status: Historical Licence No: 28/39/14/0348 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LORDS FARM - BOREHOLE Data Type: Point Name: W V MALINS & SON Easting: 457400 Northing: 224200	Annual Volume (m^3): 17520 Max Daily Volume (m^3): 48 Original Application No: - Original Start Date: 22/03/2004 Expiry Date: 31/03/2018 Issue No: 1 Version Start Date: 01/04/2008 Version End Date: -
-	1255m W	Status: Historical Licence No: 28/39/14/0214 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LORDS FARM, BICESTER (B) Data Type: Point Name: MALINS Easting: 457000 Northing: 224600	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 08/05/1967 Expiry Date: - Issue No: 100 Version Start Date: 08/05/1967 Version End Date: -

ID	Location	Details	
-	1264m NE	Status: Historical Licence No: 28/39/14/0315 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: FRINGFORD LODGE FARM, BICESTER, OXON Data Type: Point Name: ELWORTHY Easting: 459500 Northing: 225900	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 09/03/1992 Expiry Date: - Issue No: 101 Version Start Date: 04/06/2003 Version End Date: -
-	1264m NE	Status: Historical Licence No: 28/39/14/0315 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: THAMES GROUNDWATER Point: FRINGFORD LODGE FARM, BICESTER, OXON Data Type: Point Name: ELWORTHY Easting: 459500 Northing: 225900	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 09/03/1992 Expiry Date: - Issue No: 101 Version Start Date: 04/06/2003 Version End Date: -
-	1330m S	Status: Historical Licence No: 28/39/14/0034 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: BUCKINGHAM ROAD, BICESTER, - BOREHOLE 'A' Data Type: Point Name: SUNLIGHT SERVICE GROUP LTD Easting: 458510 Northing: 223550	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 13/06/1966 Expiry Date: - Issue No: 100 Version Start Date: 04/12/1996 Version End Date: -
-	1350m S	Status: Historical Licence No: 28/39/14/0333 Details: General use relating to Secondary Category (Medium Loss) Direct Source: THAMES GROUNDWATER Point: BUCKINGHAM ROAD, BICESTER, OXON Data Type: Point Name: GIBBS HOLDINGS LTD Easting: 458500 Northing: 223530	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 26/07/1996 Expiry Date: 31/12/2006 Issue No: 100 Version Start Date: 26/07/1996 Version End Date: -
-	1351m N	Status: Historical Licence No: 28/39/14/0322 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: MOAT FARM, CAVERSFIELD (A) Data Type: Point Name: DEELEY Easting: 458700 Northing: 226500	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 06/11/1992 Expiry Date: - Issue No: 100 Version Start Date: 06/11/1992 Version End Date: -

ID	Location	Details	
-	1386m W	Status: Historical Licence No: 28/39/14/0214 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: LORDS FARM, BICESTER (A) Data Type: Point Name: MALINS Easting: 456900 Northing: 224500	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 08/05/1967 Expiry Date: - Issue No: 100 Version Start Date: 08/05/1967 Version End Date: -
-	1623m N	Status: Active Licence No: 28/39/14/0048 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: WATERGATE FARM, BAINTON (A) Data Type: Point Name: HUNTER Easting: 457700 Northing: 226700	Annual Volume (m^3): 8901 Max Daily Volume (m^3): 24.32 Original Application No: WR.A/3039 Original Start Date: 05/09/1966 Expiry Date: - Issue No: 100 Version Start Date: 16/04/1996 Version End Date: -
-	1713m N	Status: Historical Licence No: 28/39/14/0067 Details: General Farming & Domestic Direct Source: THAMES GROUNDWATER Point: HOME FARM, BAINTON (A) Data Type: Point Name: THOMPSON Easting: 458100 Northing: 226900	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 10/10/1966 Expiry Date: - Issue No: 100 Version Start Date: 10/10/1966 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	2

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.

Features are displayed on the Abstractions and Source Protection Zones map on **page 39 >**

ID	Location	Details	
-	764m E	Status: Historical Licence No: 28/39/14/0291 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: THAMES GROUNDWATER Point: BRASHFIELD HOUSE, NR BICESTER, OXON Data Type: Point Name: BRASHFIELD MANAGEMENT LTD Easting: 459300 Northing: 225300	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 17/11/1980 Expiry Date: - Issue No: 100 Version Start Date: 30/01/1987 Version End Date: -
-	1264m NE	Status: Historical Licence No: 28/39/14/0315 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: THAMES GROUNDWATER Point: FRINGFORD LODGE FARM, BICESTER, OXON Data Type: Point Name: ELWORTHY Easting: 459500 Northing: 225900	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 09/03/1992 Expiry Date: - Issue No: 101 Version Start Date: 04/06/2003 Version End Date: -

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

5.9 Source Protection Zones

Records within 500m	0

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

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

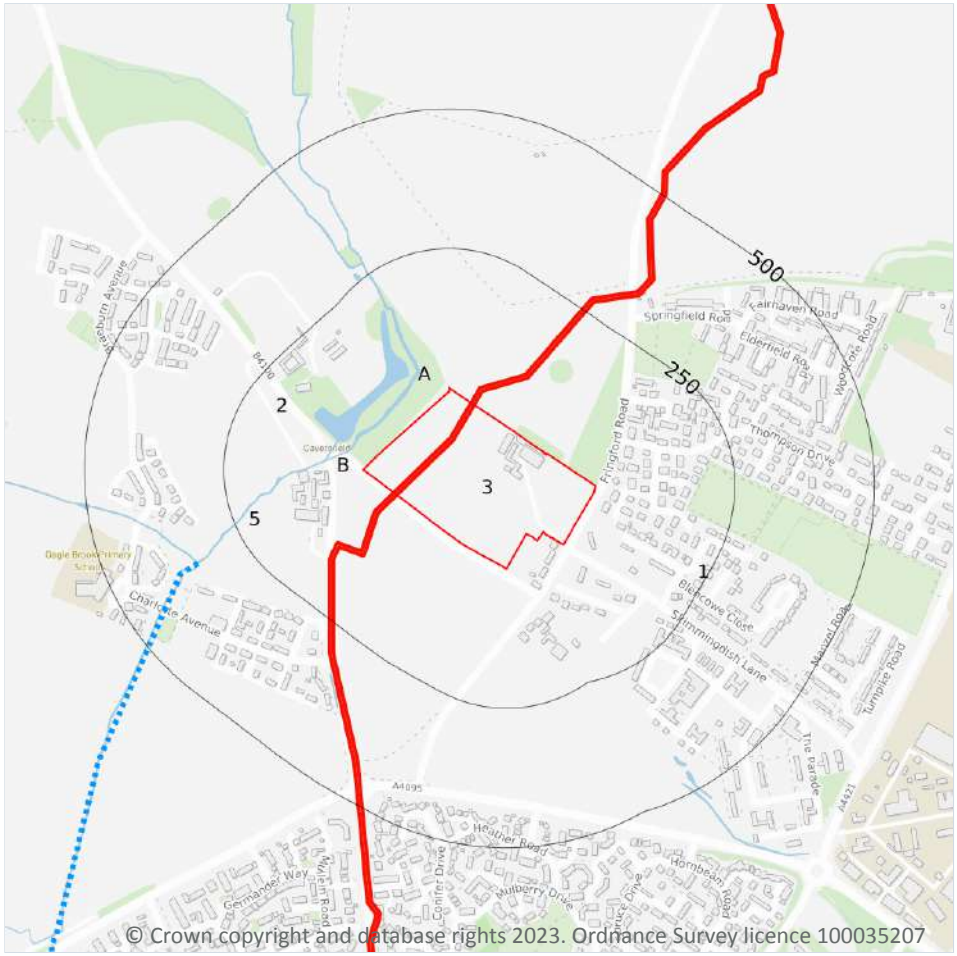
5.10 Source Protection Zones (confined aquifer)

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	**6**

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 45 >**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	42m NW	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
B	45m W	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
B	67m W	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
A	68m W	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	71m W	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
5	106m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	**4**

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 45 >**

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	**2**

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 45 >**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**River**	**Langford Brook (source to downstream A41)**	**GB106039030160**	**Oxon Ray**	**Cherwell and Ray**
2	**On site**	**River**	**Town Brook at Bicester**	**GB106039030150**	**Oxon Ray**	**Cherwell and Ray**

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

6.4 WFD Surface water bodies

Records identified	**2**

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 45 >**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
7	340m W	River	Town Brook at Bicester	GB106039030150 ↗	Moderate	Fail	Moderate	2019
-	2225m SE	River	Langford Brook (source to downstream A41)	GB106039030160 ↗	Moderate	Fail	Moderate	2019

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

6.5 WFD Groundwater bodies

Records on site	**1**

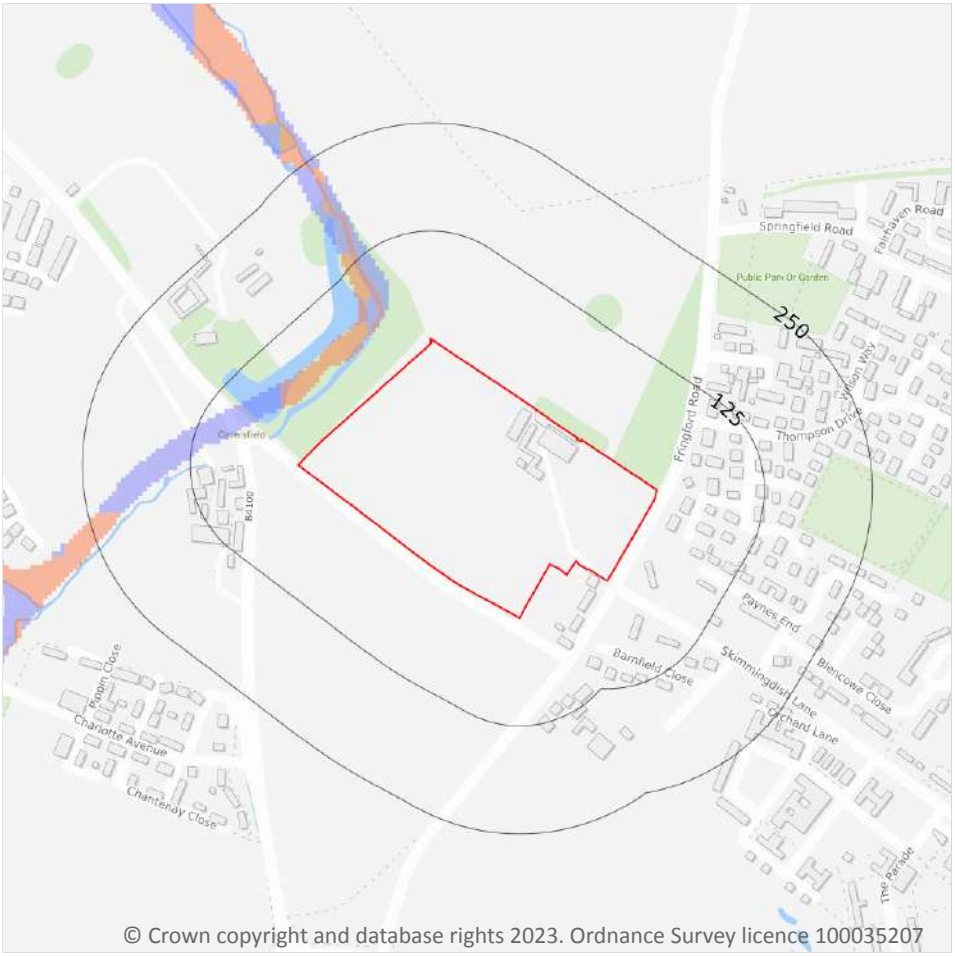
Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 45 >**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
3	**On site**	**Bicester-Otmoor Cornbrash**	**GB40602G600800 ↗**	**Poor**	**Poor**	**Good**	**2019**

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	1

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 49 >**

Distance	Flood risk category
On site	**N/A**
0 - 50m	High

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

7.2 Historical Flood Events

Records within 250m	**0**

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.

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

7.3 Flood Defences

Records within 250m	**0**

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.

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

7.4 Areas Benefiting from Flood Defences

Records within 250m	**0**

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.

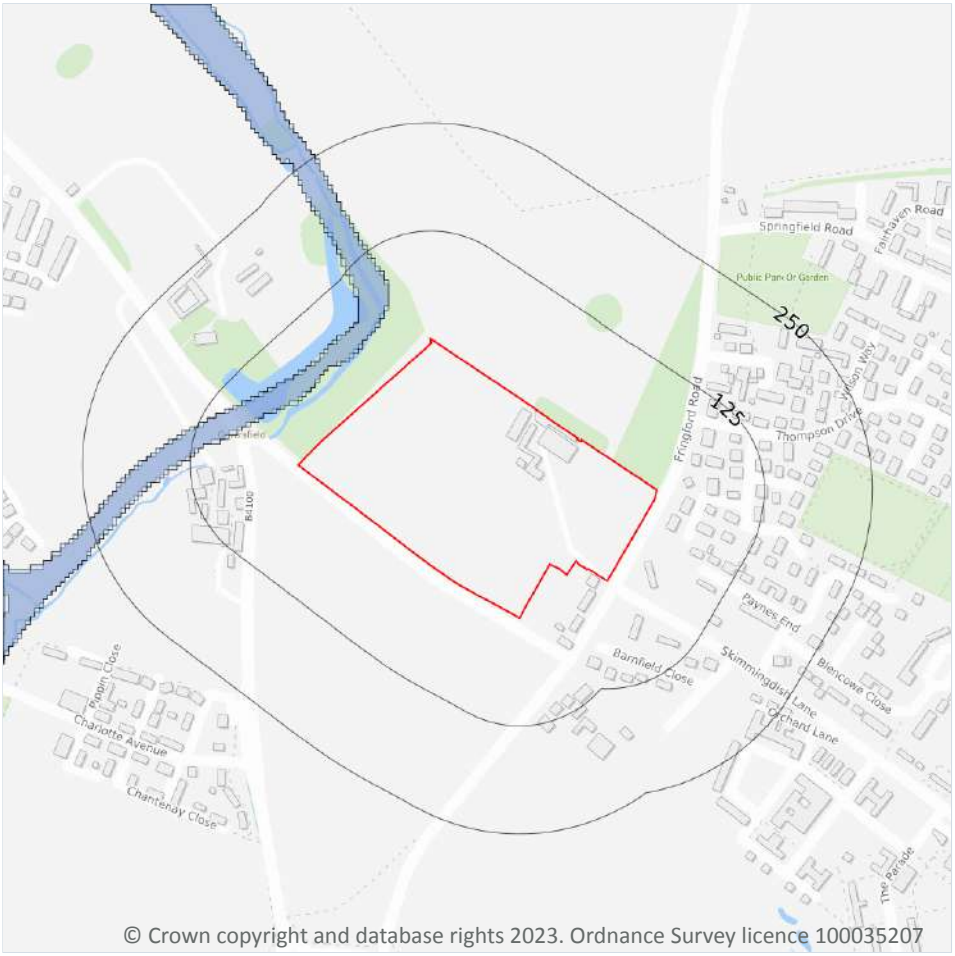
7.5 Flood Storage Areas

Records within 250m	**0**

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.

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 49 >**

Location	Type
47m NW	Zone 2 - (Fluvial /Tidal Models)

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

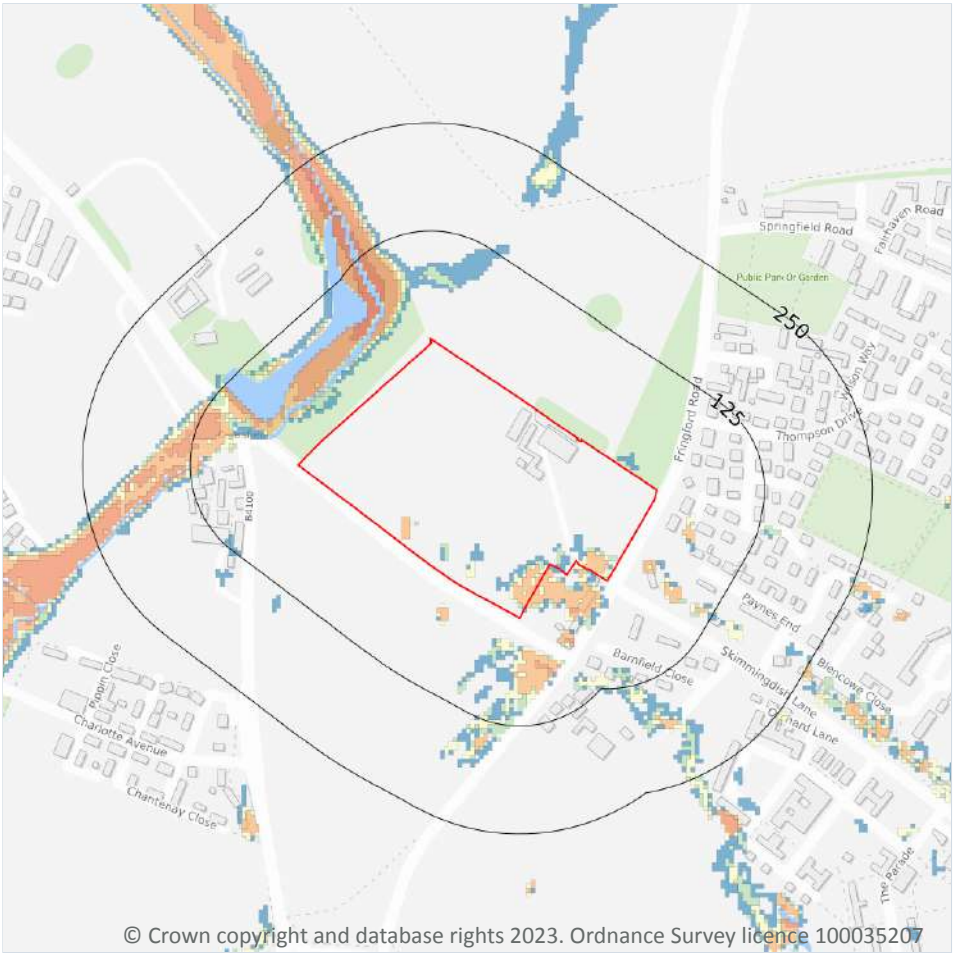
7.7 Flood Zone 3

Records within 50m	0

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.

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, 0.1m - 0.3m**
Highest risk within 50m	**1 in 30 year, 0.3m - 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 53 >**

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	Between 0.3m and 1.0m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Between 0.1m and 0.3m
1 in 30 year	Between 0.1m and 0.3m

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding

Site Outline

Search buffers in metres (m)

High

Moderate - High

Moderate

Low

Negligible

9.1 Groundwater flooding

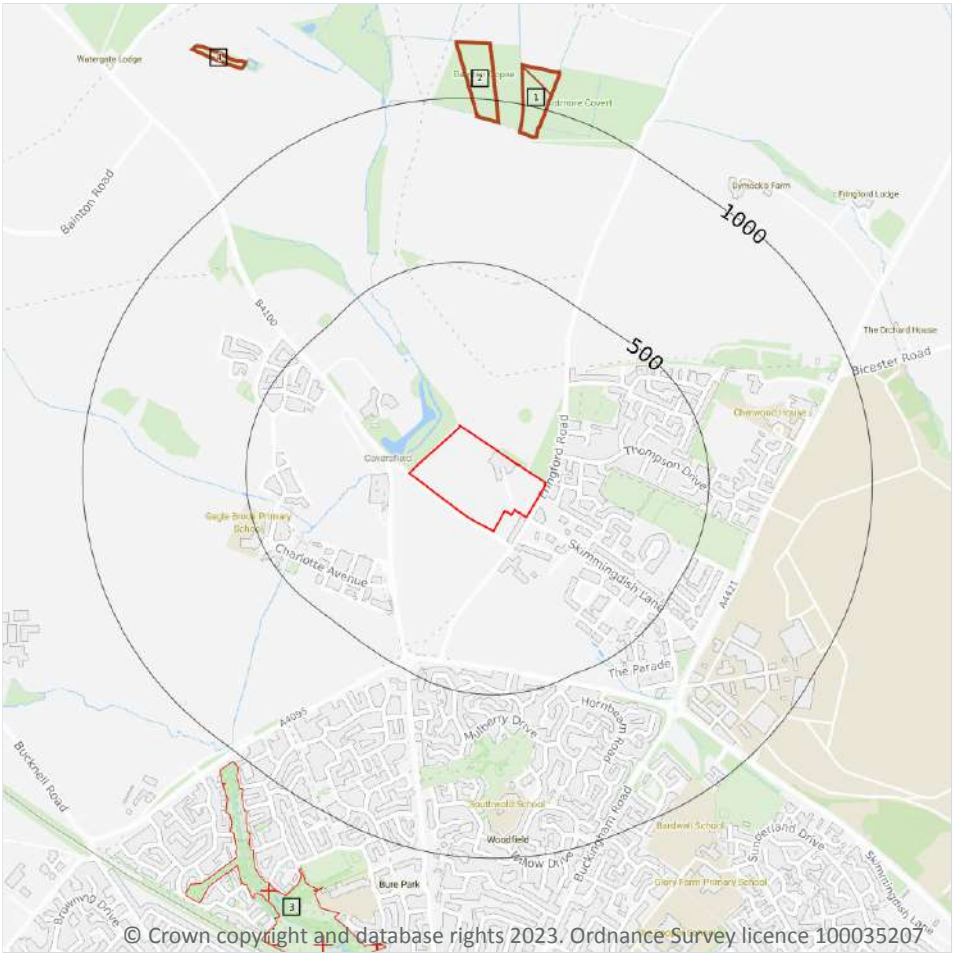
Highest risk on site	**Negligible**
Highest risk within 50m	**Negligible**

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 55 >**

This data is sourced from Ambiental 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

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 56 >**

ID	Location	Name	Data source
-	1397m E	Stratton Audley Quarries	Natural England

ID	Location	Name	Data source
-	1497m E	Stratton Audley Quarries	Natural England

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

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

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)

Records within 2000m	0

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)

Records within 2000m	0

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)

Records within 2000m	0

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	1

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 56 >**

ID	Location	Name	Data source
3	1027m SW	Bure Park	Natural England

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

10.7 Designated Ancient Woodland

Records within 2000m	6

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 56 >**

ID	Location	Name	Woodland Type
1	910m N	Cotmore Covert	Ancient Replanted Woodland
2	933m N	Bainton Copse	Ancient & Semi-Natural Woodland
4	1279m NW	Unknown	Ancient & Semi-Natural Woodland
-	1606m N	Bainton Spinney	Ancient & Semi-Natural Woodland
-	1700m NW	Nettle Copse	Ancient & Semi-Natural Woodland
-	1948m NW	Twelveacre Copse	Ancient & Semi-Natural 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	0

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

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 fell 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

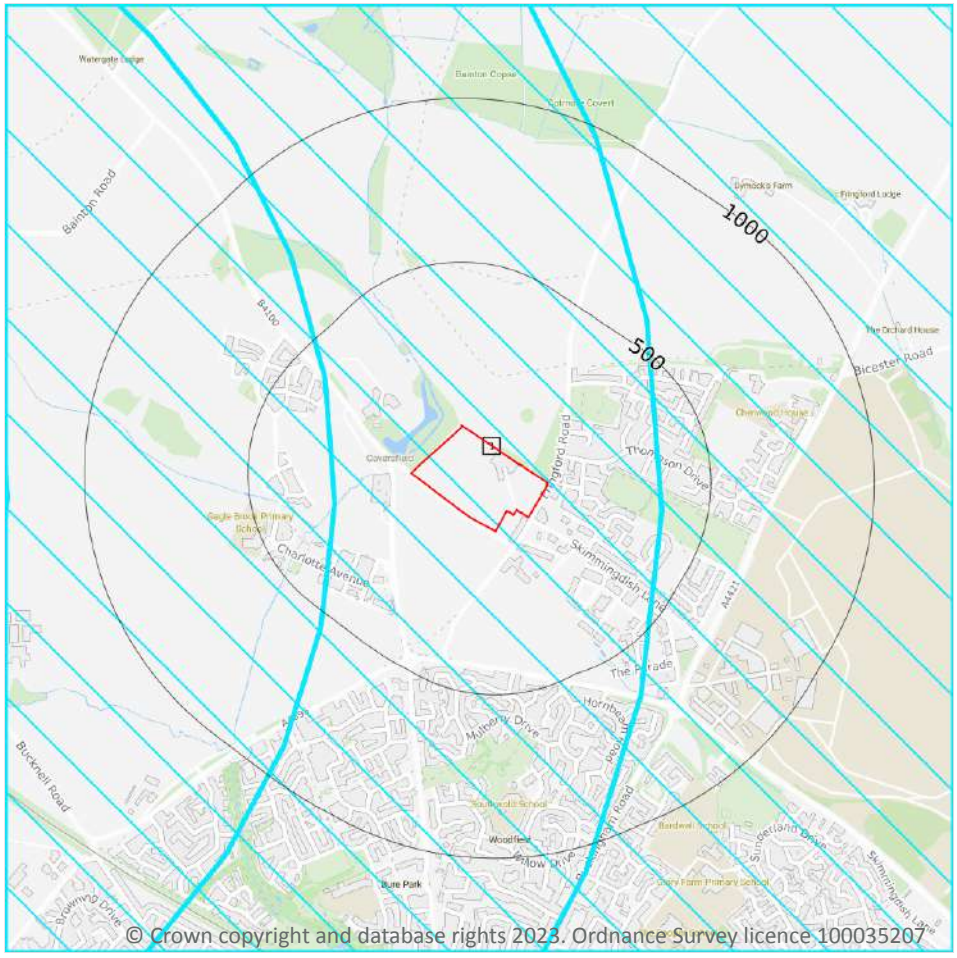
Records within 2000m	4

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.

Location	Name	Type	NVZ ID	Status
On site	**Cherwell (Ray to Thames) and Woodeaton Brook NVZ**	**Surface Water**	**472**	**Existing**
On site	**Bicester North**	**Groundwater**	**162**	**Existing**
780m N	Cherwell (Ray to Thames) and Woodeaton Brook NVZ	Surface Water	472	Existing
780m N	Bicester North	Groundwater	162	Existing

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	1

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 61 >**

ID	Location	Type of developments requiring consultation
1	**On site**	**Infrastructure - Airports, helipads and other aviation proposals.** **Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.** **Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons & digestate stores > 750m², manure stores > 3500t.**

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	2

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 61 >**

ID: -
Location: 1397m E
SSSI name: Stratton Audley Quarries
Unit name: South Quarry
Broad habitat: Inland Rock
Condition: Destroyed
Reportable features:

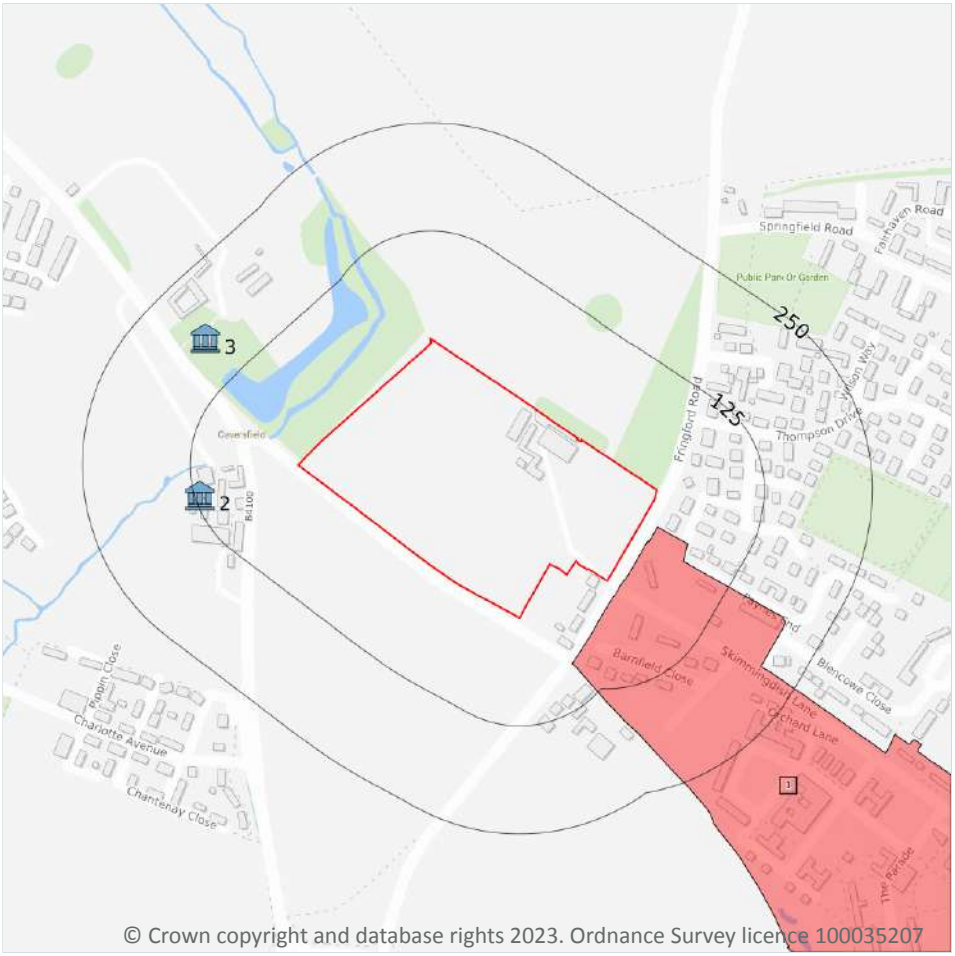
Feature name	Feature condition	Date of assessment
ED - Bathonian	Destroyed	30/03/2022

ID: -
Location: 1497m E
SSSI name: Stratton Audley Quarries
Unit name: North Quarry
Broad habitat: Inland Rock
Condition: Destroyed
Reportable features:

Feature name	Feature condition	Date of assessment
ED - Bathonian	Destroyed	30/03/2022

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

11 Visual and cultural designations



Site Outline

Search buffers in metres (m)

Listed buildings

Conservation areas

Conservation areas - no data

National Parks

Areas of Outstanding Natural Beauty

Registered parks and gardens

Scheduled Monuments

World Heritage Sites

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	2

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.

Features are displayed on the Visual and cultural designations map on **page 63 >**

ID	Location	Name	Grade	Reference Number	Listed date
2	119m W	Home Farmhouse	II	1200170	01/05/1987
3	179m NW	Church Of St Laurence	II*	1046533	07/12/1966

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

11.5 Conservation Areas

Records within 250m	1

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.

Features are displayed on the Visual and cultural designations map on **page 63 >**

ID	Location	Name	District	Date of designation
1	16m SE	RAF Bicester	Cherwell	07/2002

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.

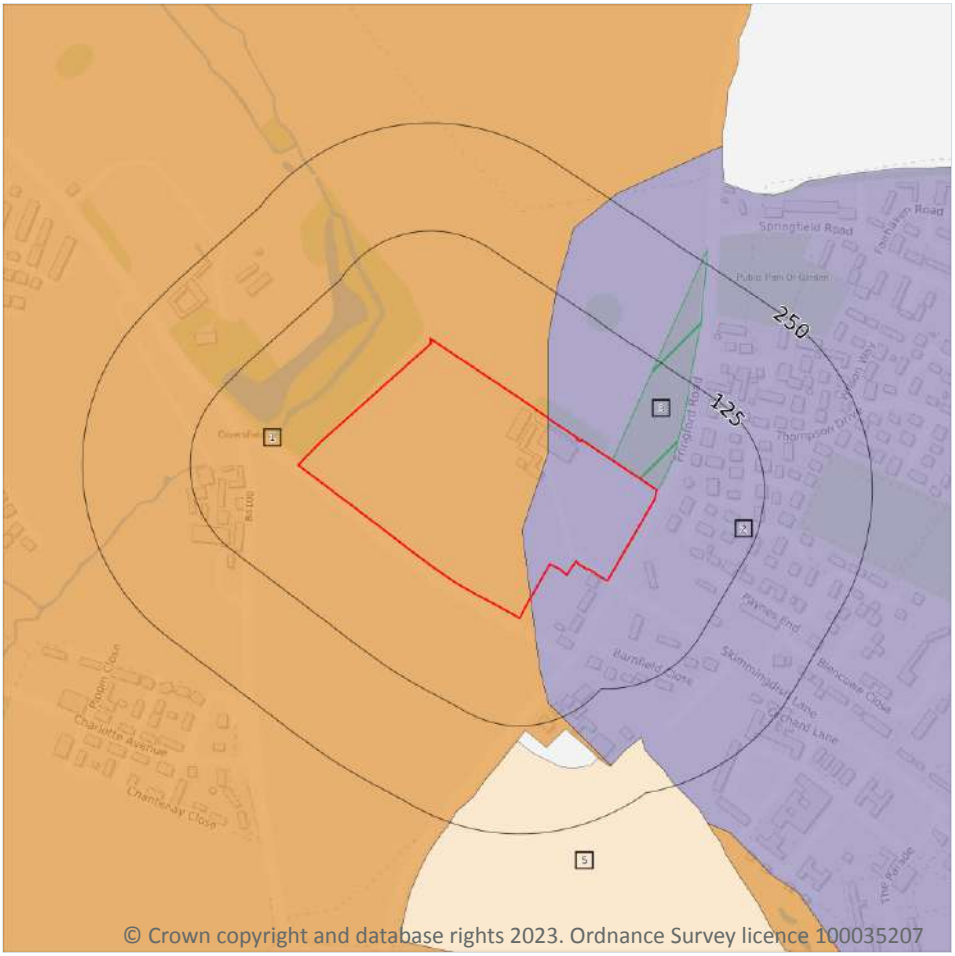
11.7 Registered Parks and Gardens

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	3

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 66 >**

ID	Location	Classification	Description
1	**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
2	**On site**	**Non Agricultural**	**-**
5	142m S	Grade 3b	Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

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	1

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.

Features are displayed on the Agricultural designations map on **page 66 >**

ID	Location	Description	Reference	Application date
3	**On site**	**Selective Fell/Thin (Conditional)**	**019/445/16-17**	**01/02/2017**

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	1

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.

Location	Reference	Scheme	Start Date	End date
On site	**AG00597011**	**Entry Level plus Higher Level Stewardship**	**01/10/2014**	**30/09/2024**

This data is sourced from Natural England.

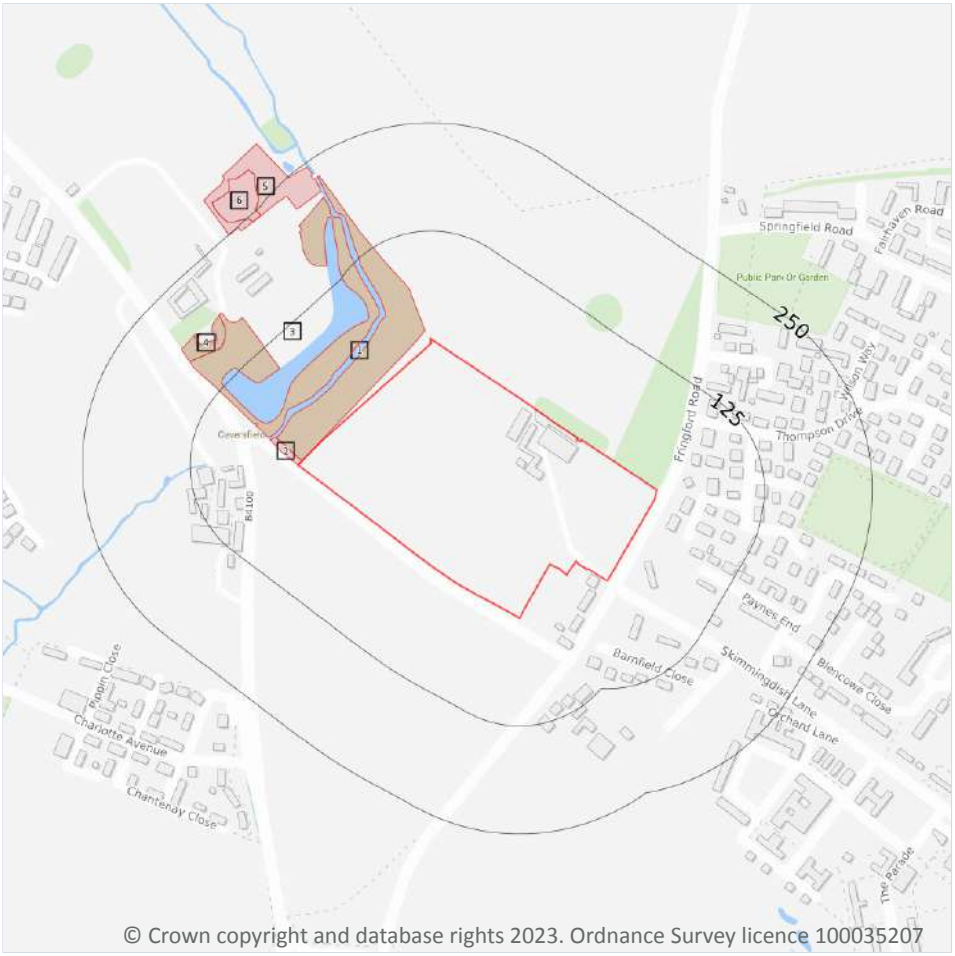
12.5 Countryside Stewardship Schemes

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	**6**

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 69 >**

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	45m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
4	159m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

ID	Location	Main Habitat	Other habitats
5	213m NW	No main habitat but additional habitats present	Additional: TORCH (INV 50%)
6	242m NW	Traditional orchard	Overruled by Traditional Orchards HAP Inventory dataset

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

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.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

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.

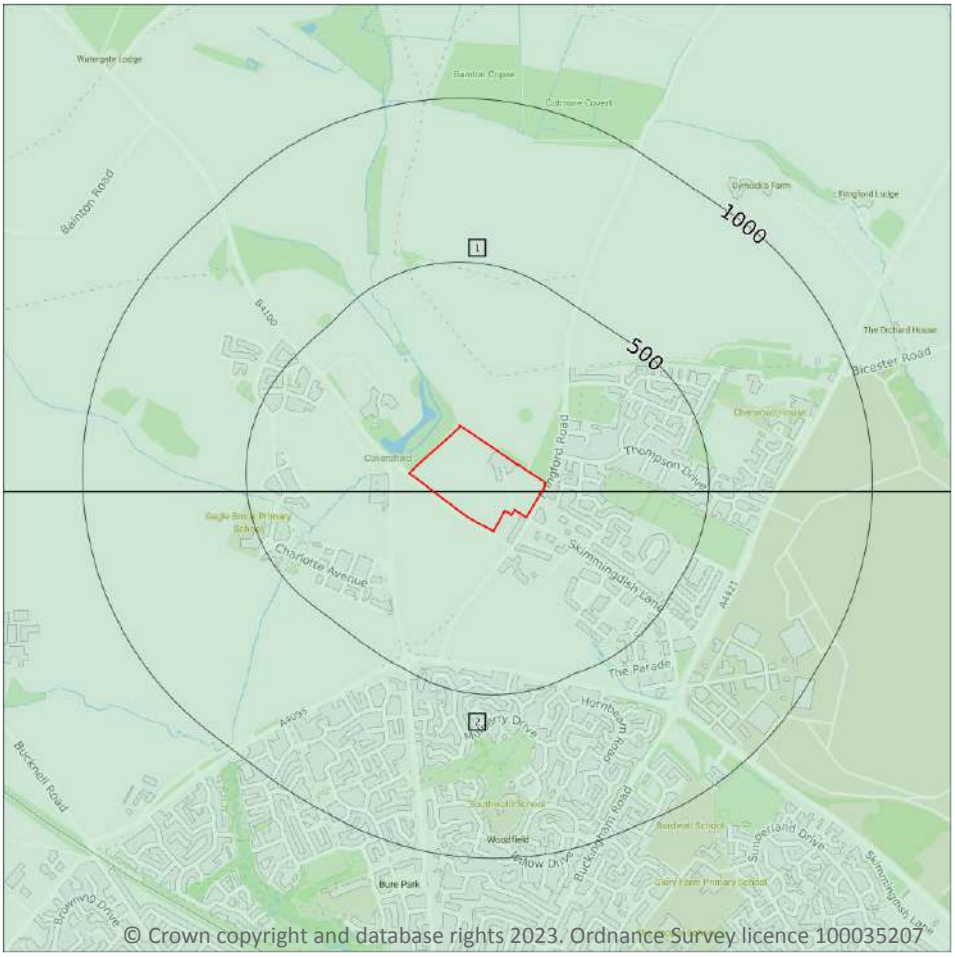
13.4 Limestone Pavement Orders

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	2

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**	**SP52NE**
2	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SP52SE**

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground

14.2 Artificial and made ground (10k)

Records within 500m	0

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

This data is sourced from the British Geological Survey.

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	2

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	58m W	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
2	192m W	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly

This data is sourced from the British Geological Survey.

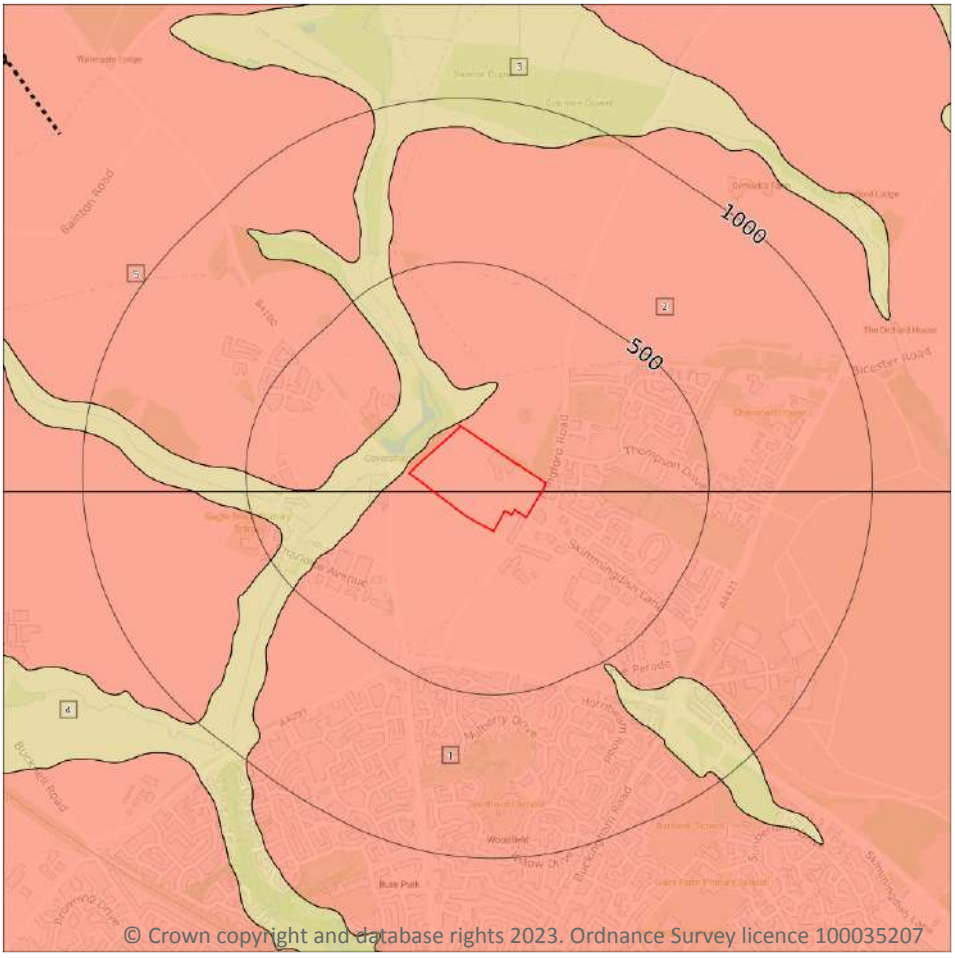
14.4 Landslip (10k)

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	5

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**	**CB-LMST**	**Cornbrash Formation - Limestone**	**Callovian Age - Bathonian Age**
2	**On site**	**CB-LMST**	**Cornbrash Formation - Limestone**	**Callovian Age - Bathonian Age**
3	10m N	FMB-LSMD	Forest Marble Formation - Interbedded Limestone And Mudstone	Bathonian Age

ID	Location	LEX Code	Description	Rock age
4	102m W	FMB-LSMD	Forest Marble Formation - Interbedded Limestone And Mudstone	Bathonian Age
5	163m NW	CB-LMST	Cornbrash Formation - Limestone	Callovian Age - Bathonian Age

This data is sourced from the British Geological Survey.

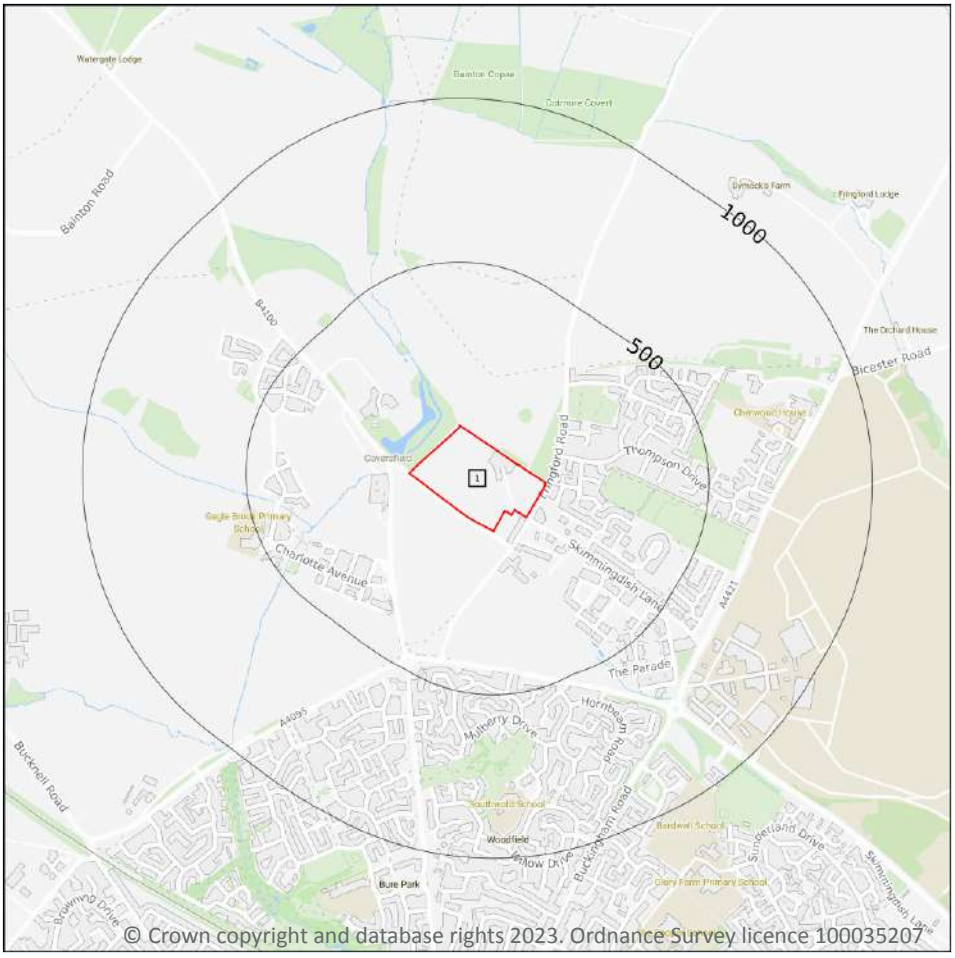
14.6 Bedrock faults and other linear features (10k)

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**	**EW219_buckingham_v4**

This data is sourced from the British Geological Survey.

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

15.2 Artificial and made ground (50k)

Records within 500m	0

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.

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 79 >**

ID	Location	LEX Code	Description	Rock description
1	56m W	ALV-XCZSV	ALLUVIUM	CLAY, SILT, 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.

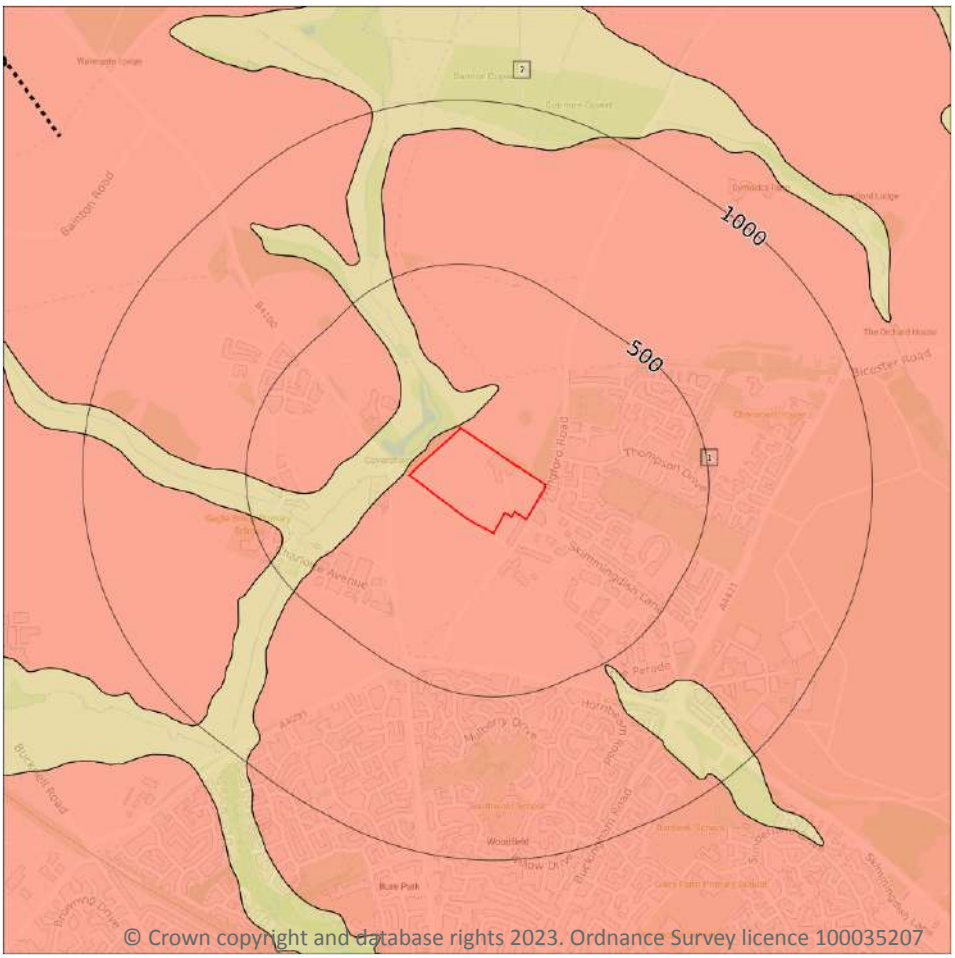
15.7 Landslip permeability (50k)

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 81 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**CB-LMST**	**CORNBRASH FORMATION - LIMESTONE**	**BATHONIAN**
2	7m N	FMB-LSMD	FOREST MARBLE FORMATION - LIMESTONE AND MUDSTONE, INTERBEDDED	BATHONIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	3

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	**Fracture**	**Very High**	**High**
On site	**Fracture**	**Very High**	**High**
7m N	Fracture	Very High	Low

This data is sourced from the British Geological Survey.

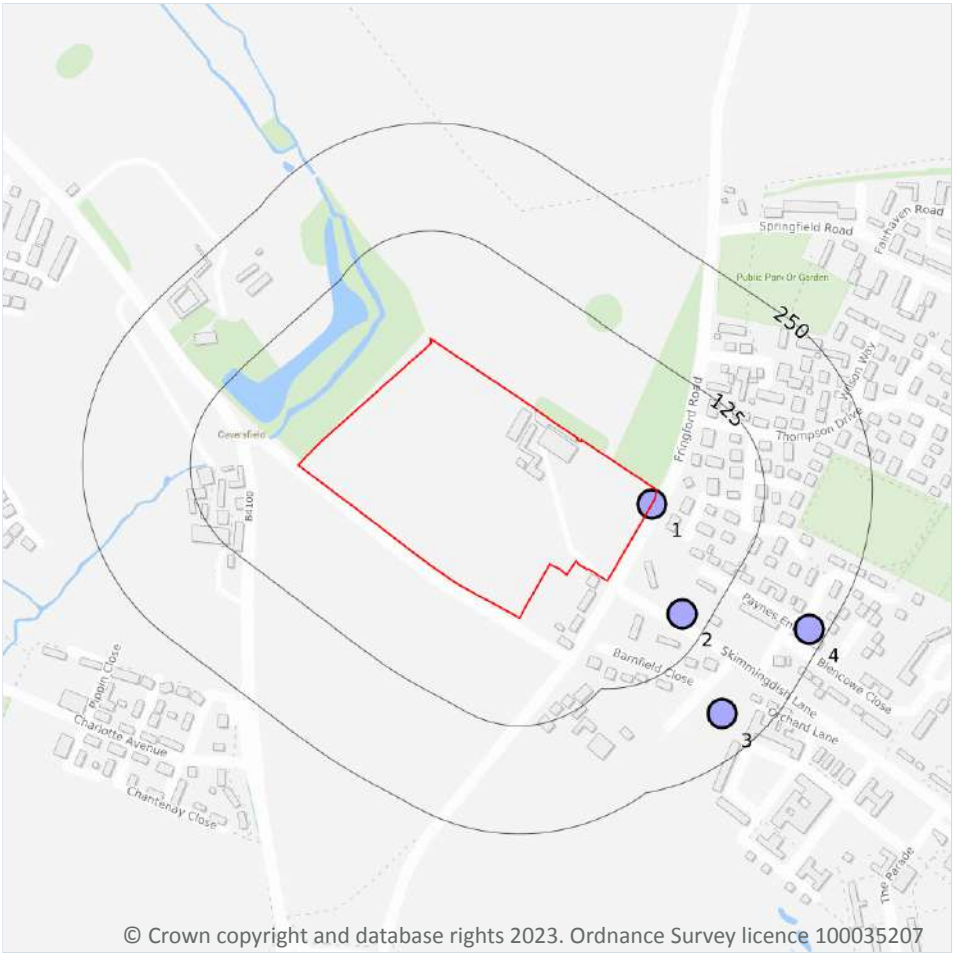
15.10 Bedrock faults and other linear features (50k)

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 **4**

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.

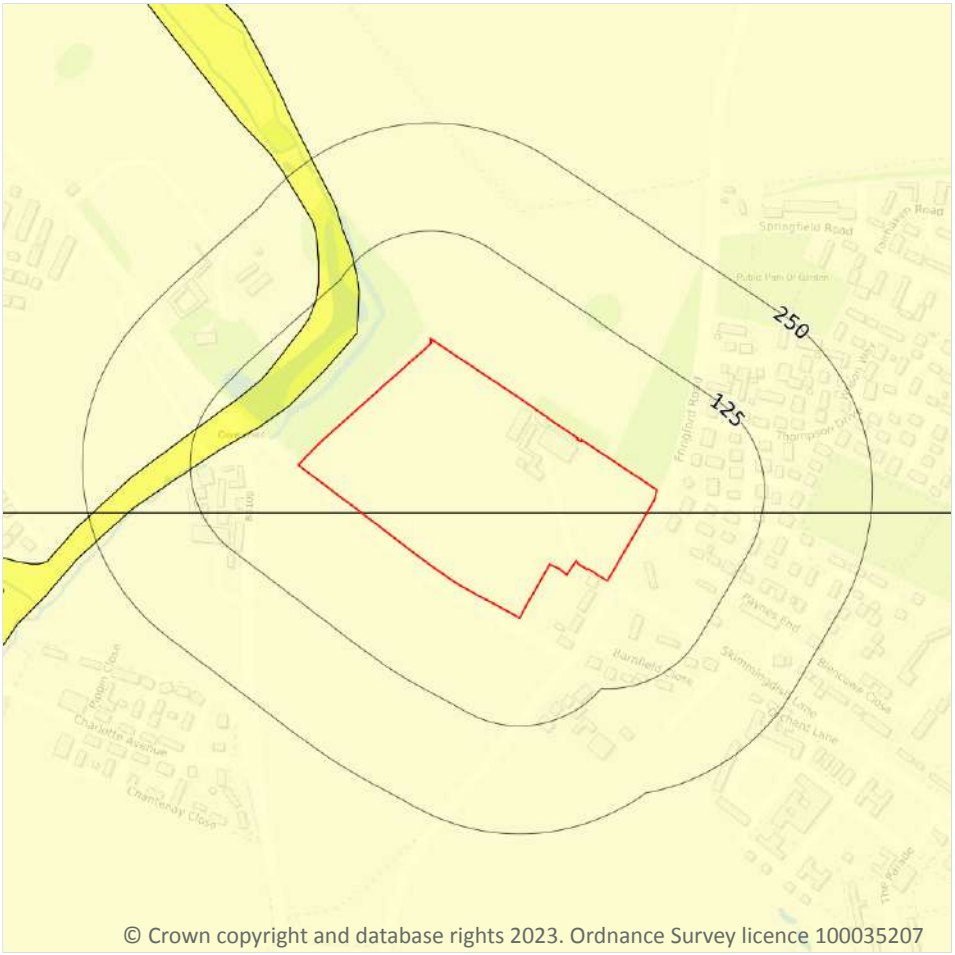
Features are displayed on the Boreholes map on **page 83 >**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	**On site**	**458580 225010**	**SOUTH LODGE CAVERSFIELD**	**5.0**	**N**	**336425** ↗
2	94m SE	458615 224883	RAF BICESTER REPLACEMENT W/MAINS TP6	1.0	N	336757 ↗
3	203m SE	458661 224767	RAF BICESTER REPLACEMENT W/MAINS TP9	2.0	N	336760 ↗

ID	Location	Grid reference	Name	Length	Confidential	Web link
4	230m SE	458762 224865	RAF BICESTER REPLACEMENT W/MAINS TP7	1.0	N	336758 ↗

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

17.1 Shrink swell clays

Records within 50m	1

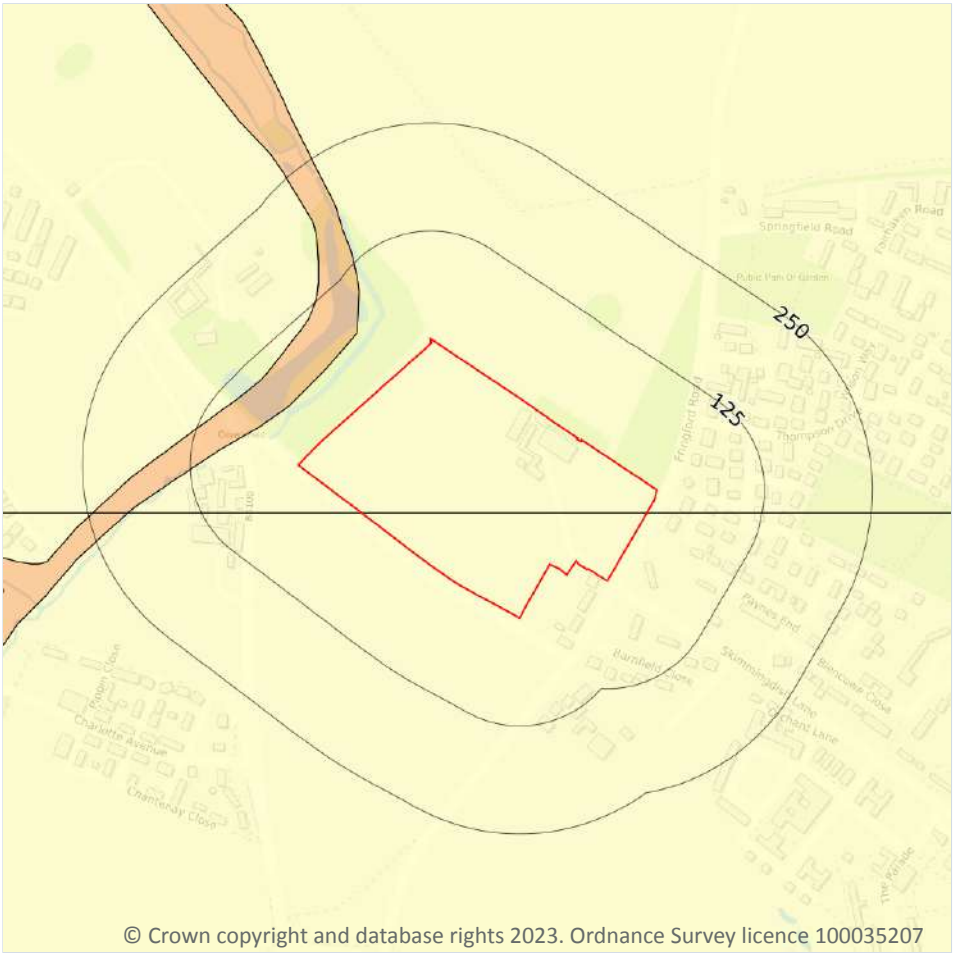
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and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

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 85 >**

Location	Hazard rating	Details
On site	**Negligible**	**Ground conditions predominantly non-plastic.**

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

17.2 Running sands

Records within 50m	1

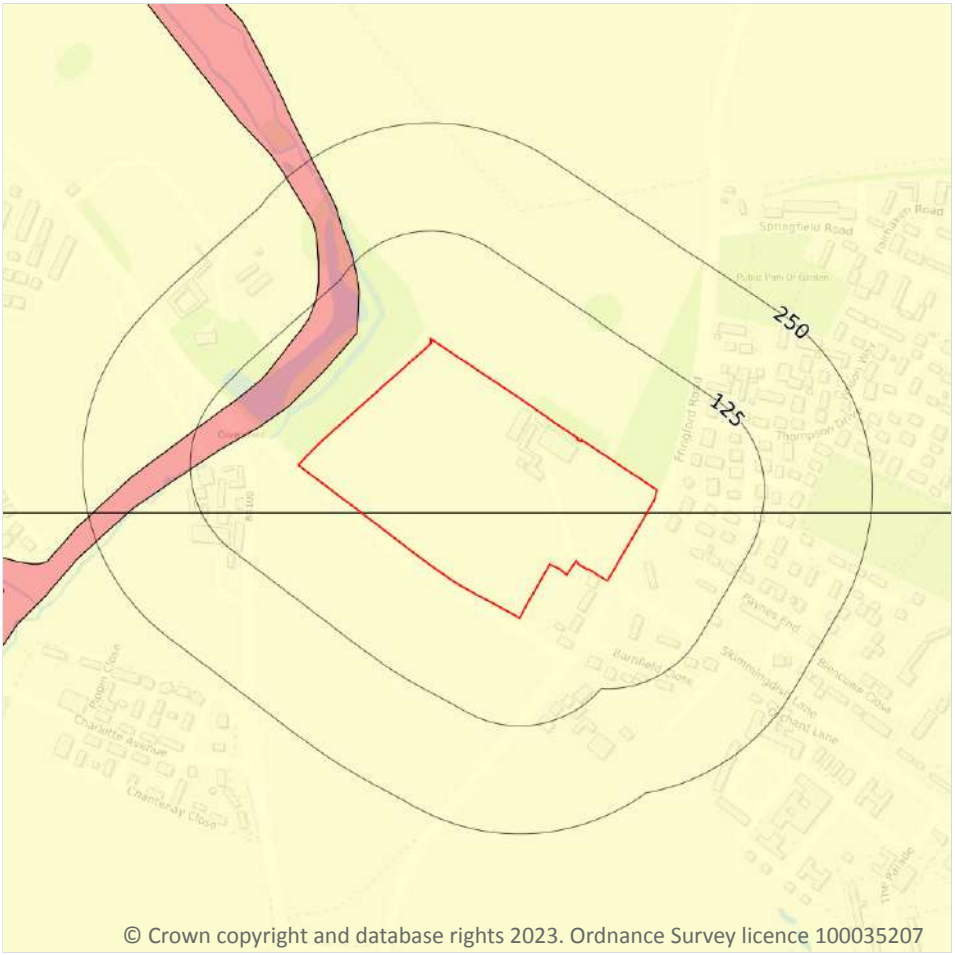
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 86 >**

Location	Hazard rating	Details
On site	**Negligible**	**Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.**

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

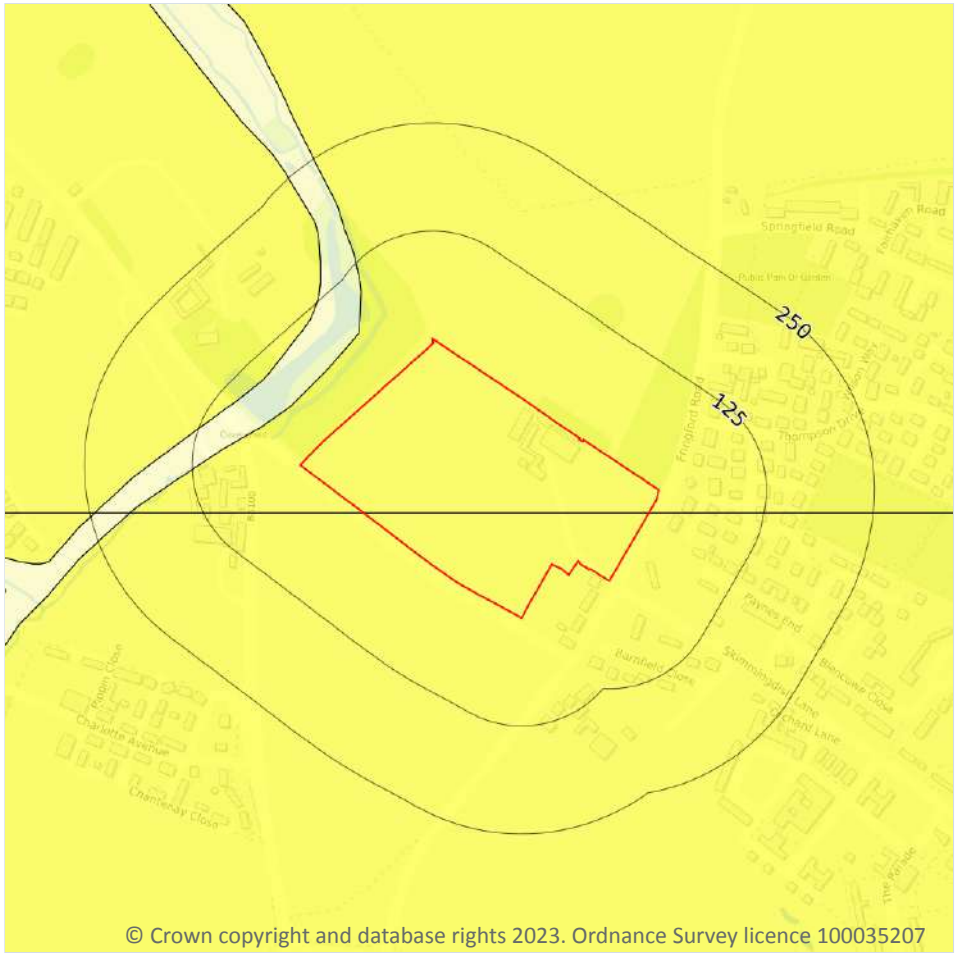
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 87 >**

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

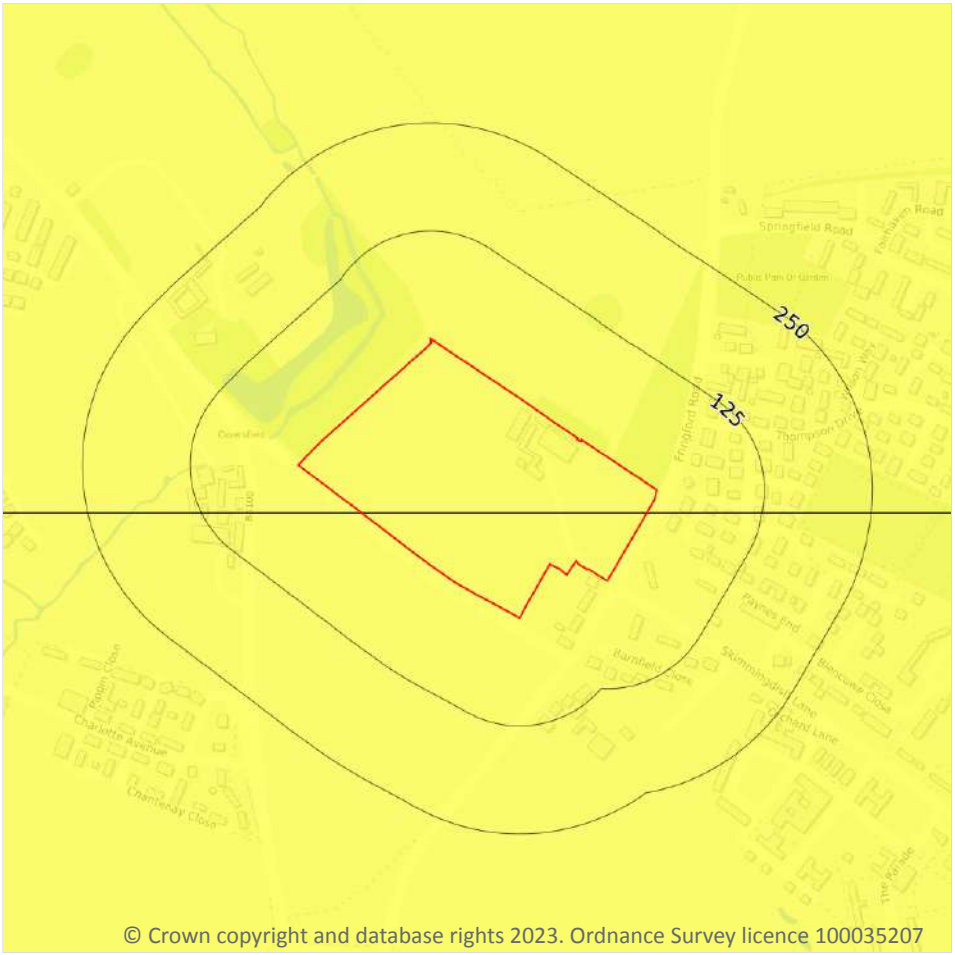
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 88 >**

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



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.5 Landslides

Records within 50m	1

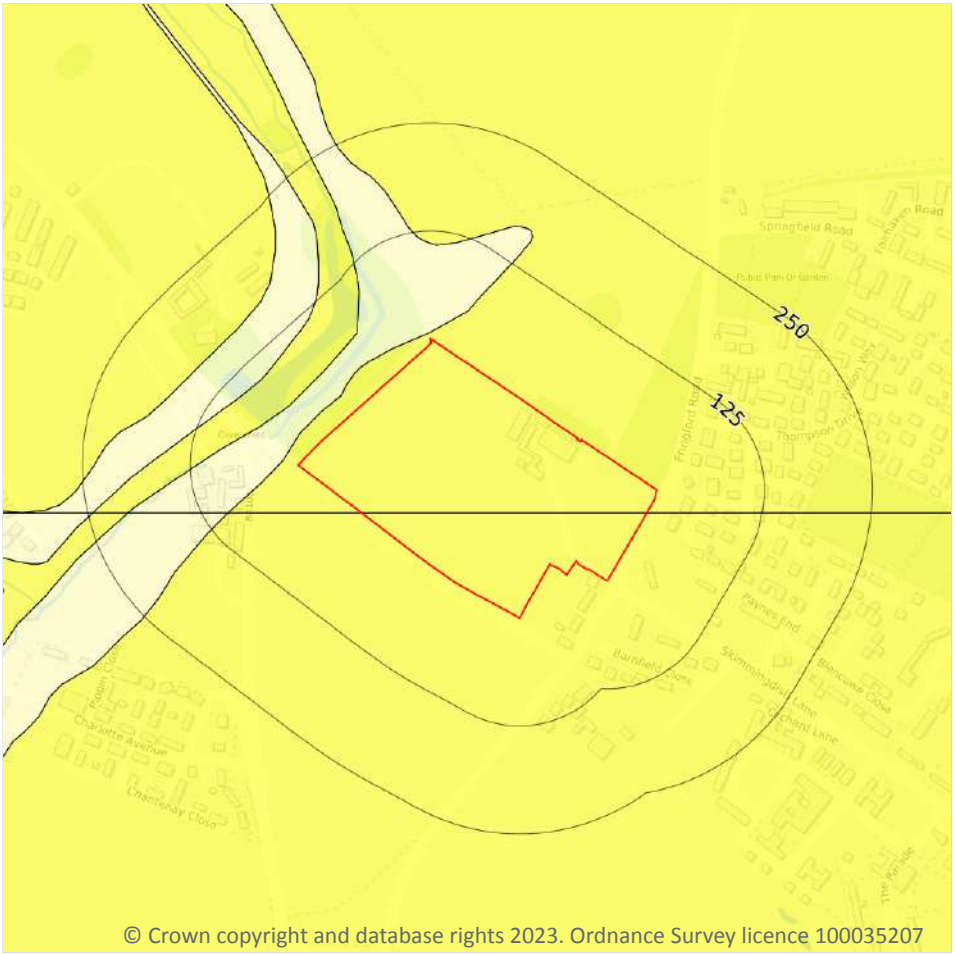
The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 89 >**

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.**

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	2

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.

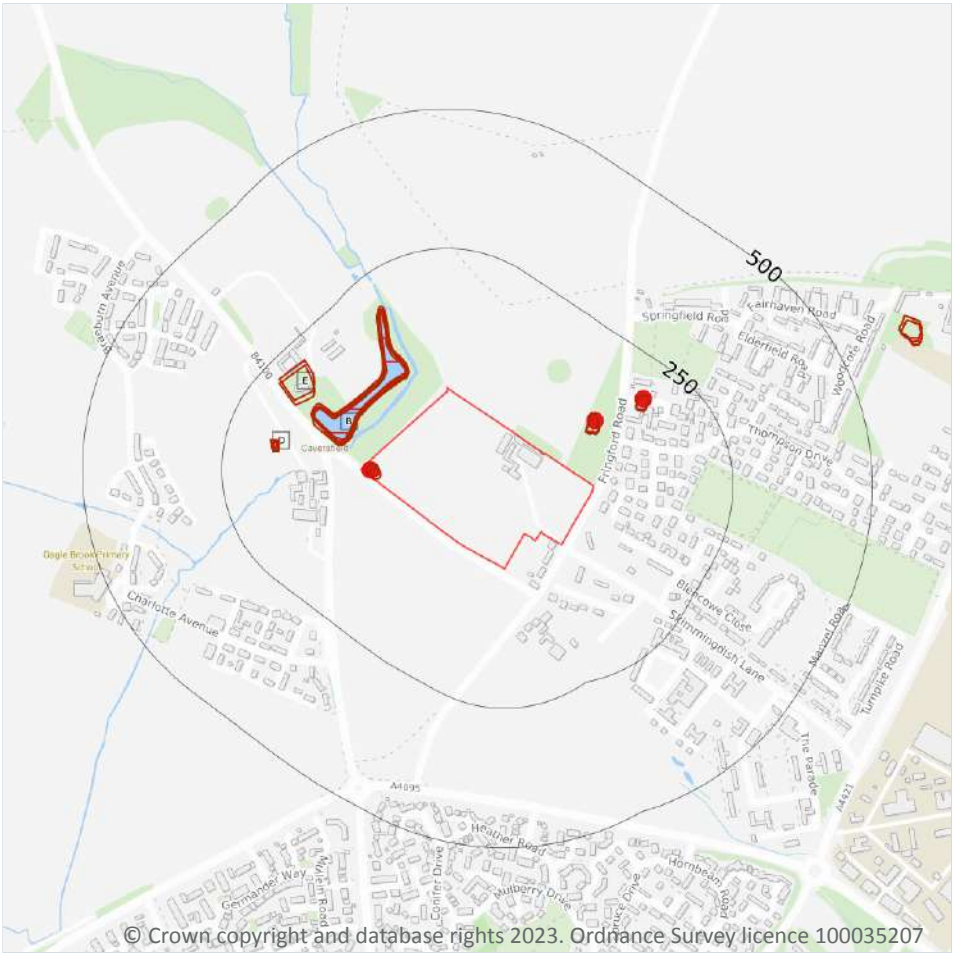
Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 90 >**

Location	Hazard rating	Details
On site	**Very low**	**Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.**

Location	Hazard rating	Details
7m N	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	3

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.

Features are displayed on the Mining and ground workings map on **page 92 >**

ID	Location	Details	Description
A	**On site**	**Name: Home Farm** **Address: Caversfield, OXFORD, Oxfordshire** **Commodity: Limestone** **Status: Ceased**	**Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site** **Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority**
C	99m NE	Name: Vicarage House Address: Caversfield, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
F	179m NE	Name: Cuckoo Farm Address: Caversfield, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m	**19**

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 92 >**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Unspecified Pit**	**1880**	**1:10560**
A	**On site**	**Unspecified Old Quarry**	**1898**	**1:10560**
B	53m W	Fish Pond	1980	1:10000
B	53m W	Fish Pond	1950	1:10560
B	54m W	Pond	1880	1:10560
B	54m W	Fish Pond	1938	1:10560
B	58m W	Fish Pond	1950	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
B	58m W	Fish Pond	1898	1:10560
B	60m W	Water Body	1882	1:10560
C	73m NE	Unspecified Quarry	1938	1:10560
C	76m NE	Unspecified Quarry	1950	1:10560
D	153m W	Filter Bed	1938	1:10560
D	153m W	Filter Bed	1938	1:10560
D	153m W	Filter Bed	1980	1:10000
E	153m NW	Grave Yard	1880	1:10560
F	157m NE	Unspecified Quarry	1938	1:10560
D	157m W	Filter Bed	1950	1:10560
F	157m NE	Unspecified Quarry	1950	1:10560
E	161m NW	Grave Yard	1882	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	0

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).

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

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	0

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.

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.

19.5 National karst database

Records within 500m	0

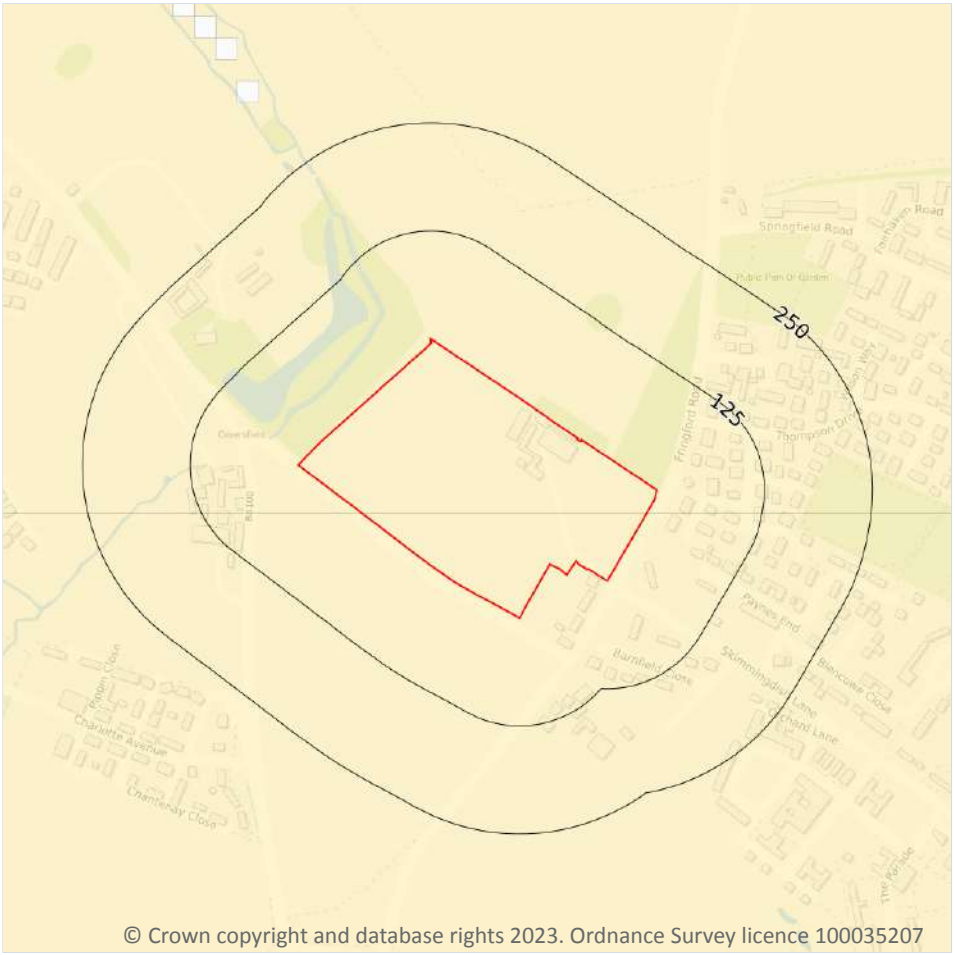
This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

This data is sourced from the British Geological Survey.

20 Radon



Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

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 100 >**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 1% and 3%**	**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 **7**

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^2. 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^2; 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**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**25 - 35 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
7m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m **0**

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^2).

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^2.

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 1

Records within 500m	0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

22.9 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.

22.10 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: https://www.groundsure.com/terms-and-conditions-april-2023/ ↗.

MEC
Development Technical Consultants

APPENDICES

APPENDIX E

Detailed Unexploded Ordnance (UXO) Risk Assessment

Project Name	Aunt Ems Lane, Caversfield
Client	Mewies Engineering Consultants Ltd.
Site Address	Aunt Ems Lane, Caversfield, Oxfordshire OX27 8TH
Report Reference	DA18287-00
Date	25/07/2023
Authored by	JL
Quality Assurance	PB
Final Check	AT

Executive Summary

Site Location and Description

The site is located in Caversfield near Bicester, within the county of Oxfordshire.

Recent aerial imagery indicates that the site is occupied by South Lodge, its associated stables, access roads and grazing fields.

Open fields and an area of woodland lie to the north. Further woodland and Fringford Road are situated to the east, while several detached residential properties and Aunt Ems Lane can be located to the south. Aunt Ems Lane and woodland – within the grounds of Caversfield House – adjoin the west of the site.

The site is approximately centred on the OS grid reference: **SP 58378 25038.**

Proposed Works

Information provided by the client indicates that the investigatory trial pits are planned on site.

Geology and Bomb Penetration Depth

The British Geological Survey (BGS) map shows the bedrock geology of the site to be underlain by the Cornbrash Formation - Limestone. This sedimentary bedrock formed between 168.3 and 163.5 million years ago during the Jurassic period. No superficial deposits were recorded on site.

Site-specific geotechnical information was not available to 1st Line Defence at the time of the production of this report. An assessment of maximum bomb penetration depth can be made once such data becomes available, or by a UXO specialist during on-site support.

It should be noted that the maximum depth that a bomb could reach may vary across a site and will be largely dependent on the specific underlying geological strata and its density.

UXO Risk Assessment

1st Line Defence has assessed that there is a **Low Risk** from both items of German air delivered UXO and Allied UXO across the site. This assessment is based on the following factors:

The Risk from German Air Delivered UXO

- During WWII the site was situated within the Ploughley Rural District. According to official Home Office bombing statistics, this district sustained an overall very low density of bombing with 275 items of ordnance recorded to have fallen within the 79,910 acre district, or an average of 3.5 items per 1,000. The relatively few bombs that fell within the district were likely targeting its airfields. The adjacent RAF Bicester was a known Luftwaffe target.
- The Oxfordshire ARP Logbook indicates that up to 150 incendiary bombs fell in close proximity to Caversfield House on 15th November 1940, causing a fire at the Gardner's Lodge (located 400m to the north-west of the site) and damaging another nearby bungalow. Furthermore, RAF Bicester's Operations Record Book notes that 'incendiaries fell west and north-west of… the Officers Quarters.' It is conceivable that some of these incendiaries fell over the general site area since it lies between both Caversfield House and the Officer's Quarters within RAF Bicester. However, no other references were found to bombing in the area.
- Aerial imagery – dated 1946 – does not show any obvious indicators of bomb damage on site or to its immediate environs. Signs of damage on site would likely have taken the form of cratering and disturbed earth.
- The nature of groundcover across the vast majority of the site is not anticipated to have been particularly conducive to the detection of air-delivered UXO throughout the war. This is because in such areas of undeveloped, open ground, UXB entry holes, which can be as small as 20cm in diameter, have the potential to become obscured by vegetation and overgrowth.
- Given that the vast majority of the site was occupied by open fields, access is likely to have been infrequent/only on a seasonal basis. Although open fields were typically not accessed to any great extent, the site may have gained a degree of coverage from a path which crossed the eastern section of the site. Additionally, Fringford Road to the east and a lane to the south and west may well have provided some degree of observation. Residential properties adjoining the south may have given the site some monitor. However, this would have been dependent on the vigilance of individual residents.

UXO Risk Assessment

- In summary, evidence has been found to indicate that incendiary bombs likely fell in the general area of the site in November 1940 given its position between Caversfield House and the Officers accommodation quarters of RAF Bicester. The site is not anticipated to have been particularly conducive towards the observation and detection of UXO in terms of ground cover. As a result, it is not possible to completely discount the possibility that an item of UXO could have fallen on-site, potentially one of the 100-150 incendiary bombs.
- However, because of the very low density of bombing across the district, it is likely that this incident was thoroughly investigated by the authorities, particularly given the site's proximity – some 20m – to the perimeter of RAF Bicester. This would significantly reduce the risk of UXO going unnoticed and unreported. Therefore, the site has been assessed to be at an overall **Low Risk** from German air-delivered UXO contamination. While active on-site support is not considered necessary, it is strongly recommended that UXO awareness briefings are provided to all staff conducting intrusive works as a minimum precaution.

The Risk from Allied UXO

- The site is situated some 20m from the eastern perimeter of the former RAF Bicester, separated by Fringford Road. RAF approximate and exact site plans indicate that the features closest to the site included accommodation blocks off Skimmingdish Lane. Caversfield House, 170m north-west of the site, also appears to have been used as billets during the war.[1]
- Bicester had been used by the Royal Flying Corps from 1917 until 1920. After 1938/1939 RAF Bicester housed both bomber and fighter planes. It was used throughout the war as a training station, and by Fighter Command from 1943. Bicester became a non-flying unit towards the end of 1944. Post-war, gliding became the predominant activity at the airfield. RAF Bicester ceased as an active military airfield in 1976.[2]
- Owing to the site's position within 20m of RAF Bicester's perimeter, the most credible pathway for LSA and SAA contamination within the site is considered to be improper disposal or munitions dumping. It remains unclear whether any such activity did indeed occur. However, despite its proximity to RAF Bicester, the site was separated by Fringford Road. Furthermore, given that the areas of the airfield located closest to the site were used for accommodation, it is unlikely that any improper disposal of LSA and SAA took place, although it cannot be entirely discounted. The risk from Allied UXO contamination has therefore been assessed as **Low**.

Post-WWII Redevelopment

- A residential property, South Lodge, and its associated riding stables were constructed on site. Several access routes now lead onto the site from Aunt Ems Lane and Fringford Road.
- The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended to support the proposed works at Aunt Ems Lane, Caversfield:

All Works

- UXO Risk Management Plan (a free template to fill in which includes a set of guidelines, a suspect UXO action flowchart, and an example risk management plan)
- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

[1] *https://planningregister.cherwell.gov.uk/Document/Download?module=PLA&recordNumber=62341&planId=109561&imageId=117&isPlan=False&fileName=9174433.pdf*

[2] Robin J. Brooks, *Oxfordshire Airfields in the Second World War* (Newbury: Countryside Books, 2001), p. 85.

Glossary

Abbreviation	Definition
AA	Anti-Aircraft
AFS	Auxiliary Fire Service
AP	Anti-Personnel
ARP	Air Raid Precautions
DA	Delay-action
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot
GM	G Mine (Parachute mine)
HAA	Heavy Anti-Aircraft
HE	High Explosive
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operation Centre
LAA	Light Anti-Aircraft
LCC	London County Council
LRRB	Long Range Rocket Bomb (V-2)
LSA	Land Service Ammunition
NFF	National Filling Factory
OB	Oil Bomb
PAC	Pilotless Aircraft (V-1)
PB	Phosphorous Bomb
PM	Parachute Mine
POW	Prisoner Of War
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
ROF	Royal Ordnance Factory
SA	Small Arms
SAA	Small Arms Ammunition
SD2	Anti-personnel “Butterfly Bomb”
SIP	Self-Igniting Phosphorous
U/C	Unclassified bomb
UP	Unrotated Projectile (rocket)
USAAF	United States Army Air Force
UX	Unexploded
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	Flying Bomb (Doodlebug)
V-2	Long Range Rocket
WAAF	Women’s Auxiliary Air Force
X	Exploded

Contents

Annexes

List of Report Annexes	
Annex A	Site Location Maps
Annex B	Recent Aerial Photography
Annex C	Client Provided Site Plan
Annex D	Pre and Post-WWII Historical Maps
Annex E	Example of UXO Entry Hole / The 'J-curve' Effect Principle
Annex F	Examples of UXO Incidents
Annex G	WWI Map of Air Raids and Naval Bombardments
Annex H	Luftwaffe Target Mapping / Photography
Annex I	Oxfordshire Distribution of Enemy Air Attacks
Annex J	Oxfordshire ARP Logbook
Annex K	RAF Bicester Operations Logbook – Enemy Action
Annex L	WWII-era RAF Aerial Photography of the Site
Annex M	RAF Bicester Site Plans / Overlay

Appendices

List of Report Appendices	
Appendix i-iii	Examples of German Air-Delivered Ordnance
Appendix iv	Examples of Anti-Aircraft Projectiles
Appendix v-vii	Examples of Land Service Ammunition
Appendix viii	Examples of Small Arms Ammunition

1st Line Defence Limited
Detailed Unexploded Ordnance (UXO) Risk Assessment

Site: Aunt Ems Lane, Caversfield
Client: Mewies Engineering Consultants Ltd.

1. Introduction

1.1. Background

1st Line Defence has been commissioned by Mewies Engineering Consultants Ltd. to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at Aunt Ems Lane, Caversfield.

Buried UXO can present a significant risk to construction works and development projects. The discovery of a suspect device during works can cause considerable disruption to operations as well as cause unwanted delays and expense.

UXO in the UK can originate from three principal sources:

1. Munitions resulting from wartime activities including German bombing in WWI and WWII, long range shelling, and defensive activities.
2. Munitions deposited as a result of military training and exercises.
3. Munitions lost, burnt, buried or otherwise discarded either deliberately, accidentally, or ineffectively.

This report will assess the potential factors that may contribute to the risk of UXO contamination. If an elevated risk is identified at the site, this report will recommend appropriate mitigation measures, in order to reduce the risk to as low as is reasonably practicable. Detailed analysis and evidence will be provided to ensure an understanding of the basis for the assessed risk level and any recommendations.

This report complies with the guidelines outlined in *CIRIA C681*, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry.'

2. Method Statement

2.1. Report Objectives

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at Aunt Ems Lane, Caversfield. The report will also recommend appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable.

2.2. Risk Assessment Process

1st Line Defence has undertaken a five-step process for assessing the risk of UXO contamination:

1. The likelihood that the site was contaminated with UXO.
2. The likelihood that UXO remains on the site.
3. The likelihood that UXO may be encountered during the proposed works.
4. The likelihood that UXO may be initiated.
5. The consequences of initiating or encountering UXO.

In order to address the above, 1st Line Defence has taken into consideration the following factors:

- Evidence of WWI and WWII German air delivered bombing as well as the legacy of Allied occupation.
- The nature and conditions of the site during WWII.
- The extent of post-war development and UXO clearance operations on site.
- The scope and nature of the proposed works and the maximum assessed bomb penetration depth.
- The nature of ordnance that may have contaminated the proposed site area.

2.3. Sources of Information

Every reasonable effort has been made to ensure that relevant evidence has been consulted and presented in order to produce a thorough and comprehensible report for the client. To achieve this the following, which includes military records and archive material held in the public domain, have been accessed:

- The National Archives and Oxfordshire History Centre.
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by Mewies Engineering Consultants Ltd.
- Available material from 33 Engineer Regiment (EOD) Archive (part of 29 Explosive Ordnance and Disposal and Search Group).
- 1st Line Defence's extensive historical archives, library and UXO geo-datasets.
- Open sources such as published books and internet resources.

3. Background to Bombing Records

3.1. General Considerations of Historical Research

This desktop assessment is based largely upon analysis of historical evidence. Every reasonable effort has been made to locate and present significant and pertinent information. 1st Line Defence cannot be held accountable for any changes to the assessed risk level or risk mitigation measures, based on documentation or other data that may come to light at a later date, or which was not available to 1st Line Defence during the production of this report.

It is often problematic and sometimes impossible to verify the completeness and accuracy of WWII-era records. As a consequence, conclusions as to the exact location and nature of a UXO risk can rarely be quantified and are, to a degree, subjective. To counter this, a range of sources have been consulted, presented and analysed. The same methodology is applied to each report during the risk assessment process. 1st Line Defence cannot be held responsible for any inaccuracies or the incompleteness in available historical information.

3.2. German Bombing Records

During WWII, bombing records were generally gathered locally by the police, Air Raid Precaution (ARP) wardens and military personnel. These records typically contained information such as the date, the location, the amount of damage caused and the types of bombs that had fallen during an air raid. This information was made either through direct observation or post-raid surveys. The Ministry of Home Security Bomb Census Organisation would then receive this information, which was plotted onto maps, charts, and tracing sheets by regional technical officers. The collective record set (regional bomb census mapping and locally gathered incidents records) would then be processed and summarised into reports by the Ministry of Home Security Research and Experiments Branch. The latter were tasked with providing the government 'a complete picture of air raid patterns, types of weapons used and damage caused- in particular to strategic services and installations such as railways, shipyards, factories and public utilities.'[3]

The quality, detail and nature of record keeping could vary considerably between provincial towns, boroughs and cities. No two areas identically collated or recorded data. While some local authorities maintained records with a methodical approach, sources in certain areas can be considerably more vague, dispersed, and narrower in scope. In addition, the immediate priority was mostly focused on assisting casualties and minimising damage at the time. As a result, some records can be incomplete and contradictory. Furthermore, many records were even damaged or destroyed in subsequent air raids. Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are therefore not always reliable. Whereas records of attacks on military or strategic targets were often maintained separately and have not always survived.

3.3. Allied Records

During WWII, considerable areas of land were requisitioned by the War Office for the purpose of defence, training, munitions production and the construction of airfields. Records relating to military features vary and some may remain censored. Within urban environments datasets will be consulted detailing the location of munition production as well as wartime air and land defences. In rural locations it may be possible to obtain plans of military establishments, such as airfields, as well as training logs, record books, plans and personal memoirs. As with bombing records, every reasonable effort will be made to access records of, and ascertain any evidence of, military land use. However, there are occasions where such evidence is not available, as records may not be accessible, have been lost/destroyed, or simply were not kept in the first place.

[3] http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/bomb-census-survey-records-1940-1945/.

4. UK Regulatory Environment and Guidelines

4.1. General

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, it is implicit in the legislation outlined below that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

4.2. CDM Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) define the responsibilities of parties involved in the construction of temporary or permanent structures.

The CDM 2015 establishes a duty of care extending from clients, principle designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties, if correct health and safety procedure has not been applied.

Although the CDM does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation for parties to:

- Provide an appropriate assessment of potential UXO risks at the site (or ensure such an assessment is completed by others).
- Put in place appropriate risk mitigation measures if necessary.
- Supply all parties with information relevant to the risks presented by the project.
- Ensure the preparation of a suitably robust emergency response plan.

4.3. The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable and conduct suitable and sufficient risk assessments.

4.4. CIRIA C681

In 2009, the Construction Industry Research and Information Association (CIRIA) produced a guide to the risk posed by UXO to the UK construction industry (CIRIA C681). CIRIA is a neutral, independent and not-for-profit body, linking organisations with common interests and facilitating a range of collaborative activities that help improve the industry.

The publication provides the UK construction industry with a defined process for the management of risks associated with UXO from WWI and WWII air bombardment. It is also broadly applicable to the risks from other forms of UXO that might be encountered. It focuses on construction professionals' needs, particularly if there is a suspected item of UXO on site, and covers issues such as what to expect from a UXO specialist. The guidance also helps clients to fulfil their legal duty under CDM 2015 to provide designers and contractors with project specific health and safety information needed to identify hazards and risks associated with the design and construction work. This report conforms to this CIRIA guidance and to the various recommendations for good practice referenced therein. It is recommended that this document is acquired and studied where possible to allow a better understanding of the background to both the risk assessment process and the UXO issue in the UK in general.

4.5. Additional Legislation

In the event of a casualty resulting from the failure of an employer/client to address the risks relating to UXO, the organisation may be criminally liable under the Corporate Manslaughter and Corporate Homicide Act 2007.

5. The Role of Commercial UXO Contractors and The Authorities

5.1. Commercial UXO Specialists

The role of a UXO Specialist (often referred to as UXO Consultant or UXO Contractor) such as 1st Line Defence, is defined in CIRIA C681 as the provision of expert knowledge and guidance to the client on the most appropriate and cost-effective approach to UXO risk management at a site.

The principal role of UXO Specialists is to provide the client with an appropriate assessment of the risk posed by UXO for a specific project, and identify and carry out suitable methodology for the mitigation of any identified risks to reduce them to an acceptable level.

The requirement for a UXO Specialist should ideally be identified in the initial stages of a project, and it is recommended that this occur prior to the start of any detailed design. This will enable the client to budget for expenditure that may be required to address the risks from UXO, and may enable the project team to identify appropriate techniques to eliminate or reduce potential risks through considered design, without the need for UXO specific mitigation measures. The UXO Specialist should have suitable qualifications, levels of competency and insurances.

Please note 1st Line Defence has the capability to provide a complete range of required UXO risk mitigation services, in order to reduce a risk to as low as reasonably practicable. This can involve the provision of both ground investigation, and where appropriate, UXO clearance services.

5.2. The Authorities

The police have a responsibility to co-ordinate the emergency services in the event of an ordnance-related incident at a construction site. Upon inspection they may impose a safety cordon, order an evacuation, and call the military authorities Joint Services Explosive Ordnance Disposal Operation Centre (JSEODOC) to arrange for investigation and/or disposal. Within the Metropolitan Police Operational Area, SO15 EOD will be tasked to any discovery of suspected UXO. The request for Explosive Officer (Expo) support is well understood and practiced by all Metropolitan Boroughs. The requirement for any additional assets will then be coordinated by the Expo if required.

In the absence of a UXO specialist, police officers will usually employ such precautionary safety measures, thereby causing works to cease, and possibly requiring the evacuation of neighbouring businesses and properties.

The priority given to the police request will depend on the EOD teams' judgement of the nature of the UXO risk, the location, people and assets at risk, as well as the availability of resources. The speed of response varies; authorities may respond immediately or in some cases it may take several days for the item of ordnance to be dealt with. Depending on the on-site risk assessment the item of ordnance may be removed from the site and/or destroyed by a controlled explosion.

Following the removal of an item of UXO, the military authorities will only undertake further investigations or clearances in high-risk situations. If there are regular UXO finds on a site the JSEODOC may not treat each occurrence as an emergency and will recommend the construction company puts in place alternative procedures, such as the appointment of a commercial contractor to manage the situation.

6. The Site

6.1. Site Location

The site is located in Caversfield near Bicester, within the county of Oxfordshire.

Open fields and an area of woodland lie to the north. Further woodland and Fringford Road are situated to the east, while several detached residential properties and Aunt Ems Lane can be located to the south. Aunt Ems Lane and woodland – within the grounds of Caversfield House – adjoin the west of the site.

The site is approximately centred on the OS grid reference: **SP 58378 25038**.

Site location maps are presented in **Annex A**.

6.2. Site Description

Recent aerial imagery indicates that the site is occupied by South Lodge, its associated stables, access roads and grazing fields.

A recent aerial photograph and site plan are presented in **Annex B** and **Annex C** respectively.

7. Scope of the Proposed Works

7.1. General

Information provided by the client indicates that the investigatory trial pits are planned on site.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the bedrock geology of the site to be underlain by the Cornbrash Formation - Limestone. This sedimentary bedrock formed between 168.3 and 163.5 million years ago during the Jurassic period. No superficial deposits were recorded on site.

8.2. Site-Specific Geology

Site-specific geotechnical data was not provided by the client during the production of this report.

9. Site History

9.1. Introduction

The purpose of this section is to identify the composition of the site pre and post-WWII. It is important to establish the historical use of the site, as this may indicate the site's relation to potential sources of UXO as well as help with determining factors such as the land use, groundcover, likely frequency of access and signs of bomb damage.

9.2. Ordnance Survey Historical Maps

Relevant historical maps were obtained for this report and are presented in **Annex D.** See below for a summary of the site history shown on acquired mapping.

Pre-WWII – Annex D1-D2		
Date	**Scale**	**Description**
1922-1923 – **Annex D1**	1:2,500	This map shows the site to predominantly consist of open undeveloped ground. A line of trees crosses the site north-east to south-west, while a small area of woodland can be located in the west of the site. Further such open ground continues to the north where a track and *Quarry* can be found. A roadway runs to the east. Another roadway, *Vicarage House*, a *Lodge*, and an *Orchard* are situated immediately to south. The roadway continues to the west where further areas of woodland can be seen.
1938-1952 – **Annex D2**	1:10,560	No obvious changes to the site footprint can be observed. The site remains occupied by undeveloped open ground. Additionally, the site's immediate environs do not appear to have altered significantly since the previous mapping edition.

Post-WWII – Annex D3		
Date	**Scale**	**Description**
1955 – **Annex D3**	1:10,000	No significant alterations appear to have taken place on site since the previous mapping edition. Furthermore, the areas adjoining the site remain largely unchanged.

10. Introduction to German Air Delivered Ordnance

10.1. General

During WWI and WWII, the UK was subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. The poor accuracy of WWII targeting technology and the nature of bombing techniques often resulted in neighbouring areas to targets sustaining collateral damage.

In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place. This occurred most prominently in the London 'Blitz', though affected many other towns and cities. As discussed in the following sections, a proportion of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

The main focus of research for this section of the report will concern German air delivered ordnance dropped during WWII, although WWI bombing will also be considered.

10.2. Generic Types of WWII German Air Delivered Ordnance

To provide an informed assessment of the hazards posed by any items of unexploded ordnance that may remain in situ on site, the table below provides information on the types of German air delivered ordnance most commonly used by the Luftwaffe during WWII. Images and brief summaries of the characteristics of these items of ordnance are listed in **Appendices i-iii**.

Generic Types of WWII German Air Delivered Ordnance		
Type	**Frequency**	**Likelihood of detection**
High Explosive (HE) bombs	In terms of weight of ordnance dropped, HE bombs were the most frequently deployed by the Luftwaffe during WWII.	Although efforts were made to identify the presence of unexploded ordnance following an air raid, often the damage and destruction caused by detonated bombs made observation of UXB entry holes impossible. The entry hole of an unexploded bomb can be as little as 20cm in diameter and was easily overlooked in certain ground conditions (see **Annex E**). Furthermore, ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded smaller bomb. UXBs therefore present the greatest risk to present–day intrusive works.
1kg Incendiary bombs (IB)	In terms of the number of weapons dropped, small IBs were the most numerous. Millions of these were dropped throughout WWII.	IBs had very limited penetration capability and in urban areas would often have been located in post-raid surveys. If they failed to initiate and fell in water, on soft vegetated ground, or bombed rubble, they could easily go unnoticed.
Large Incendiary bombs (IB)	These were not as common as the 1kg IBs, although they were more frequently deployed than PMs and AP bomblets.	If large IBs did penetrate the ground, complete combustion did not always occur and in such cases they could remain a risk to intrusive works.
Aerial or Parachute mines (PM)	These were deployed less frequently than HE and IBs due to size, cost and the difficulty of deployment.	If functioning correctly, PMs would generally have had a slow rate of descent and were very unlikely to have penetrated the ground. Where the parachute failed, mines would have simply shattered on impact if the main charge failed to explode. There have been extreme cases when these items have been found unexploded. However, in these scenarios, the ground was either extremely soft or the munition fell into water.
Anti-personnel (AP) bomblets	These were not commonly used and are generally considered to pose a low risk to most works in the UK.	SD2 bomblets were packed into containers holding between 6 and 108 submunitions. They had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.

10.3. Failure Rate of German Air Delivered Ordnance

It has been estimated that 10% of WWII German air delivered HE bombs failed to explode as designed. Reasons for why such weapons might have failed to function as designed include:

- Malfunction of the fuze or gain mechanism (manufacturing fault, sabotage by forced labour or faulty installation).
- Many were fitted with a clockwork mechanism that could become immobilised on impact.
- Failure of the bomber aircraft to arm the bombs due to human error or an equipment defect.
- Jettisoning the bomb before it was armed or from a very low altitude. This most likely occurred if the bomber aircraft was under attack or crashing.

From 1940 to 1945, bomb disposal teams reportedly dealt with a total of 50,000 explosive items of 50kg, over 7,000 anti-aircraft projectiles and 300,000 beach mines. Unexploded ordnance is still regularly encountered across the UK, see press articles in **Annex F**.

10.4. UXB Ground Penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of burial. There are several factors which determine the depth that an unexploded bomb will penetrate:

- Mass and shape of bomb.
- Height of release.
- Velocity and angle of bomb.
- Nature of the ground cover.
- Underlying geology.

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvium are easier to penetrate than gravel and sand, whereas layers of hard strata will significantly retard and may stop the trajectory of a UXB.

10.4.1. The J-Curve Effect Principle

J-curve is the term used to describe the characteristic curve commonly followed by an air delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface. Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly, however, is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth, but can be higher in certain conditions (see **Annex E**).

10.4.2. WWII UXB Ground Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by bomb disposal (BD) teams. Conclusions were drawn predicting the likely average and maximum depths of penetration of different sized bombs in different geological strata.

For example, the largest common German bomb (500kg) had a likely concluded penetration depth of 6m in sand or gravel but 11m in clay. The maximum observed depth for a 500kg bomb was 11.4m and for a 1,000kg bomb 12.8m. Theoretical calculations suggested that significantly greater penetration depths were probable.

10.4.3. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the site of proposed works the following parameters should be used:

- WWII geology – Cornbrash Formation.
- Impact angle and velocity – 10-15° from vertical and 270 metres per second.
- Bomb mass and configuration – The 500kg SC HE bomb, without retarder units or armour piercing nose (this was the largest of the common bombs used against Britain).

It has not been possible to determine maximum bomb penetration capabilities at this stage due to the limitations of site-specific geotechnical information provided for the purpose of this report. An assessment can be made once further information becomes available or by an UXO Specialist on-site.

10.5. V-Weapons

Hitler's 'V-weapon' campaign began from mid-1944. It used newly developed unmanned cruise missiles and rockets. The V-1, known as the *flying bomb* or *pilotless aircraft*, and the V-2, a long range rocket, were launched from bases in Germany and occupied Europe. A total of 9,251 V-1s and 1,115 V-2s were recorded in the United Kingdom.

Although these weapons caused considerable damage, their range was limited by their position of deployment across Europe and as a result the vast majority of V-weapon strikes were directed against targets in the south-east of England, predominantly in the London Boroughs and Home Counties. This limitation of capability meant targets in Oxfordshire were generally too far to be considered for V-weapon strikes by the Luftwaffe. The risk from V-weapons is therefore considered negligible and will not be further addressed in this report.

11. The Likelihood of Contamination from German Air Delivered UXBs

11.1. World War I

During WWI Britain was targeted and bombed by Zeppelin Airships as well as Gotha and Giant fixed-wing aircraft. The objective of these raids was to unnerve the British public, to destroy strategic targets and to ultimately attempt to coerce Britain's capitulation from the war. High explosive and incendiary bombs were typically used during WWI raids, though aerial torpedoes and grenades were also used.

A WWI map of air raids and naval bombardments across the UK was consulted, see **Annex G**. This source shows that neither Caversfield or nearby Bicester were indeed bombed during the conflict.

WWI bombs were generally smaller and dropped from a lower altitude than those used in WWII. This resulted in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density, the risk from WWI UXBs is considered low and will not be further addressed in this report.

11.2. World War II Bombing Ploughley Rural District

The Luftwaffe's main objective for the attacks on Britain was to inhibit the country's economic and military capability. To achieve this they targeted airfields, depots, docks, warehouses, wharves, railway lines, factories, and power stations. As the war progressed the Luftwaffe bombing campaign expanded to include the indiscriminate bombing of civilian areas in an attempt to subvert public morale.

During WWII the site was located within the Ploughley Rural District, which sustained an overall very low density of bombing, as represented by bomb density data figures in Section 11.3. The relatively few bombs that fell within the district were likely targeting its airfields, which included RAF Kidlington and RAF Upper Heyford. Indeed, the adjacent RAF Bicester was a known Luftwaffe target, as demonstrated by the reconnaissance mapping and imagery presented in **Annex H**.

Records of bombing incidents in the civilian areas of the district were typically collected by Air Raid Precautions wardens and collated by Civil Defence personnel. Some other organisations, such as port and railway authorities, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the country most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

Records of bombing incidents are presented in the following sections.

11.3. WWII Home Office Bombing Statistics

The following table summarises the quantity of German air delivered bombs (excluding 1kg incendiaries and anti-personnel bombs) dropped on the Ploughley Rural District between 1940 and 1945.

Record of German Ordnance Dropped on the Ploughley Rural District		
Area Acreage		**79,910**
Weapons	High Explosive bombs (all types)	275
	Parachute mines	0
	Oil bombs	3
	Phosphorus bombs	0
	Fire pots	0
	Pilotless aircraft (V-1)	0
	Long range rockets (V-2)	0
Total		**278**
Number of Items per 1,000 acres		**3.5**

Source: Home Office Statistics
This table does not include UXO found during or after WWII.

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the risk relating to IBs is lesser than that relating to larger HE bombs, they were similarly designed to inflict damage and injury. Anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. Although Home Office statistics did not record these types of ordnance, both should not be overlooked when assessing the general risk to personnel and equipment.

11.4. Distribution of Enemy Air Attacks in Oxfordshire

Mapping showing the general location and type of bombing in Oxfordshire was obtained from Oxfordshire History Centre. The map is insufficient in terms of scale and only shows approximate locations. The accompanying table of attacks in Oxfordshire is presented in **Annex I**, and a description presented below.

Distribution of Enemy Air Attacks in Oxfordshire – Annex I	
Date Range	**Comments**
1940-1945	Incendiary bombing is shown to have occurred in Caversfield on 15th/16th November 1940.

11.5. Oxfordshire ARP Logbook

An Air Raid Precaution Logbook which details the date, type of bombs, location of incident and damage was obtained from Oxfordshire History Centre. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex J**.

ARP Logbook 1940-1944 – Annex J	
Date Range	**Comments**
15th/16th November 1940 – **Annex J1-J2**	***Date:*** *15th/16th November 1940.* ***Where Dropped:*** *Bicester (100 to 150 Incendiary Bombs (IB) at 23:20, 15th November).* ***Remarks:*** *Bicester. These incendiary bombs fell in the vicinity of Caversfield House. One bomb dropped through the roof of the gardner's lodge, setting fire to bedding and furniture. Another bungalow was slightly damaged.* ***Fire:*** *Bicester Fire Brigade put out fire in cottage at Caversfield Lodge.* ***Damage:*** *Bicester. Gardner's cottage, Caversfield House damaged, bedding and furniture on fire. Another bungalow slightly damaged.*

11.6. RAF Bicester Operations Record Book

The perimeter of RAF Bicester is situated approximately 20m east of the site. Operations Record Books for RAF Stations detail all significant events that took place during the period of their use by the military. This included any attacks / bombing by Luftwaffe aircraft at the base or its immediate vicinity. Operational Log Books for RAF Bicester were obtained from the National Archives.

These log books were checked for any reference to air raids that may have affected the areas surrounding the airfield. Relevant entries to the site or its immediate environs are presented below and in **Annex K**.

RAF Bicester Operations Record Book – Annex K	
Date Range	**Comments**
15th/16th November 1940 – **Annex K**	***Date:*** *15th November 1940* ***Summary of Events:*** *10 high explosive (HE) fell three miles south-east of "K" Site. Several incendiaries fell west and north-west of, and close to the Officers Quarters at Bicester Station.*

11.7. WWII-Era Aerial Photography

WWII-era aerial photography for the site area was obtained from the National Monuments Record Office (Historic England). This photography provides a record of the potential composition of the site during the war, as well as its condition immediately following the war (see **Annex L**).

WWII-Era Aerial Photography – Annex L	
Date	**Description**
12th December 1946 – **Annex L**	This image shows the site to comprise undeveloped open ground interspersed with lines of trees. A pathway also appears to cross the east of the site. There are no obvious signs of bomb damage to the site or its environs. Signs of damage on site would likely have taken the form of cratering and disturbed earth.

11.8. Abandoned Bombs

A post air-raid survey of buildings, facilities, and installations would have included a search for evidence of bomb entry holes. If evidence of an entry hole was encountered, Bomb Disposal Officer Teams would normally have been requested to attempt to locate, render safe, and dispose of the bomb. Occasionally, evidence of UXBs was discovered but due to a relatively benign position, access problems, or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an 'abandoned bomb'.

Given the inaccuracy of WWII records, and the fact that these bombs were 'abandoned', their locations cannot be considered definitive or the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

1st Line Defence holds no records of officially registered abandoned bombs at or near the site of the proposed works.

11.9. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (now part of 29 EOD & Search Group) no longer processes commercial requests for information. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works. If any relevant information is received at a later date, Mewies Engineering Consultants Ltd. will be advised.

11.10. Evaluation of German Air Delivered UXO Records

Factors	Conclusion
Density of Bombing *It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.*	During WWII the site was situated within the Ploughley Rural District. According to official Home Office bombing statistics, this district sustained an overall very low density of bombing with 278 items of ordnance recorded to have fallen within the 79,910 acre district, or an average of 3.5 items per 1,000 acres. The relatively few bombs that fell within the district were likely targeting its airfields, which included RAF Kidlington and RAF Upper Heyford. Indeed, the adjacent RAF Bicester was a known Luftwaffe target, as shown in **Annex H**. The Oxfordshire ARP Logbook indicates that up to 150 incendiary bombs fell in close proximity to Caversfield House on 15th November 1940, causing a fire at the Gardner's Lodge (located 400m to the north-west of the site) and damaging another nearby bungalow. Furthermore, RAF Bicester's Operations Record Book notes that 'incendiaries fell west and north-west of… the Officers Quarters.' It is conceivable that some of these incendiaries fell over the general site area since it lies between both Caversfield House and the Officer's Quarters within RAF Bicester. However, no other references were found to bombing in the area.
Damage *Similarly, a high explosive bomb strike in an area of open agricultural land will have caused soil disturbance, increasing the risk that a UXB entry hole would be overlooked.*	Aerial imagery – dated 1946 – does not show any obvious indicators of bomb damage on site or to its immediate environs. Signs of damage on site would likely have taken the form of cratering and disturbed earth.
Ground Cover *The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.*	The nature of groundcover across the vast majority of the site is not anticipated to have been particularly conducive to the detection of UXO throughout the war. This is because in such areas of undeveloped, open ground, UXB entry holes, which can be as small as 20cm in diameter, have the potential to become obscured by vegetation and overgrowth.
Access Frequency *UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied. The importance of a site to the war effort is also an important consideration as such sites are likely to have been both frequently visited and subject to post-raid checks for evidence of UXO.*	Given that the vast majority of the site was occupied by open fields, access is likely to have been infrequent/only on a seasonal basis. Although open fields were typically not accessed to any great extent, the site may have gained a degree of coverage from a path which crossed the eastern section of the site. Additionally, Fringford Road to the east and the lane to the south and west may have provided some degree of observation. Additionally, residential properties adjoining the south may have given the site some monitor. However, this would have been dependent on the vigilance of individual residents.
Bomb Failure Rate	There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.
Abandoned Bombs	1st Line Defence holds no records of abandoned bombs at or within the site vicinity.
Bombing Decoy sites	1st Line Defence could find no evidence of bombing decoy sites within the site vicinity.
Bomb Disposal Tasks	1st Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.

12. Introduction to Allied Ordnance

12.1. General

Many areas across the UK may be at risk from Allied UXO because of both wartime and peacetime military use. Typical military activities and uses that may have led to a legacy of military UXO at a site include former minefields, home guard positions, anti-aircraft emplacements, training and firing ranges, military camps, as well as weapons manufacture and storage areas.

Although land formerly used by the military was usually subject to clearance before returned to civilian use, items of UXO are sometimes discovered and can present a potential risk to construction projects.

This section of the report discusses the generic types of Allied ordnance typically encountered on areas associated with former military activity.

12.2. Land Service Ammunition

Owing to the site's position within 20m of RAF Bicester's perimeter, the most credible pathway for LSA contamination within the site is considered to be improper disposal or munitions dumping. The term LSA covers items of ordnance that are propelled, placed, or thrown during land warfare. These items may be filled or charged with explosives, smoke, incendiary, or pyrotechnics and can be divided into five main groups:

Land Service Ammunition	
Item	**Description**
Mortar Rounds	A mortar round is normally nosed-fused and fitted with its own propelling charge. Its flight is stabilised by the use of a fin. They are usually tear-drop shaped (though older variants are parallel sided), with a finned 'spigot tube' screwed or welded to the rear end of the body which houses the propellant charge. Mortars are either High Explosive or Carrier (i.e. smoke, incendiary, or pyrotechnic).
Grenades	A grenade is a short range weapon designed to kill or injure people. It can be hand thrown or fired from a rifle or a grenade launcher. Grenades either contain high explosive or smoke producing pyrotechnic compounds. The common variants have a classic 'pineapple' shape.
Projectiles	A projectile (or shell) is propelled by force, normally from a gun, and continues in motion using its kinetic energy. The gun a projectile is fired from usually determines its size. A projectile contains a fuzing mechanism and a filling. Projectiles can be high explosive, carrier or Shot (a solid projectile).
Rockets	Rockets were commonly designed to destroy heavily armoured military vehicles (anti-tank weapon). The device contains an explosive head (warhead) that can be accelerated using internal propellants to an intended target. Anti-aircraft rocket batteries were also utilised as part of air defence measures.
Landmines	A landmine is designed to be laid on or just below the ground to be exploded by the proximity or contact of a person or vehicle. Landmines were often placed in defensive areas of the UK to obstruct potential invading adversaries.

In the UK unexploded or partially exploded mortars and grenades are the most common items of LSA encountered, as they could be transported and utilised anywhere. They are mostly encountered in areas used for military training and are often found discarded on or near historical military bases. Images of the most commonly found items of LSA are presented in **Appendices v - vii.**

12.3. Small Arms Ammunition

Personnel at RAF stations often carried items of SAA on their person. Given the number of such individuals in close proximity to the site, the risk from SAA contamination is being considered in this report. The most common type of ordnance encountered on land used by the military are items of Small Arms Ammunition (SAA). SAA refers to the complete round or cartridge designed to be discharged from varying sized hand-held weapons such as rifles, machine guns and pistols. SAA can include bullets, cartridge cases and primers/caps. Example images of the most SAA are presented in **Appendix viii.**

12.4. Defending the UK From Aerial Attack

During WWII the War Office employed a number of defence tactics against the Luftwaffe from bombing major towns, cities, manufacturing areas, ports and airfields. These can be divided into passive and active defences (examples are provided in the table below).

Active Defences	Passive Defences
• Anti-aircraft gun emplacements to engage enemy aircraft. • Fighter aircraft to act as interceptors. • Rockets and missiles were used later during WWII.	• Blackouts and camouflaging to hinder the identification of Luftwaffe targets. • Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas. • Barrage balloons forced enemy aircraft to greater altitudes. • Searchlights were often used to track and divert adversary bomber crews during night raids.

Active defences such as anti-aircraft artillery present a greater risk of UXO contamination than passive defences. Unexploded ordnance resulting from dogfights and fighter interceptors is rarely encountered and difficult to accurately qualify.

12.4.1. Anti-Aircraft Artillery (AAA)

During WWII three main types of gun sites existed: heavy anti-aircraft (HAA), light anti-aircraft (LAA) and 'Z' batteries (ZAA). If the projectiles and rockets fired from these guns failed to explode or strike an aircraft they would descend back to land. The table below provides further information on the operation and ordnance associated with these type of weapons.

Anti-Aircraft Artillery				
Item	**Description**			
HAA	These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.			
LAA	These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m.			
Variations in HAA and LAA Ammunition	**Gun type**	**Calibre**	**Shell Weight**	**Shell Dimensions**
	3.0 Inch	76mm	7.3kg	76mm x 356mm
	3.7 Inch	94mm	12.7kg	94mm x 438mm
	4.5 Inch	114mm	24.7kg	114mm x 578mm
	40mm	40mm	0.9kg	40mm x 311mm
Z-AA	The three inch unrotated rocket/projectile known as the UP-3 had initially been developed for the Royal Navy. The UP-3 was also used in ground-based single and 128-round launchers known as ''Z'' batteries. The rocket, containing a high explosive warhead was often propelled by cordite.			

The conditions in which anti-aircraft projectiles may have fallen unnoticed within a site area are analogous to those regarding air delivered ordnance. Unexploded anti-aircraft projectiles could essentially have fallen indiscriminately anywhere within range of the guns. The chance of such items being observed, reported and removed during the war depends on factors such as land use, ground cover, damage and frequency of access – the same factors that govern whether evidence of a UXB is likely to have been noted. More information about these factors with regards to this particular site can be found in the German Air Delivered Ordnance section of this report.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Appendix iv**.

13. The Likelihood of Contamination from Allied Ordnance

13.1. Introduction

When undertaking construction work within or immediately adjacent to a site with previous and/or current military use, it is often considered likely to contain an elevated risk of contamination from Allied UXO. This assumption of risk is based on the following reasoning:

- The clearance of ordnance from military camps, depots, storage facilities, ranges and training areas were not always effectively managed, or undertaken to equivalent degrees of certainty. In addition, search and detection equipment used over seventy years ago following WWII has proved ineffective both for certain types of UXO and at depths beyond capability.
- In the vast majority of cases, explosive ordnance would have been stored and available for use at military installations. Ordnance ranged from small arms and land service ammunition to weapons components and larger, air delivered items. During periods of heightened activity, ordnance was also frequently lost in transit, particularly between stores and assigned training locations.
- The military generally did not anticipate that their land would be later sold for civilian development, and consequently appropriate ordnance disposal procedure was not always adhered to. It was not uncommon for excess or unwanted ordnance to be buried or burnt within the perimeters of a military establishment as a means of disposal. Records of such practice were rarely kept.

There are several factors that may serve to either affirm, increase, or decrease the level of risk within a site with a history of military usage. Such factors are typically dependent upon the proximity of the proposed area of works to training activities, munition productions and storage, as well as its function across the years.

This section will examine the history of the proposed site and assess to what degree, if any, the site could have become contaminated as a result of the military use of the surrounding area.

13.2. RAF Bicester History

Bicester airfield was first used for organised flying in 1916, and then subsequently by the Royal Flying Corps from 1917. Closed briefly in the early 1920s, in 1925 redevelopment began to turn the site into a bomber station. Flying recommenced in 1928 and by 1938/1939 RAF Bicester housed both bomber and fighter planes, including Bristol Blenheims, the Handley Page Halifax, and Avro Ansons. The airfield was used throughout the war as a training station, with No. 13 OTU (Operational Training Unit) within 7 Group Bomber Command being the primary occupants.[4] Targeted by the Luftwaffe early on in the war, the airfield possessed a decoy site around 9.2km south-east of the station which was relatively successful in diverting enemy attacks. The airfield transferred to Fighter Command in 1943, flying Spitfires and De Havilland Mosquitos. Bicester became a non-flying unit towards the end of 1944 and into the immediate post-war era. From 1956 gliding became the predominant activity at the airfield. In 1963 the RAF Gliding & Soaring Association began using the site. RAF Bicester ceased as an active military airfield in 1976.[5] It has recently been transformed into a heritage centre, while some civil aviation continues to take place.

[4] Ken Delve, *The Military Airfields of Britain, Northern Home Counties: Bedfordshire, Berkshire, Buckinghamshire, Essex, Hertfordshire, London, Middlesex, Oxfordshire* (Ramsbury: The Crowood Press, 2007), pp. 54-55.

[5] Robin J. Brooks, *Oxfordshire Airfields in the Second World War* (Newbury: Countryside Books, 2001), p. 85.

13.3. RAF Bicester Historical Site Plans

Plans of RAF Bicester were obtained from the RAF Museum, Hendon in addition to an approximate WWII-era airfield plan from *The Military Airfields of Britain: Northern Home Counties*. A description of these maps and the site's location in relation to the airfield is presented below and in **Annex M**.

RAF Bicester Site Plans – Annex M	
Date Range	**Comments**
RAF Bicester Approximate Site Plan– **Annex M1**	This plan indicates that the site was located beyond the western perimeter of the airfield. It is separated from RAF Bicester by the Fringford Road. Although the areas of RAF Bicester closest to the site appear undeveloped, a series of 'frying pan' aircraft dispersal areas can be observed approximately 270m to the north-east.
RAF Bicester Site Plan – **Annex M2**	The site is shown to lie outside of RAF Bicester's perimeter at this stage. Fringford Road and several detached residential properties – not thought to be associated with the airfield – divide the site from the RAF station. It is appears that the areas of RAF Bicester closest to the site at this stage are accommodation quarters, indeed *Officers Tennis Courts* can be observed some 240m to the south-east of the site.[6] An overlay of this plan onto modern aerial imagery can be found in **Annex M3**.

13.4. Evaluation of Contamination Risk from Allied UXO

1st Line Defence has considered the following potential sources of Allied ordnance contamination:

Sources of Allied UXO Contamination	**Conclusion**
Military Camps *Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.*	1st Line Defence could find no evidence of a military camp within the site. However, the perimeter of RAF Bicester, an active RAF station throughout WWII, was located some 20m to the east of the site.
Anti-Aircraft Defences *Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.*	Owing to the history of RAF Bicester, it is considered likely that local AA defence such as 40mm Bofors guns or machinegun posts may have been employed surrounding the airfield. Despite this, no reference or indication could be found to suggest the precise location of any gun sites. The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are generally analogous to those regarding German air delivered ordnance.

[6] *https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MOX27162&resourceID=1033*

Home Guard Activity *The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.*	Evidence of Home Guard activity is often difficult to locate, owing to the ad-hoc nature of Home Guard activity within each local area. Such training was often conducted on a small scale at the discretion of individual commanders and as such was seldom recorded officially. As such, no positive evidence could be found to confirm the presence of HG units within proximity to the site.
Defensive Positions *Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.*	There is no evidence of any pillbox, emplacement or other defensive features formerly located on or bordering the site footprint.
Training or firing ranges *Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.*	No evidence of training or firing ranges could be found within the site or surrounding area.
Defensive Minefields *Minefields were placed in strategic areas to defend the country in the event of a German invasion. Minefields were not always cleared with an appropriate level of vigilance.*	There is no evidence of defensive minefields affecting the site.
Ordnance Manufacture *Ordnance manufacture indicates an increased chance that items of ordnance were stored, or disposed of, within a location.*	Owing to the site's position within 20m of RAF Bicester's perimeter, the most credible pathway for LSA and SAA contamination within the site is considered to be improper disposal or munitions dumping. It remains unclear whether any such activity did indeed occur.
Military Related Airfields *Military airfields present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training or bombing practice.*	The site is situated some 20m from the eastern perimeter of the former RAF Bicester, separated by Fringford Road. RAF approximate and exact site plans indicate that the features closest to the site included accommodation blocks off Skimmingdish Lane. Caversfield House, 170m north-west of the site, also appears to have been used as billets during the war.[7] Bicester had been used by the Royal Flying Corps from 1917 until 1920. After 1938/1939 RAF Bicester housed both bomber and fighter planes. It was used throughout the war as a training station, and by Fighter Command from 1943. Bicester became a non-flying unit towards the end of 1944. Post-war, gliding became the predominant activity at the airfield. RAF Bicester ceased as an active military airfield in 1976.[8]

[7] *https://planningregister.cherwell.gov.uk/Document/Download?module=PLA&recordNumber=62341&planId=109561&imageId=117&isPlan=False&fileName=9174433.pdf*

[8] Robin J. Brooks, *Oxfordshire Airfields in the Second World War* (Newbury: Countryside Books, 2001), p. 85.

14. The Likelihood of UXO Contamination Summary

The following table assesses the likelihood that the site was contaminated by items of German air delivered and Allied ordnance. Factors such as the risk of UXO initiation, remaining, and encountering will be discussed later in the report.

UXO Contamination Summary	
Quality of the Historical Record	The research has evaluated pre- and post-WWII Ordnance Survey maps, Luftwaffe reconnaissance imagery, Oxfordshire Distribution of Enemy Air Attacks, Oxfordshire ARP Logbook, RAF Bicester Operations Record Book, and WWII-era aerial photography. In addition, plans for RAF Bicester were obtained for the purposes of this report. The record set is generally adequate. Although the Oxfordshire Distribution of Enemy Attacks is of a poor scale, it identified the dates of bombing in the Caversfield area which could be corroborated with both the Oxfordshire ARP Logbook and RAF Bicester Operations Record Book.
German Air Delivered Ordnance	• During WWII the site was situated within the Ploughley Rural District. According to official Home Office bombing statistics, this district sustained an overall very low density of bombing with 275 items of ordnance recorded to have fallen within the 79,910 acre district, or an average of 3.5 items per 1,000. The relatively few bombs that fell within the district were likely targeting its airfields. The adjacent RAF Bicester was a known Luftwaffe target. • The Oxfordshire ARP Logbook indicates that up to 150 incendiary bombs fell in close proximity to Caversfield House on 15th November 1940, causing a fire at the Gardner's Lodge (located 400m to the north-west of the site) and damaging another nearby bungalow. Furthermore, RAF Bicester's Operations Record Book notes that 'incendiaries fell west and north-west of… the Officers Quarters.' It is conceivable that some of these incendiaries fell over the general site area since it lies between both Caversfield House and the Officer's Quarters within RAF Bicester. However, no other references were found to bombing in the area. • Aerial imagery – dated 1946 – does not show any obvious indicators of bomb damage on site or to its immediate environs. Signs of damage on site would likely have taken the form of cratering and disturbed earth. • The nature of groundcover across the vast majority of the site is not anticipated to have been particularly conducive to the detection of air-delivered UXO throughout the war. This is because in such areas of undeveloped, open ground, UXB entry holes, which can be as small as 20cm in diameter, have the potential to become obscured by vegetation and overgrowth. • Given that the vast majority of the site was occupied by open fields, access is likely to have been infrequent/only on a seasonal basis. Although open fields were typically not accessed to any great extent, the site may have gained a degree of coverage from a path which crossed the eastern section of the site. Additionally, Fringford Road to the east and a lane to the south and west may well have provided some degree of observation. Residential properties adjoining the south may have given the site some monitor. However, this would have been dependent on the vigilance of individual residents. • In summary, evidence has been found to indicate that incendiary bombs likely fell in the general area of the site in November 1940 given its position between Caversfield House and the Officers accommodation quarters of RAF Bicester. The site is not anticipated to have been particularly conducive towards the observation and detection of UXO in terms of ground cover. As a result, it is not possible to completely discount the possibility that an item of UXO could have fallen on-site, potentially one of the 100-150 incendiary bombs.

	• However, because of the very low density of bombing across the district, it is likely that this incident was thoroughly investigated by the authorities, particularly given the site's proximity – some 20m – to the perimeter of RAF Bicester. This would significantly reduce the risk of UXO going unnoticed and unreported. Therefore, the site has been assessed to be at an overall **Low Risk** from German air-delivered UXO contamination. While active on-site support is not considered necessary, it is strongly recommended that UXO awareness briefings are provided to all staff conducting intrusive works as a minimum precaution.
Allied Ordnance	• The site is situated some 20m from the eastern perimeter of the former RAF Bicester, separated by Fringford Road. RAF approximate and exact site plans indicate that the features closest to the site included accommodation blocks off Skimmingdish Lane. Caversfield House, 170m north-west of the site, also appears to have been used as billets during the war.[9] • Bicester had been used by the Royal Flying Corps from 1917 until 1920. After 1938/1939 RAF Bicester housed both bomber and fighter planes. It was used throughout the war as a training station, and by Fighter Command from 1943. Bicester became a non-flying unit towards the end of 1944. Post-war, gliding became the predominant activity at the airfield. RAF Bicester ceased as an active military airfield in 1976.[10] • Owing to the site's position within 20m of RAF Bicester's perimeter, the most credible pathway for LSA and SAA contamination within the site is considered to be improper disposal or munitions dumping. It remains unclear whether any such activity did indeed occur. However, despite its proximity to RAF Bicester, the site was separated by Fringford Road. Furthermore, given that the areas of the airfield located closest to the site were used for accommodation, it is unlikely that any improper disposal of LSA and SAA took place, although it cannot be entirely discounted. The risk from Allied UXO contamination has therefore been assessed as **Low**.

[9] *https://planningregister.cherwell.gov.uk/Document/Download?module=PLA&recordNumber=62341&planId=109561&imageId=117&isPlan=False&fileName=9174433.pdf*

[10] Robin J. Brooks, *Oxfordshire Airfields in the Second World War* (Newbury: Countryside Books, 2001), p. 85.

15. The Likelihood that UXO Remains

15.1. Introduction

It is important to consider the extent to which any explosive ordnance clearance (EOC) activities or extensive ground works have occurred on site. This may indicate previous ordnance contamination or reduce the risk that ordnance remains undiscovered.

15.2. UXO Clearance

1st Line Defence has found no evidence in the public domain or within internal records that any official ordnance clearance operations have taken place on site. Note however that we have not received confirmation of this fact from the 33 EOD Regiment Archive (now part of 29 EOD & Search Group). It should also be noted that in addition to 29 EOD & Search Group archival information, 1st Line Defence also do not currently have access to data that may be relevant including 5131(BD)SQN Archive, SD Training Technical Advisory Section (TAS) and MACA Records (bomb disposal callouts).

If such information is available at a later date, it is recommended that it be reviewed as it will assist with understanding both levels and types of contamination likely to be present, and may indicate risk reduction in certain areas.

15.3. Post-War Redevelopment

A residential property, South Lodge, and its associated riding stables were constructed on site. Several access routes now lead onto the site from Aunt Ems Lane and Fringford Road.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

16. The Likelihood of UXO Encounter

16.1. Introduction

For UXO to pose a risk at a site, there should be a means by which any potential UXO might be encountered on that site.

The likelihood of encountering UXO on the site of proposed works would depend on various factors, such as the type of UXO that might be present and the intrusive works planned on site. In most cases, UXO is more likely to be present below surface (buried) than on surface.

In general, the greater the extent and depth of intrusive works, the greater the risk of encountering. The most likely scenarios under which items of UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Generally speaking, the risk of encountering any type of UXO will be minimal for any works planned within the footprint and down to the depth of post-war foundations and excavations.

16.2. Encountering Air Delivered Ordnance

Since an air delivered bomb may come to rest at any depth between just below ground level and its maximum penetration depth, there is a chance that such an item (if present) could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level as well as at depth.

16.3. Land Service/Small Arms Ammunition Encounter

Items of LSA and SAA are mostly encountered in areas previously used for military training. Such items could have been lost, burnt, buried or discarded during being in use by the military. Due to this, LSA are most likely to be encountered at relatively shallow depths – generally in the top 1m below ground level. Therefore, such items are most likely to be encountered during open excavation works. In some cases, there is the potential that LSA or SAA may be present on the surface of the ground – especially in areas with active military use or were recently in use by the MoD.

17. The Likelihood of UXO Initiation

17.1. Introduction

UXO does not spontaneously explode. Older UXO devices will require an external event/energy to create the conditions for detonation to occur. The likelihood that a device will function can depend on a number of factors including the type of weaponry, its age and the amount of energy it is struck with.

17.2. Initiating Air Delivered Ordnance

Unexploded bombs do not spontaneously explode. All high explosive filling requires significant energy to create the conditions for detonation to occur.

In recent decades, there have been a number of incidents in Europe where Allied UXBs have detonated, and incidents where fatalities have resulted. There have been several hypotheses as to the reason why the issue is more prevalent in mainland Europe – reasons could include the significantly greater number of bombs dropped by the Allied forces on occupied Europe, the preferred use by the Allies of mechanical rather than electrical fuzes, and perhaps just good fortune. The risk from UXO in the UK is also being treated very seriously in many sectors of the construction industry, and proactive risk mitigation efforts will also have affected the lack of detonations in the UK.

There are certain construction activities which make initiation more likely, and several potential initiation mechanisms must be considered:

UXB Initiation	
Direct Impact	Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
Re- starting the Clock	A small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion would have taken place within the fuze mechanism over the last 70+ years that would prevent clockwork mechanisms from functioning. Nevertheless, it was reported that the clockwork fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-start.
Friction Impact	The most likely scenario resulting in the detonation of a UXB is friction impact initiating the shock-sensitive fuze explosive. The combined effects of seasonal changes in temperature and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive which could detonate the main charge.

17.3. Land Service /Small Arms Ammunition Initiation

Items of LSA generally do not become inert or lose their effectiveness with age. Time can cause items to become more sensitive and less stable. This applies equally to items submerged in water or embedded in silts, clays, or similar materials. The greatest risk occurs when an item of ordnance is struck or interfered with. This is likely to occur when mechanical equipment is used or when unqualified personnel pick up munitions.

If left alone, an item of LSA will pose little/no risk of initiation. Therefore, if it is not planned to undertake construction/intrusive works at the site, the risk of initiation of any LSA that may be present would be negligible. Similarly, those accessing a contaminated area would be at minimal risk if they do not interfere with any UXO present on the ground. Clearly for many end uses, however, the presence of UXO anywhere on a site would not be acceptable as it could not be guaranteed that the items will not be handled, struck or otherwise affected, increasing the likelihood of initiation.

Items of SAA are much less likely to detonate than LSA or UXBs, but can be accidentally initiated by striking the casing, coming into contact with fire, or being tampered with/dismantled. It is likely that the detonation of an item of SAA would result in a small explosion, as the pressure would not be contained within a barrel. Detonation would only result in local overpressure and very minor fragmentation from the cartridge case.

18. Consequences of Initiation/Encounter

18.1. Introduction

The repercussions of the inadvertent detonation of UXO during intrusive ground works, or if an item or ordnance is interfered with or disturbed, are potentially profound, both in terms of human and financial cost. A serious risk to life and limb, damage to plant and total site shutdown during follow-up investigations are potential outcomes. However, if appropriate risk mitigation measures are put in place, the chances of initiating an item of UXO during ground works is comparatively low.

The consequences of encountering UXO can be particularly notable in the case of high-profile sites (such as airports and train stations) where it is necessary to evacuate the public from the surrounding area. A site may be closed for anything from a few hours to a week with potentially significant cost in lost time. It should be noted that even the discovery of suspected or possible item of UXO during intrusive works (if handled solely through the authorities), may also involve significant loss of production.

18.2. Consequences of Detonation

When considering the potential consequences of a detonation, it is necessary to identify the significant receptors that may be affected. The receptors that may potentially be at risk from a UXO detonation on a construction site will vary depending on the site specific conditions but can be summarised as follows:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

19. 1st Line Defence Risk Assessment

19.1. Risk Assessment Stages

Taking into account the quality of the historical evidence, the assessment of the overall risk from unexploded ordnance is based on the following five considerations:

1. That the site was contaminated with unexploded ordnance.
2. That unexploded ordnance remains on site.
3. That such items will be encountered during the proposed works.
4. That ordnance may be initiated by the works operations.
5. The consequences of encountering or initiating ordnance.

19.2. Assessed Risk Level

1st Line Defence has assessed that there is an overall **Low Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is also an assessed **Low Risk** from Allied unexploded ordnance.

Ordnance Type	Risk Level			
	Negligible	Low	Medium	High
German Unexploded HE Bombs		✓		
German 1kg Incendiary Bombs		✓		
Anti-Aircraft Artillery Projectiles		✓		
Allied Land Service and Small Arms Ammunition		✓		

Please note – although the risk from unexploded ordnance on this site has been assessed as 'Low', this does not mean there is 'no' risk of encountering UXO. This report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified throughout this report. Our reports take a common-sense and practical approach to the assessment of risk, and we strive to be reasonable and pragmatic in our conclusions.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk where necessary. The mitigation measures outlined in the next section are recommended as a minimum precaution to alert ground personnel to the history of the site, what to look out for, and what measures to take in the event that a suspect item is encountered. It should also be noted that the conclusions of this report are based on the scope of works outlined in the 'Proposed Works' section of this report. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.

20. Proposed Risk Mitigation Methodology

20.1. General

The following risk mitigation measures are recommended to support the proposed works at Aunt Ems Lane, Caversfield:

Type of Work	Recommended Mitigation Measure
All Works	• **UXO Risk Management Plan** It is recommended that a site-specific plan for the management of UXO risk be written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc. Contact 1st Line Defence for help/more information. • **Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.** As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

In making this assessment and recommending these risk mitigation measures, if known, the works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, 1st Line Defence should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

1st Line Defence Limited **25/07/2023**

This Report has been produced in compliance with the Construction Industry Research and Information Association (CIRIA) C681 guidelines for the writing of Detailed UXO Risk Assessments.

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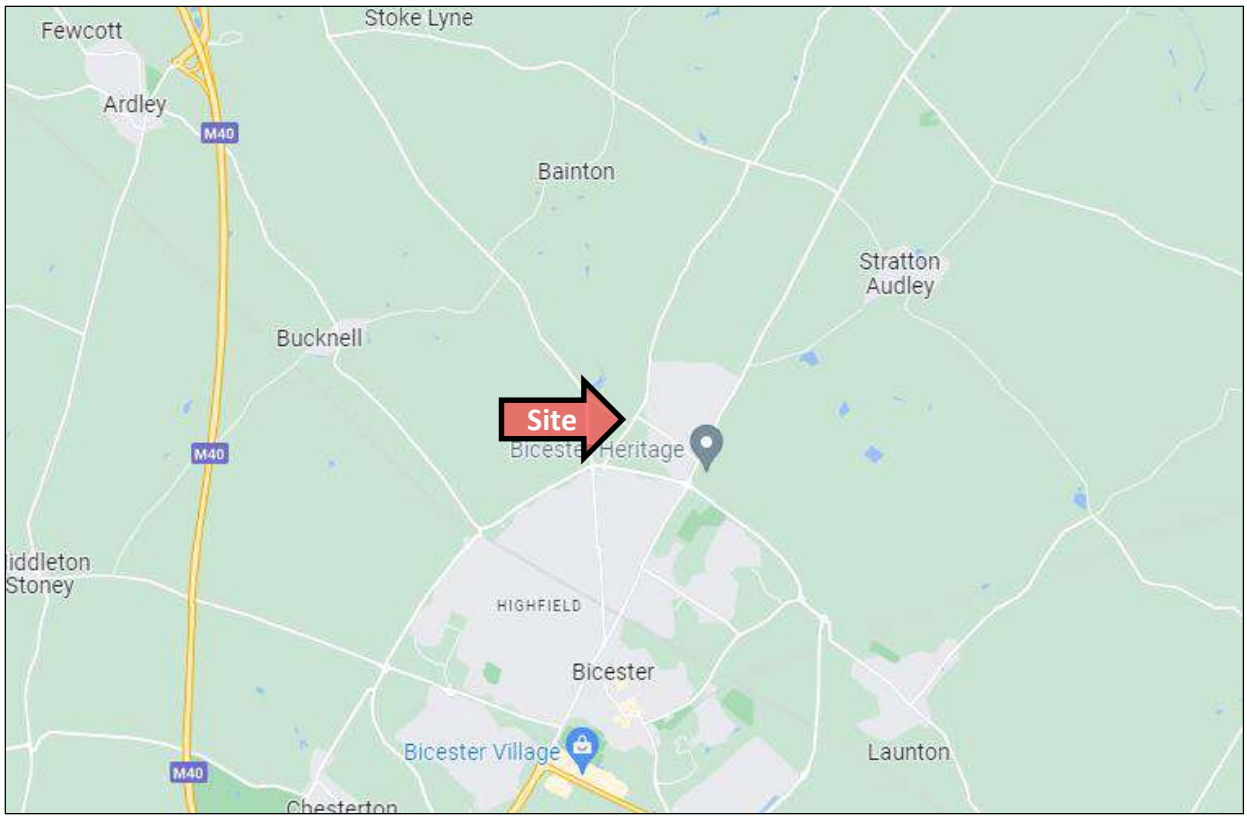
This report has been prepared by 1st Line Defence Limited with all reasonable care and skill. The report contains historical data and information from third party sources. 1st Line Defence Limited has sought to verify the accuracy and comprehensiveness of this information where possible but cannot be 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.

Site Location Maps

Annex: **A**



1ST LINE DEFENCE

Unit 3, Maple Park
Essex Road, Hoddesdon,
Hertfordshire. EN11 0EX
Email: info@1stlinedefence.co.uk
Tel: +44 (0)1992 245 020

Client: **Mewies Engineering Consultants Ltd.**

Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Google Maps

Approximate site boundary

N

Recent Aerial Photography

Annex: **B**

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Approximate site boundary

Project: **Aunt Elms Lane, Caversfield**

N

Ref: **DA18287-00**

Source: Google Earth ™ Mapping Services

Client Provided Site Plan

Annex: **C**

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Approximate site boundary

N

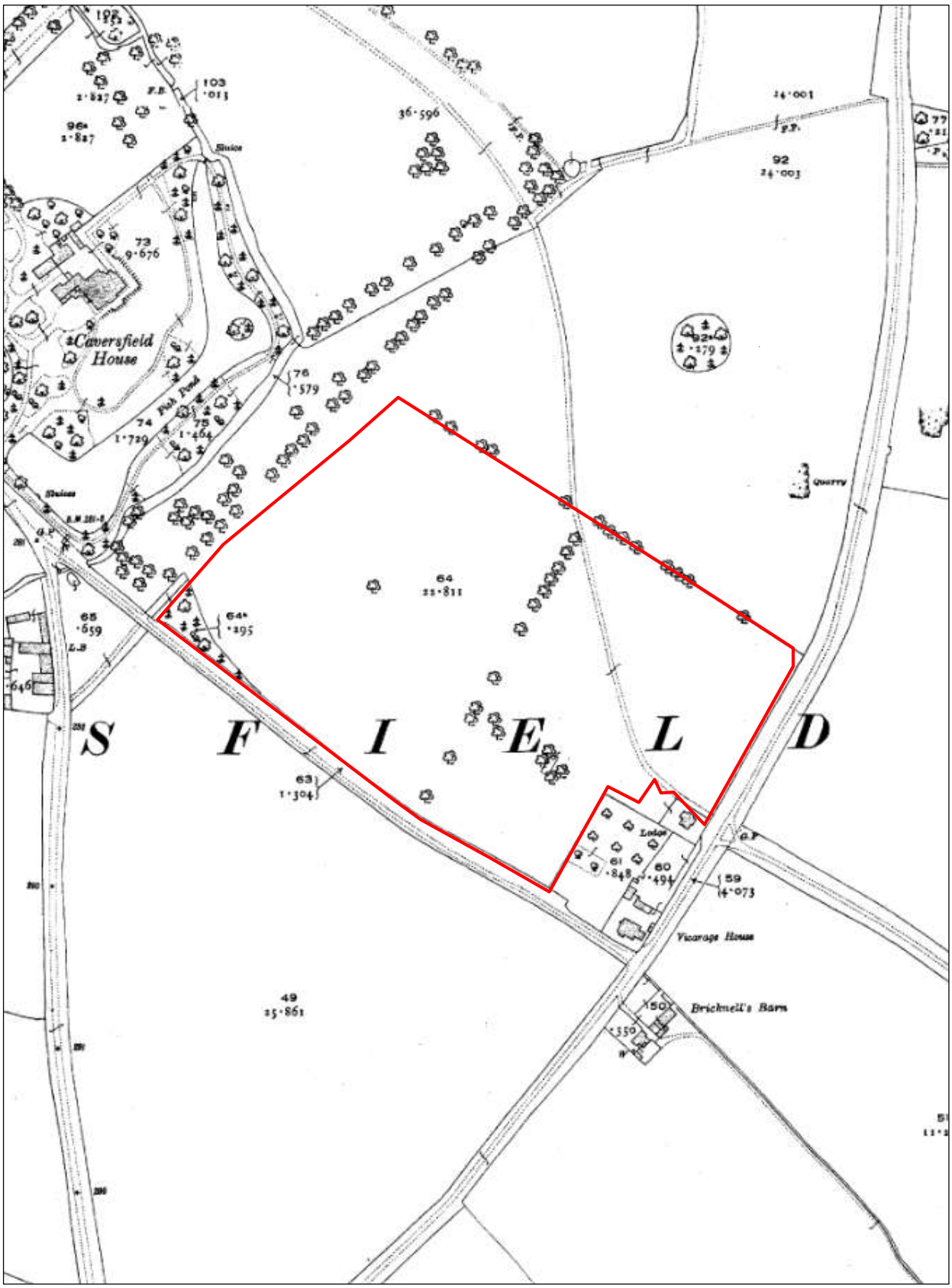
Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Mewies Engineering Consultants Ltd.

Pre-war Historical Map, 1922-1923 (1:2,500)

Annex: D1



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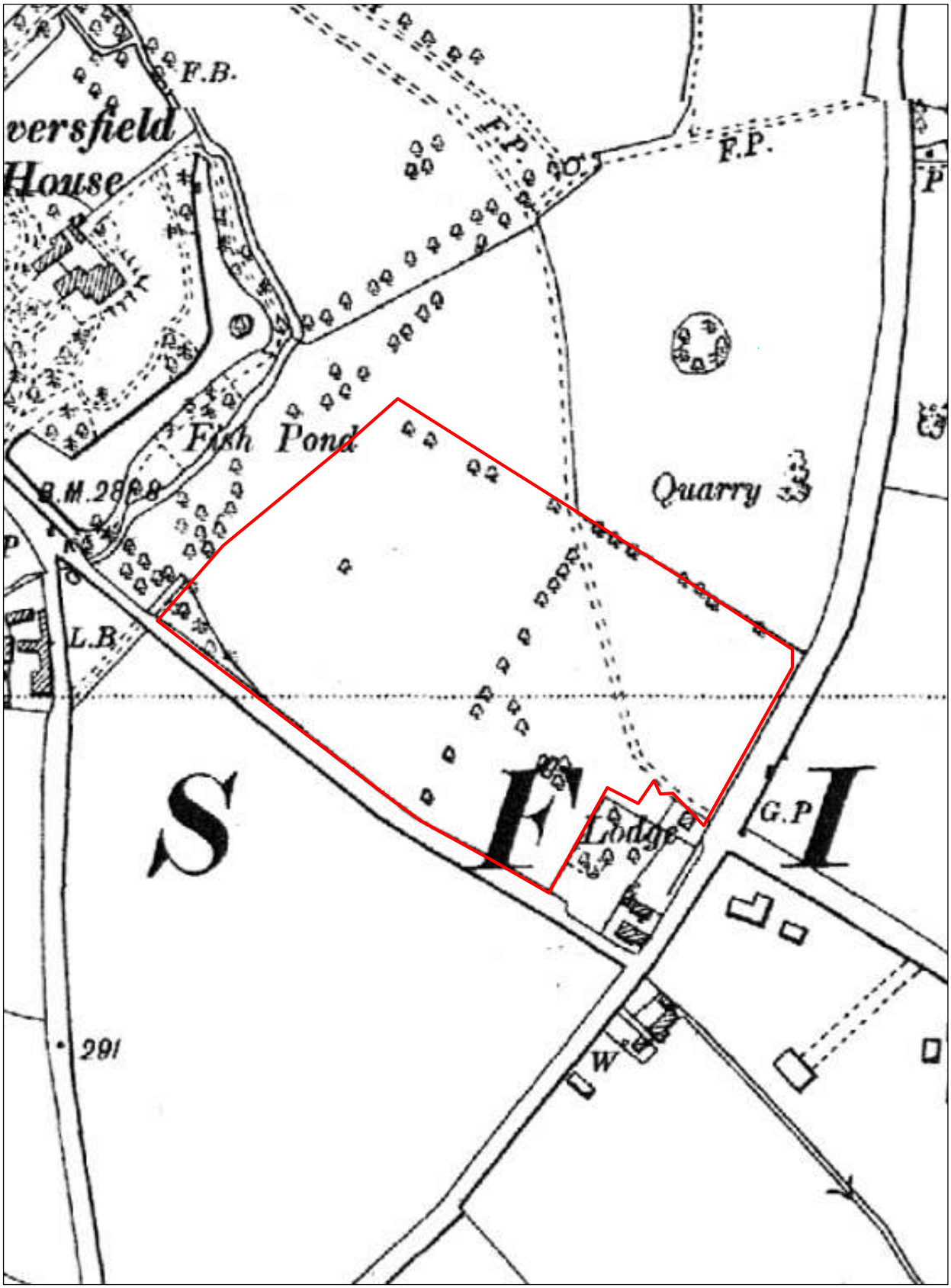
Source: Landmark Maps

Approximate site boundary

N

Pre-war Historical Map, 1938-1952 (1:10,560)

Annex: D2



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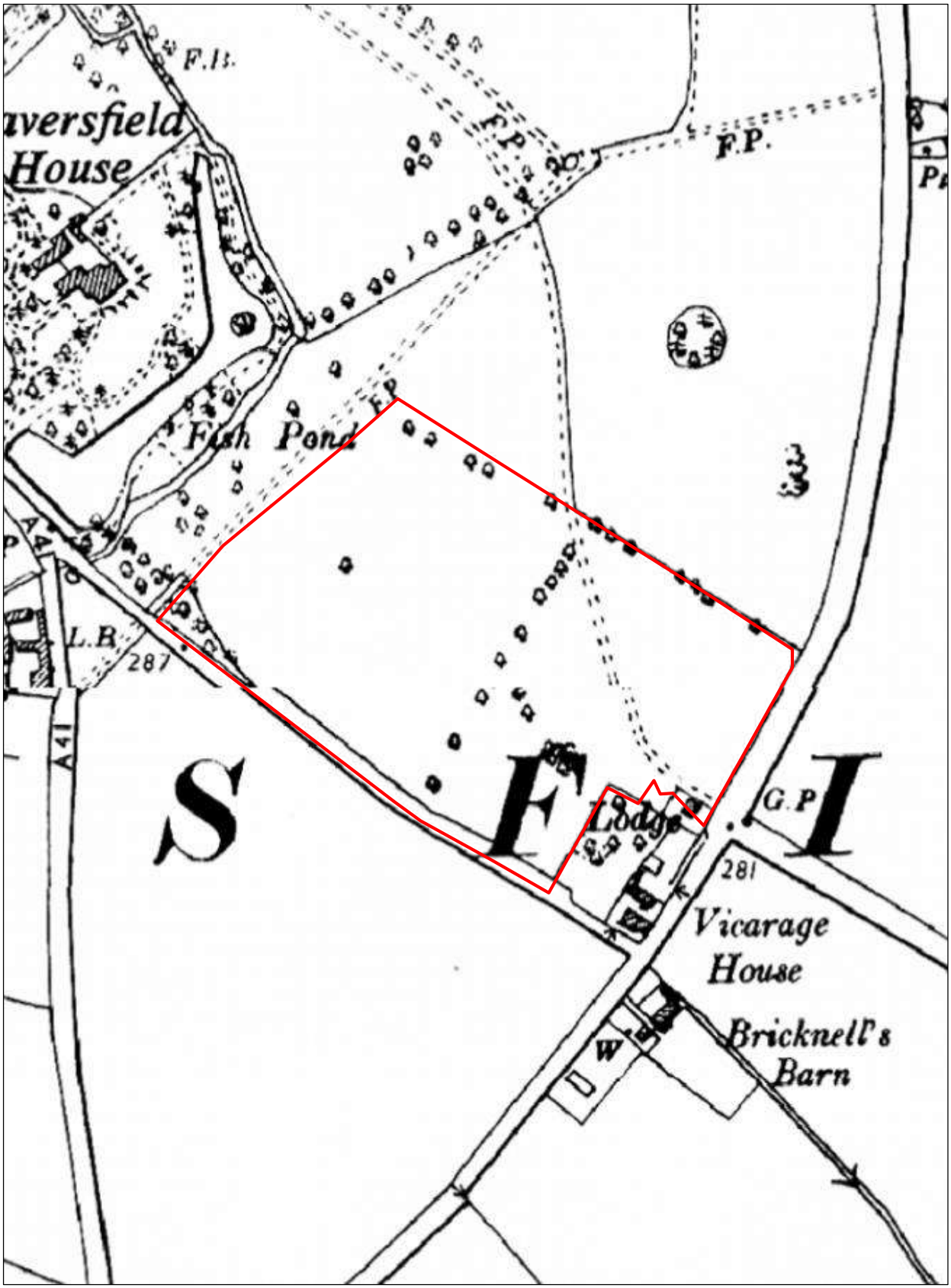
Ref: **DA18287-00**

Source: Landmark Maps

Post-WWII Historical Map, 1955 (1:10,000)

Annex: D3



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N

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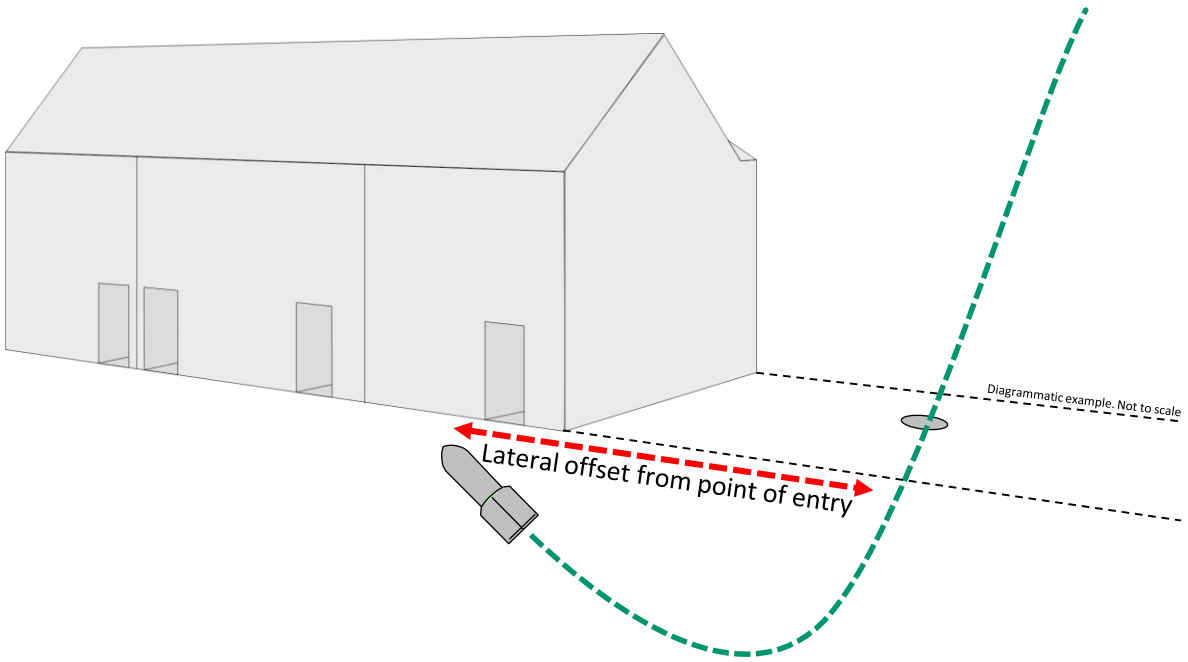
Source: Landmark Maps

Example of UXO Entry Hole / The 'J-curve' Effect Principle



Top: J-curve Effect - Due to angle of entry, unexploded bombs would often end their trajectory at a lateral offset from point of entry, often ending up beneath adjacent extant structures/sites. The photograph above shows a 250kg unexploded bomb found in Bermondsey in 2015, pointing upwards, demonstrating 'J-curve'.

One of the most common scenarios for UXO going unnoticed was when a UXB fell into a 'bomb site' (such as the area shown **Top Left**), the entry hole of the bomb obscured by any debris and rubble present. Note that the entry hole of a 50kg UXB could be as little as 20cm in diameter (**Left**).

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Ref: **DA18287-00** Source: Various sources

BBC NEWS

Bermondsey bomb: World War Two device safely removed

An unexploded World War Two bomb found in south London has been driven away safely under police and Army escort.

The 500lb (250kg) device was found on a building site in Grange Walk, Bermondsey on Monday.

Two primary schools were closed and hundreds of homes were evacuated as a precaution.

A cordon and 656ft (200m) exclusion zone was lifted at about 18:15 GMT as the bomb was removed to a quarry in Kent to be detonated, police said.

The Metropolitan Police force said the device was a 'SA' 250kg WWII German air-dropped bomb, known to the Army's Royal Logistic Corps bomb disposal experts.

250kg German HE Bomb, March 2015

BBC NEWS

WW2 bomb found near London City Airport blown up

An unexploded World War Two bomb found near London City Airport has been detonated.

The 500kg device was discovered at the King George V Dock on Sunday during planned work at the airport.

It was closed and all flights were cancelled on Monday after an exclusion zone was put in place.

The detonation, which took take place off Shoeburyness, Essex, was postponed on Tuesday because of high winds and dangerous conditions for divers.

The 1.5m-long German bomb - which was found in a bed of silt, 15m underwater - was carefully removed from the Thames and placed in a secure location a mile away from the coast of Essex.

500kg German HE Bomb, February 2018

BBC NEWS

Exeter WW2 bomb is detonated after homes evacuated

More than 2,600 households and 12 university halls of residence were cleared before the 2,200lb (1,000kg) device **was destroyed** on Saturday.

Police said the blast left a crater about the size of a double-decker bus.

Police have reported large pieces of metal debris hitting buildings and said some properties in the 100m (330ft) exclusion zone had sustained "structural damage".

1000kg German HE bomb, February 2021

BBC NEWS

Great Yarmouth: Huge blast after unplanned WW2 bomb detonation

A World War Two bomb found in Great Yarmouth has detonated while work was being done to defuse it, causing a huge blast that was heard for miles.

Army specialists were attempting to disarm it when there was an unplanned detonation at about 17:00 GMT.

People on social media said they heard a loud bang and felt buildings shake 15 miles (24km) away.

There have been no reports of injuries among the Army, emergency services or the public, Norfolk Police said.

Cordons were put in place when the bomb was first discovered close to two gas pipes on Tuesday, and work began to make it safe.

250kg German HE Bomb, February 2023

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Ref: **DA18287-00**

Source: BBC News

Examples of Unexpected Detonation of WWII Bombs in Europe

Annex: F2

BASF has confirmed that an explosive device, most likely a World War II-era bomb, caused the blast that left one person injured Tuesday at a plant construction site in Germany.

The explosion was reported at BASF's Ludwigshafen toluene diisocyanate (TDI) plant, which recently broke ground for a 300,000 metric tons per year TDI production plant and other construction to expand its facilities.

BASF Provides Some Details

Responding to a request from *PaintSquare News* for more information on Wednesday (Feb. 27), BASF's manager of media relations and corporate communications Europe, Ursula von Stetten, wrote in an email, "So here [are] the facts: The detonation took place at 10:00 a.m. One person was injured; the injury is not serious. He will be kept in the hospital for some days.

"Cause of the detonation was an explosive device, presumably a bomb deriving from the Second World War. The device detonated when grounding work was done. No details on [a] delay [are] available. At the moment, the exact circumstances of the incident are [being] evaluated."

1st March 2013

SPIEGEL ONLINE

Blast Kills One

World War II Bomb Explodes on German Motorway

A highway construction worker in Germany accidentally struck an unexploded World War II bomb, causing an explosion which killed him and wrecked several passing cars.

A World War II bomb has exploded during construction work on a German highway, killing one worker and injuring several motorists who were driving past, police said.

The worker had been cutting through the road surface near the south-western town of Aschaffenburg when his machine struck the bomb and triggered it. Police said they weren't sure yet what type of bomb it was. "The explosion seems to have been too small for it to have been an aircraft bomb," a police spokesman said.

23rd October 2006

WWII bomb injures 17 at Hattingen construction site

Seventeen people were injured on Friday when a construction crew unwittingly detonated a buried World War II-era bomb in Hattingen.

An excavator apparently drove over a 250-kilogramme (550 pound) American bomb, damaging surrounding buildings. Most of the injured suffered auditory trauma from the blast, and the excavator operator suffered injuries to his hands, police in the German state of North Rhine-Westphalia said.

"The hole was astoundingly small for such a large bomb full of so many explosives," Armin Gebhard, head of the Arnsberg department for military ordnance removal, told The Local. "But of course it damaged all the surrounding buildings too. We are really happy it wasn't worse."

19th September 2013

BBC NEWS

World War II bomb kills three in Germany

A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

The blast happened an hour before the defusing operation was due to start.

Officials said the three men who died were experienced sappers, or combat engineers, who over 20 years had defused up to 700 bombs.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

2nd June 2010

June 2006

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Ref: **DA18287-00**

Source: Various news sources

Examples of Land Service Ammunition finds in the UK

Annex: F3

Unexploded Second World War bomb discovered under Somerset footpath

By Western Daily Press | Posted: January 21, 2014

The unexploded bomb was found in Somerset.

Comments (0)

An unexploded bomb dropped in Britain during the Second World War has finally been discovered – underneath a popular footpath in Somerset.

Unexploded WW2 bomb found at Kenfig Pool, Bridgend

Dean Smith believes the shell was made in Germany

Bomb experts have been called to a south Wales nature reserve after an unexploded World War Two shell was discovered by a walker in Bridgend.

Dean Smith, 38, of Pyle, was walking near Kenfig Pool on Saturday when he saw a fin sticking out of the sand.

He reached down to pick it up, but ending up falling and landed with the 2ft-long (0.6m) bomb on top of him.

The site has been cordoned off by police and the Royal Logistics Corps will carry out a controlled explosion.

Related Stories

'Panic' as dog nearly thrown grenade

WW2 bomb found at wind farm exploded

WWII bomb found in kitchen cupboard

Mortar thought to be from WWII found on Oshawa's Camp-X grounds

August 24, 2018 | 5:42 am

What is believed to be a World War II mortar has been discovered in south Oshawa. A man out in Intrepid Park, the site of the Camp-X Second World War training grounds, discovered the round with his metal detector on Tuesday evening. Durham police are held the scene overnight awaiting military officials from Trenton to come and properly detonate the mortar.

Unexploded bomb found in farmer's field

17 Mar 2016

A live Second World War mortar shell was blown up by Army experts after a farmer found it in his field.

The discovery was made in the field alongside the A20 between Folkestone and Dover.

The mortar shell, which was around a foot long and 3in in diameter, was around 50ft from the main road.

The farmer alerted police and PC Trevor Moody and PCSO Michelle Brady went to the field.

PC Moody contacted the Army who sent in a bomb disposal unit.

An Army officer confirmed the live shell was from the Second World War and was packed with high explosives.

They moved it a safe distance away from the A20 and carried out a controlled explosion.

PC Moody said: "Given that we live in an area that saw much action during the Second World War, it is not uncommon for us to be alerted about unexploded bombs."

The incident was on Thursday.

• Click here for more news from Kent

Royal Navy bomb disposal experts remove a World War Two shell discovered in a nature reserve

- A World War Two bomb was discovered in a Plymouth nature reserve
- Amateur metal detector found the shell and partially dug it up
- Royal Navy experts carried the explosive away before disposing of it

By VALERIE EDWARDS FOR MAILONLINE

PUBLISHED: 01:29, 13 January 2016 | UPDATED: 09:58, 13 January 2016

Share 338 shares 10 View comments

A World War Two bomb was reportedly found at Efford Nature Reserve in Plymouth after a member of the public was metal detecting and partially dug it up.

The Royal Navy Bomb Disposal team was called in to remove the bomb and police have closed off Military Lane, with the possibility of Military Road also being closed.

Police were called at around 1.30pm yesterday after what appeared to be a shell was discovered and partially dug up near Military Lane, Efford.

Holiday beach cordoned off after landslip sends more than a THOUSAND Second World War bombs and rockets tumbling onto the sands

- Bad weather led to ground movement which exposed the huge arsenal at Mappleton, East Riding
- A dog walker stumbled across the deadly find on Saturday and 15 controlled explosions were carried out
- Rockets, mortar bombs and 25-pounder bombs were recovered after they were fired into the cliffs by RAF aircraft during the war
- Most of the devices were dummy rounds used for bombing practice but contain enough explosives to cause terrible injuries

© Jonathan Pow

Bomb Beach Alley: Rockets were found after a landslide on Mappleton beach in 2012

Army bomb disposal team called to Blacksole Bridge in Herne Bay

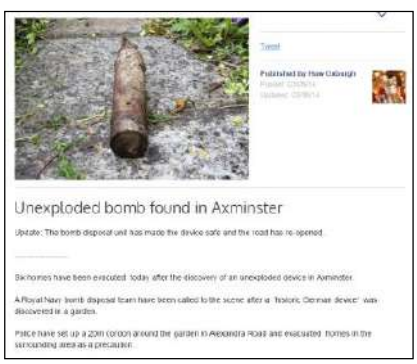
by Aidan Barlow abarlow@thekentgroup.co.uk 08 July 2015

It was like a scene from Dad's Army when Army bomb disposal experts found wartime explosives made by the Home Guard in makeshift bottles.

A team was called to the Blacksole Bridge in Herne Bay after the wartime bombs were found.

The team from the Royal Logistics Corps set up a 50 metre exclusion zone for pedestrians around the railway embankment after the suspected homemade phosphorous bombs were found.

The scene at Blacksole Bridge after wartime explosives were found in the railway cutting



Unexploded bomb found in Axminster

Update: The bomb disposal unit has made the device safe and the road has re-opened.

Six homes have been evacuated today after the discovery of an unexploded device in Axminster.

A Royal Navy bomb disposal team have been called to the scene after a "historic German device" was discovered in a garden.

Police have set up a 220m cordon around the garden in Alexandra Road and evacuated homes in the surrounding area as a precaution.

Storms and floods unearth unexploded wartime bombs

By Claire Marshall

BBC environment correspondent

There has been a dramatic increase in the number of wartime bombs unearthed because of the winter storms and flooding.

Bomb disposal teams in the South West have dealt with double the number of unexploded ordnance than in the same period last year.

Since mid December, the Royal Navy's Southern Dive Unit has recovered or disposed of 244 items of ordnance.

During the same period last year, they dealt with just 108 items.

The storms have uncovered a lethal past

Almost 70 years after the end of WWII, one legacy of that conflict continues to turn up on beaches and harbours around Britain.

Unexploded shells, bombs and mines continue to be discovered every year, and the Royal Navy's Southern Dive Unit is tasked with making these devices safe.

Its area of responsibility stretches for some 2,250km (1,400 miles). It begins from the highwater mark in Hull and proceeds seaward to the territorial limit, and then runs clockwise around the British Isles - including the Isle of Wight, Channel Islands, and Isles of Scilly - to finish in Liverpool.

Related Stories

Ancient trees revealed by storms

Land Service Ammunition (LSA) resulting from historic military activity is commonly encountered across the UK by the public and construction industry alike. Such finds are much more common in rural areas than in urban environments, and can often be anticipated in areas such as former RAF stations or ranges. However, such items are also encountered entirely by surprise where the landowner or developer has no knowledge of any previous military use of the land.

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Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Various news sources

'Unexploded bomb' Upper Heyford: Cordon lifted

3rd April 2019

BICESTER

POLICE have lifted a cordon in a village near Bicester after safely removing two unexploded bombs.

Both devices have been safely removed and all police units have now left the scene.

The local school, Heyford Park Free School, was not evacuated, but the public were being urged to avoid the Upper Heyford area earlier.

The Explosive Ordance Disposal team arrived at a building site on the former RAF Upper Heyford earlier today, with Camp Road cordoned off.

The area has now reopened and police say there is 'no danger' to the public. One device was safely disposed of yesterday, before a second bomb was discovered.

Thames Travel said last night that Camp Road had been closed, with witnesses suggesting a bomb disposal unit was on the scene.

In a statement earlier this morning, police explained: "Officers from **Thames Valley Police** are currently in Upper Heyford, Oxfordshire, following reports of historic ordnance being located. Officers from the Explosive Ordnance Disposal (EOD) Unit are currently attending to assess the device."

The statement continued: "A cordon is currently in place around the area and a road closure is in place in Camp Road. There is no impact on the local primary school which is open as usual. Members of the public are, however, advised to avoid the immediate area until further notice.

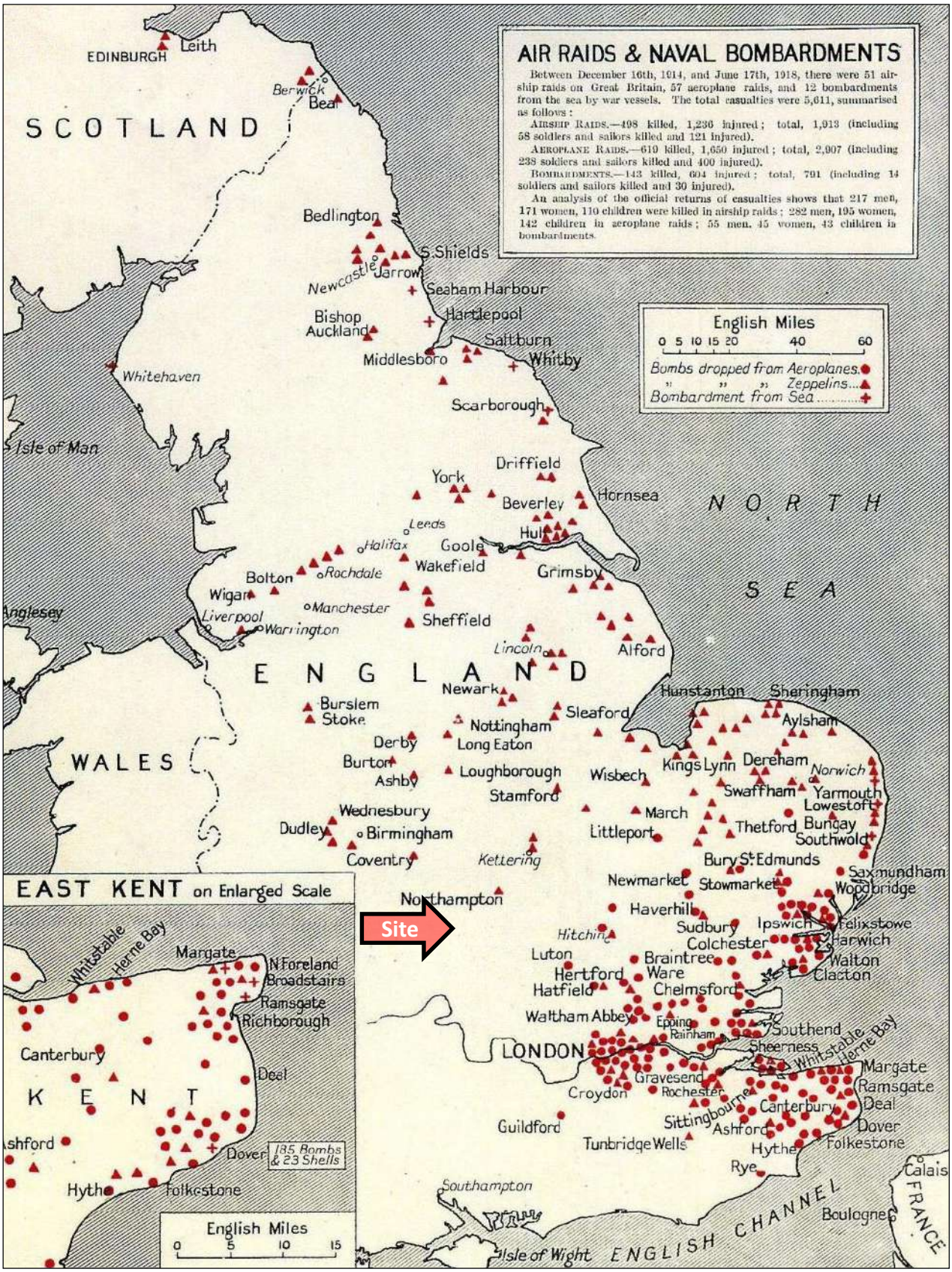
"A further device was located at the same site yesterday at around 3.50pm and was disposed of safely by the EOD."
They later added: "The device has been removed, and all units have left scene."

Last night a caller told the Oxford Mail that an "unexploded mortar bomb has been discovered and it has closed off most of Upper Heyford."

The site of RAF Upper Heyford, which was in use from 1918 - 1994, used to be home to the US air force.
Now known as Heyford Park, 1,000 homes were approved for the area in September.

WWI Map of Air Raids and Naval Bombardments

Annex: **G**



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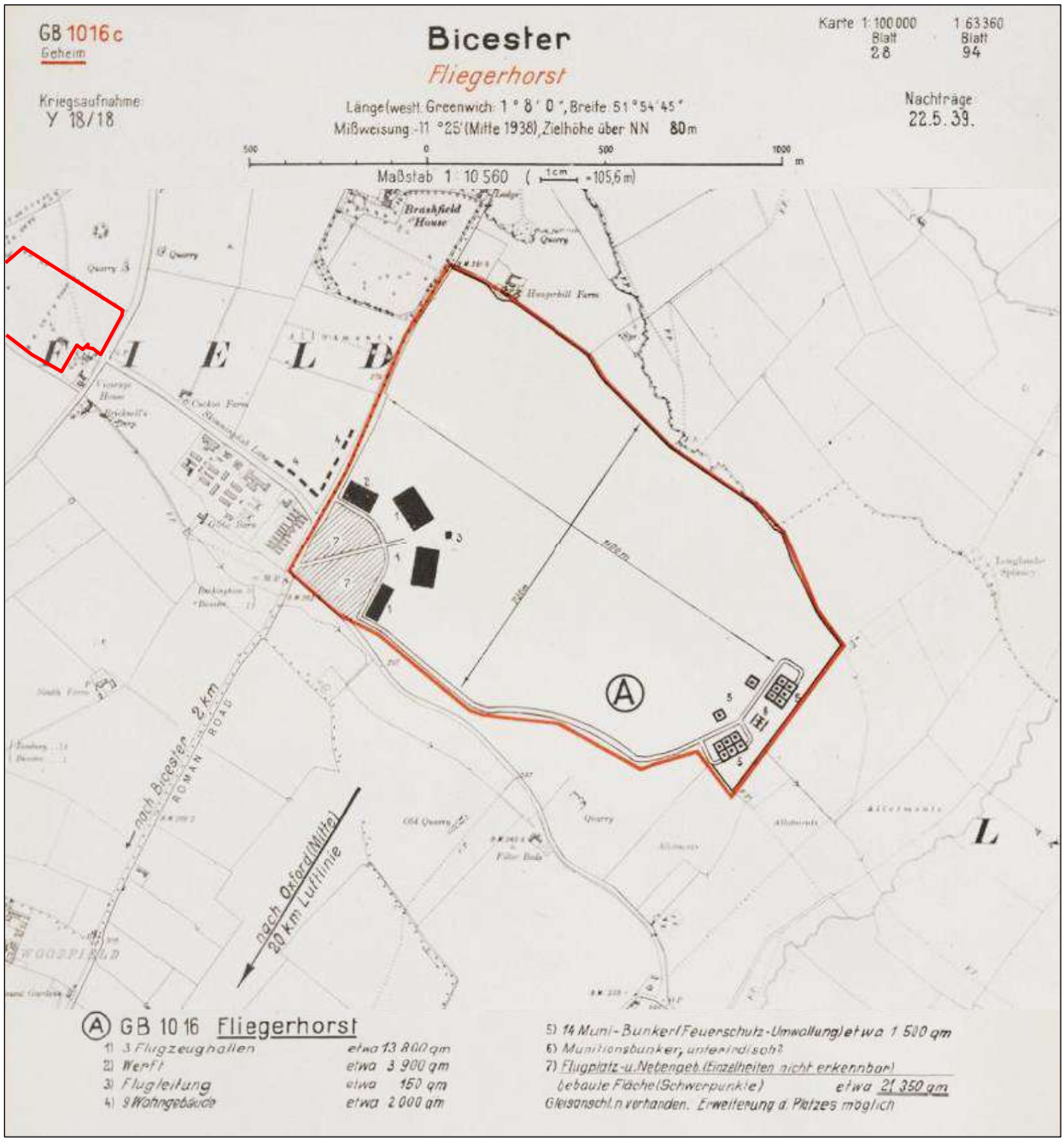
Source: J. Morris, *German Air Raids on Britain*



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Client: **Mewies Engineering Consultants Ltd.**

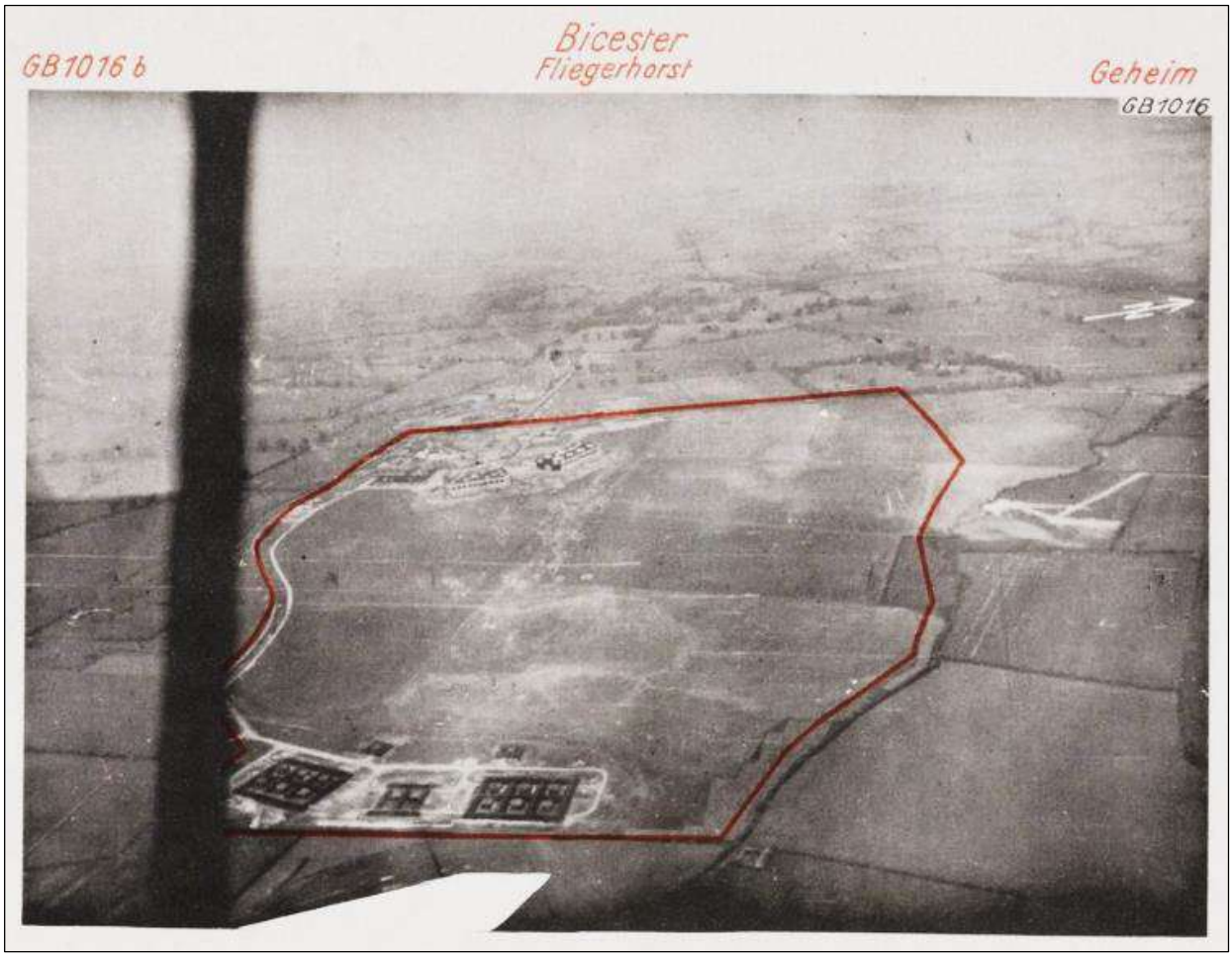
Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Imperial War Museum

Approximate site boundary

N



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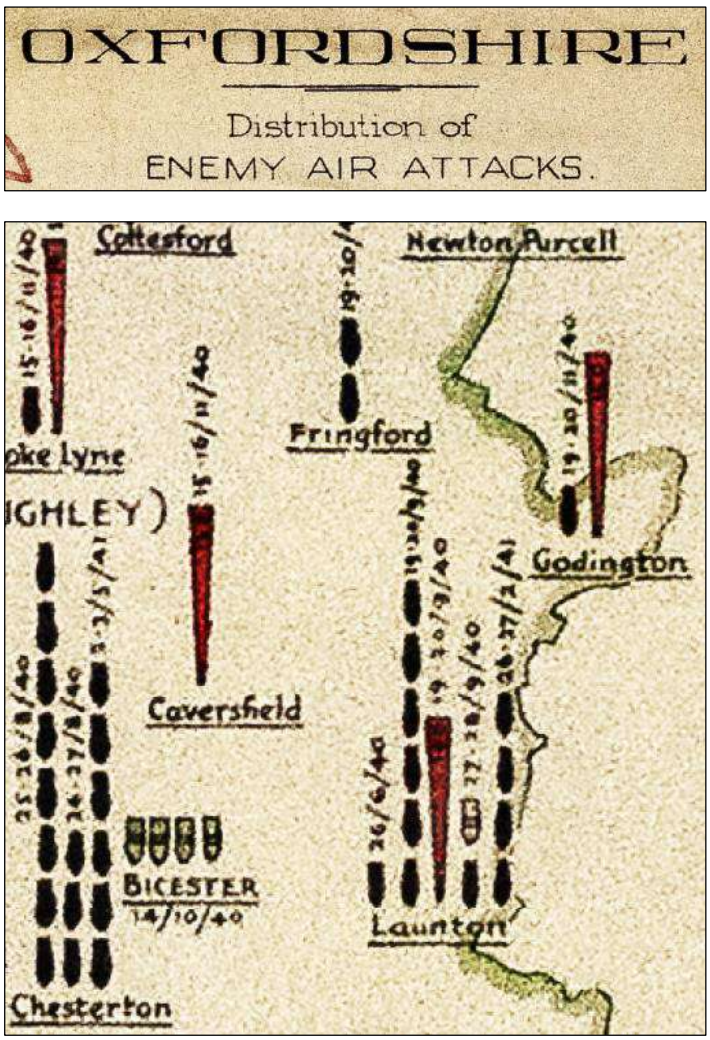

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Source: Oxfordshire History Centre

N

PAGE 67.

REGISTER OF AIR RAIDS AND ALARMS

DATE 15th/16th NOVEMBER, 1940.

I. SIGNALS

		TIME Oxford	Henley
a. Air Raid message	Yellow	1822/15	1813/15
b. Lights warning	Purple	-	-
c. Action warning	Red	1850/15	2215/15
d. Cancel action	White	2400/15	0638/16

II. BOMBS

		No. dropped
High Explosive	H.E.	1 (at 2325/15)
		1 (at 2330/15)
Medium		1 (at 2400/15)
		7 (at 0051/16)
Incendiary	I.B.	100- 150 (at 2320/15)
Smoke		Several (at 2400/15)
Delayed action		1 (at 2325/15)
Unexploded		
Poison Gas:	Type:-	

Machine Gunning

Where dropped BICESTER (100 to 150 I.B. at 2320/15). STOKE LYNE (1 H.E. and 1 I.B. at 2325/15). CHINNOR (1 H.E. at 2330/15). WHITCHURCH (1 H.E. and several I.B. at 2400/15). MIXBURY (7 H.E. at 0051/16).

Remarks. Bicester. These I.B.'s fell in the vicinity of Caversfield House. One bomb dropped through the roof of the gardner's lodge, setting fire to bedding and furniture. Another bungalow was slightly damaged.

III. SERVICES CALLED

First Aid

Fire — Bicester Fire Brigade put out fire in cottage at Caversfield lodge.

A. F. S.

DEMOLITION

Decontamination

Rescue

~~Road Repair~~ — Rescue Squad turned out to clear road at Stoke Lyne.

Utilities

IV. DAMAGE

a. Utilities

Gas

Electricity

Water

Sewers

G. P. O. LINES

b. Roads

c. Buildings — Bicester. Gardner's cottage, Caversfield House damaged, bedding and furniture on fire. Another bungalow slightly damaged. Stoke Lyne. 3 windows broken in cottage. Whitchurch. Windows broken. Mixbury. Glass in windows of Mixbury Hall smashed.

d. Livestock

1ST LINE DEFENCE

Unit 3, Maple Park
Essex Road, Hoddesdon,
Hertfordshire. EN11 0EX
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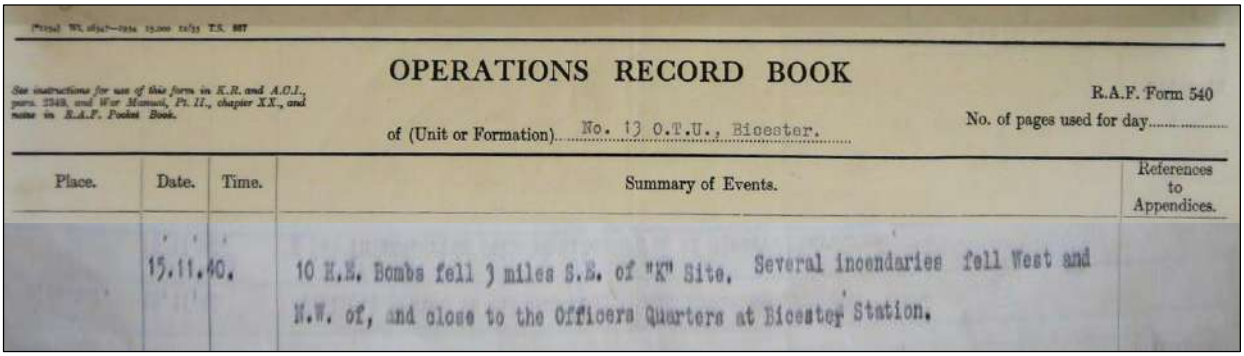
Tel: +44 (0)1992 245 020



OPERATIONS RECORD BOOK

See instructions for use of this form in K.R. and A.C.I., para. 2348, and War Manual, Pt. II., chapter XX., and same in R.A.F. Pocket Book.

R.A.F. Form 540

of (Unit or Formation) No. 13 O.T.U., Bicester.

No. of pages used for day.....

Place.	Date.	Time.	Summary of Events.	References to Appendices.
	15.11.40.		10 H.E. Bombs fell 3 miles S.E. of "K" Site. Several incendaries fell West and N.W. of, and close to the Officers Quarters at Bicester Station.	

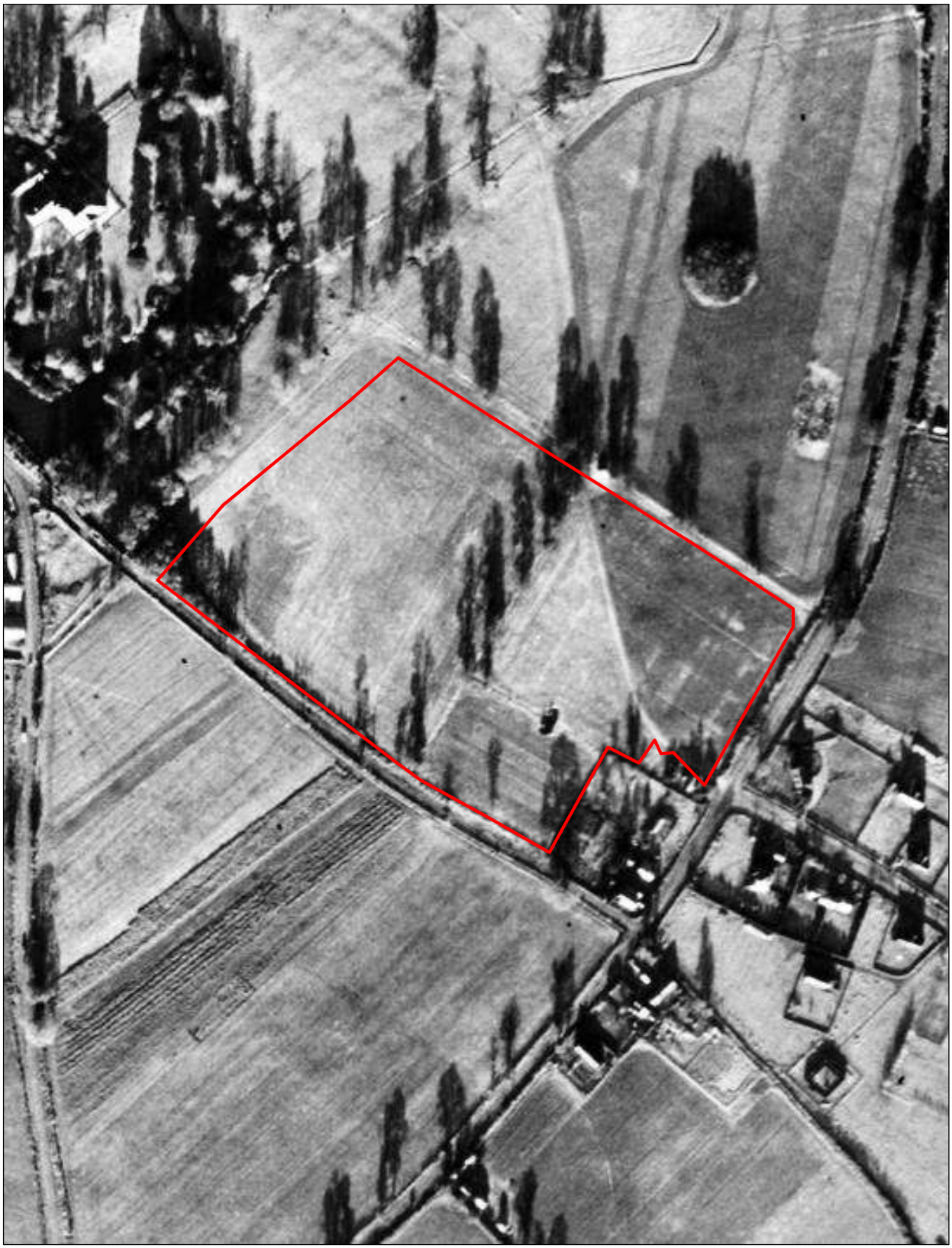
Transcription:

Date: *15th November 1940*

Summary of Events: *10 high explosive (HE) fell three miles south-east of "K" Site. Several incendiaries fell west and north-west of, and close to the Officers Quarters at Bicester Station.*

RAF Aerial Photography, 12th December 1946

Annex: **L1**



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Email: info@1stlinedefence.co.uk
Tel: +44 (0)1992 245 020

Client: **Mewies Engineering Consultants Ltd.**

Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

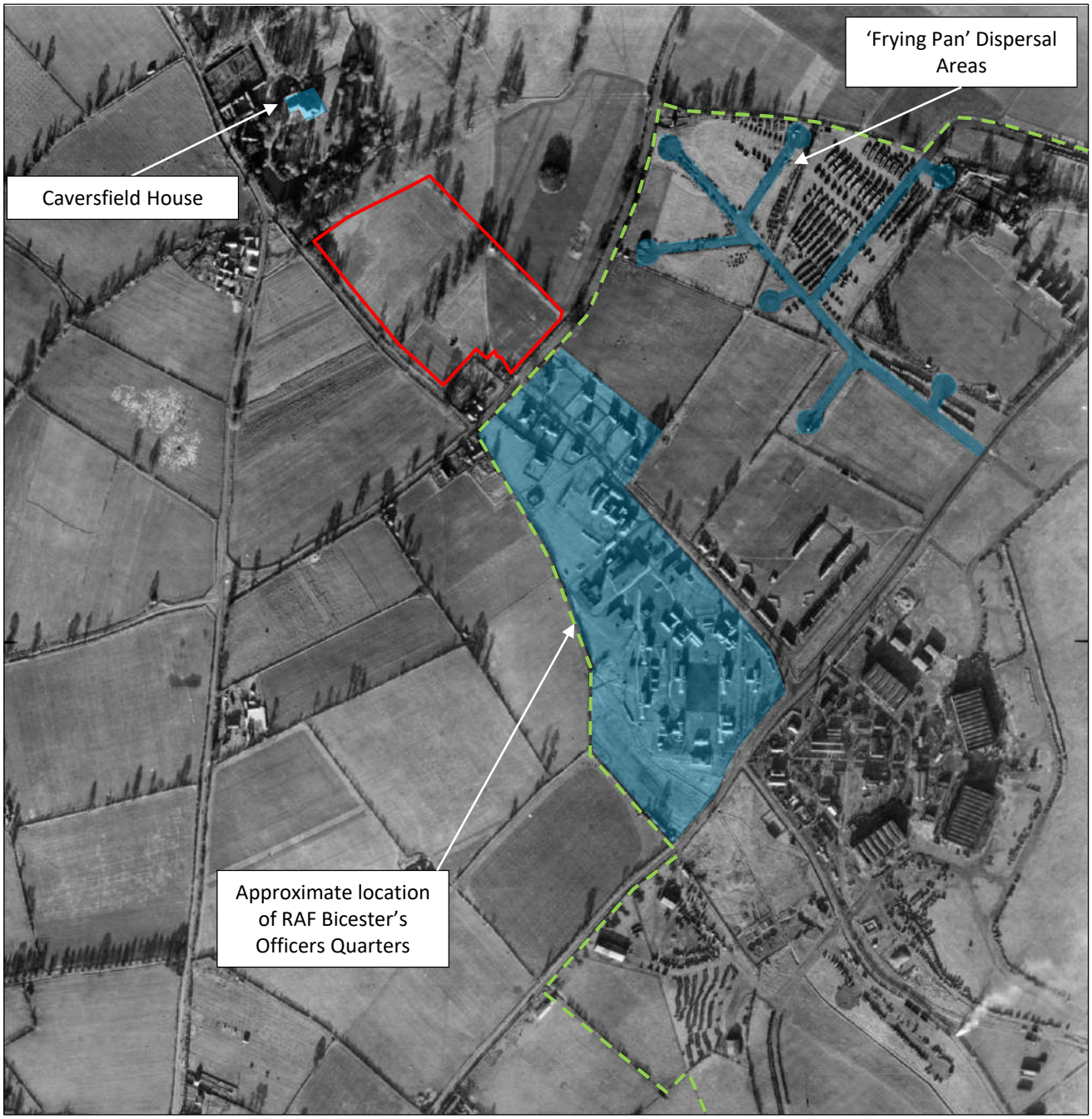
Source: National Monuments Record Office (Historic England)

Approximate site boundary

N

RAF Aerial Photography, 12th December 1946

Annex: L2



Approximate Airfield Perimeter

1ST LINE DEFENCE

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Tel: +44 (0)1992 245 020

Client: **Mewies Engineering Consultants Ltd.**

Approximate site boundary

N

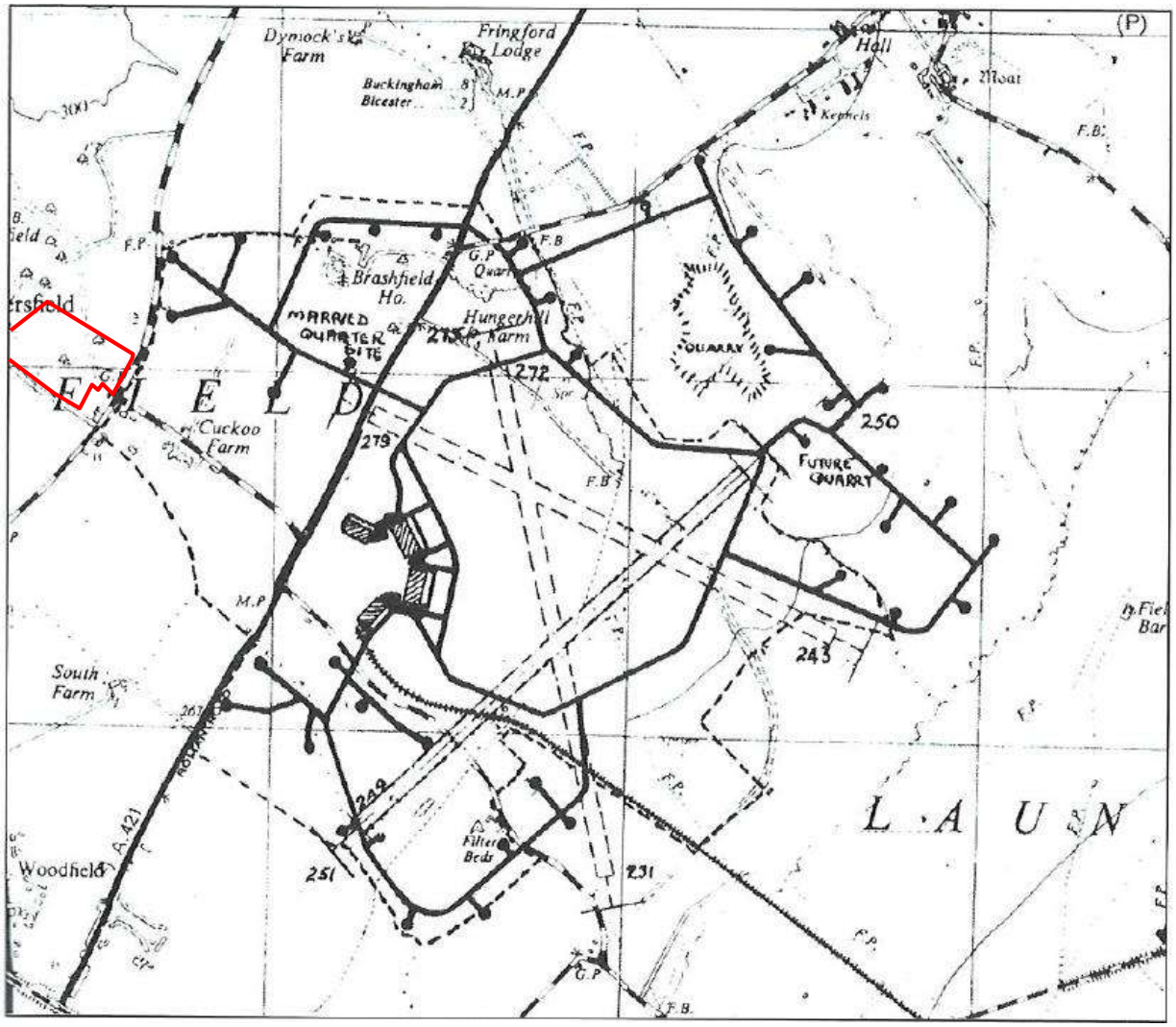
Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: 1st Line Defence

RAF Bicester Approximate Site Plan

Annex: **M1**



AIRFIELD NAME: BICESTER. OPENED : 1917. Focus 38
COUNTY : Oxfordshire. CLOSED :
COMMAND : Fighter.
FORMATION : !2 Grp[Watnall] GRID REF: L 044450[94]
FUNCTION : Operational Training Unit[satellite] O.S.REF.: SP 598245.
LOCALITY : 1.75miles NNE of Bicester. CIT
RAILWAY STN. : Bicester 1mile[GWR]

LATITUDE : 51 54 53N. HEIGHT ASL : 270' LIGHTING : None.
LONGITUDE : 01 08 00W. FLYING CONTROL : Yes. RADIO : QDM.

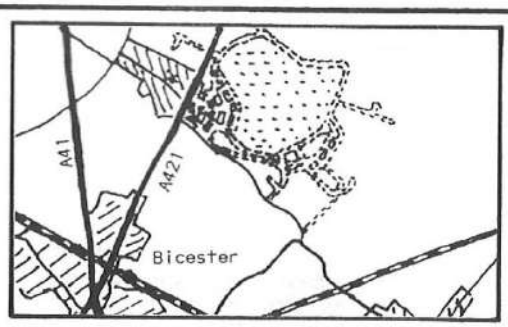
LANDMARKS : Brickwork chimneys 6miles E. Town of Bicester
DAY 1.5miles SW.

LANDMARKS : -
NIGHT

OBSTRUCTIONS : -

LANDING AREA SURFACE : Grass.

QDM:	LENGTH X WIDTH:	Ext:
NE-SW.	1250yds.	2-2700yds.
SE-NW.	1100yds.	14-2000yds.
E-W.	950yds.	14-2700yds.



EXTENSIBILITY : The Roman Road to W of A/F is already closed & an alternative route exists.
ACCOMMODATION : Permanent.
HANGARS : Type A-2;Type C-2.

HARDSTANDINGS : Tarmac-41.

R.A.F. : OFFICERS: 172.S.N.C.O's.: 428.O.R's.: 1211.TOTAL: 1811.
W.A.A.F.: " : 13. " : 11. " : 576. " : 600.

AFFILIATED AIRFIELDS : Harwell[Parent]

PRESENT USE [1985] : RAF/Army/USAFE.

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Client: **Mewies Engineering Consultants Ltd.**

Approximate site boundary

N

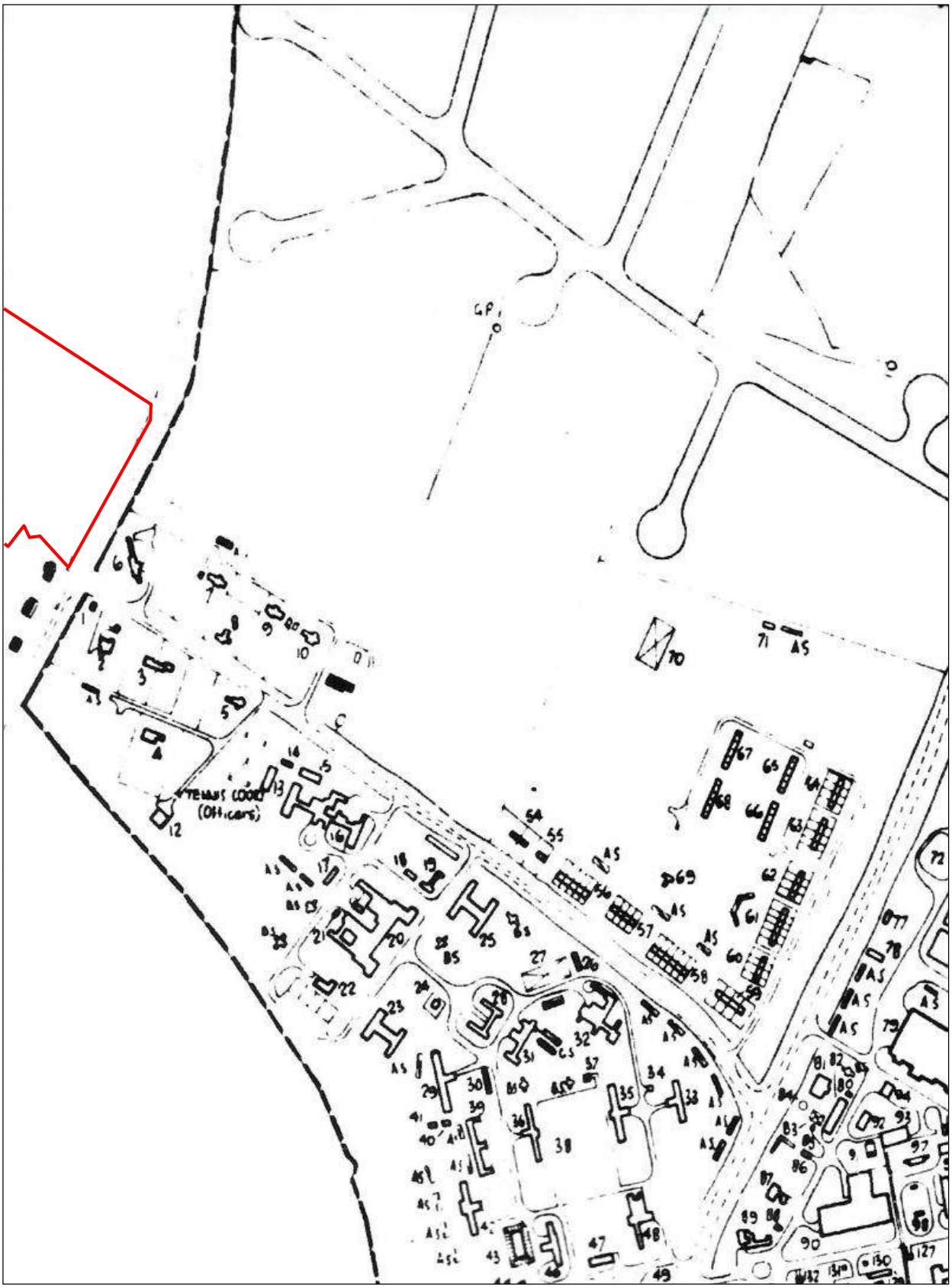
Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Ken Delve, *The Military Airfields of Britain: Northern Home Counties*

RAF Bicester Site Plan

Annex: **M2**



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Client: **Mewies Engineering Consultants Ltd.**

Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: RAF Museum, Hendon

Approximate site boundary

N

RAF Bicester Site Plan – Overlay

Annex: **M3**

1ST LINE DEFENCE

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Client: **Mewies Engineering Consultants Ltd.**

Approximate site boundary

N

Project: **Aunt Elms Lane, Caversfield**

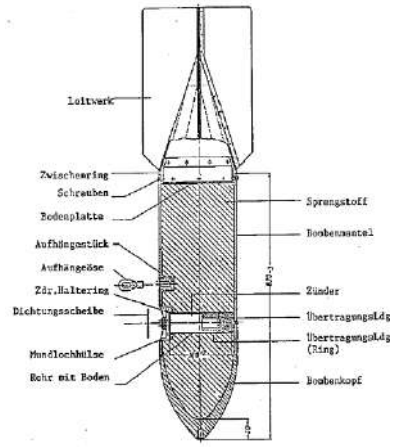
Ref: **DA18287-00**

Source: 1st Line Defence

Examples of German Aerial-Delivered Ordnance

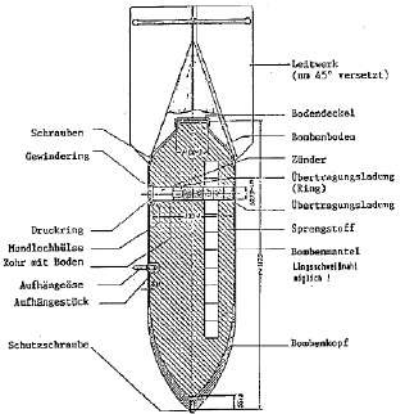
SC 50kg High Explosive Bomb

Bomb Weight	40-54kg (88-119lb)
Explosive Weight	25kg (55lb)
Fuze Type	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions	1,090 x 280mm (42.9 x 11.0in)
Body Diameter	200mm (7.87in)
Use	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.



SC 250kg High Explosive Bomb

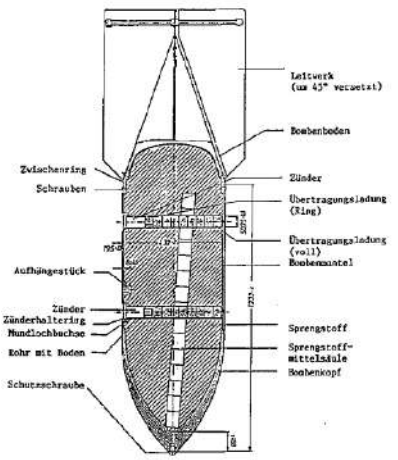
Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.
Remarks	It could be carried by almost all German bomber aircraft and was used to notable effect by the Junkers Ju-87 Stuka (*Sturzkampfflugzeug*, or dive-bomber).

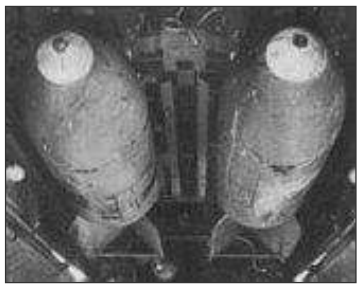



SC250 bomb being loaded onto German bomber

SC 500kg High Explosive Bomb

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, Trialene. Bombs recovered with Trialen filling have cylindrical paper-wrapped pellets, 1-15/16in. in length and diameter.





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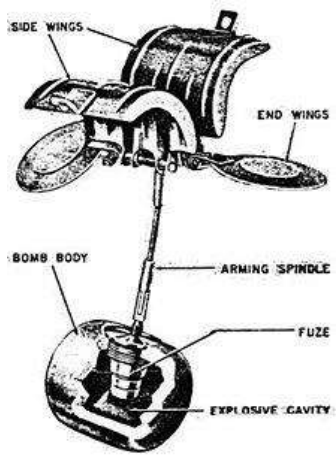
Ref: **DA18287-00**

Source: Various sources

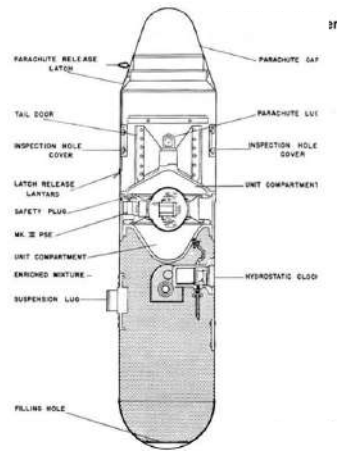
SD2 Anti-Personnel 'Butterfly Bomb'

Bomb Weight	Approx. 2kg (4.41lb)
Explosive Weight	Approx. 7.5oz (225 grams) of Amatol surrounded by a layer of bituminous composition.
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long
Use	Designed as an anti-personnel/fragmentation weapon. They were delivered by air, being dropped in containers of 23-144 sub-munitions that opened at a predetermined height, thus scattering the bombs.
Remarks	Quite rare. First used against Ipswich in 1940, but were also dropped on Kingston upon Hull, Grimsby and Cleethorpes in June 1943, amongst various other targets in UK. As the bombs fell the outer case flicked open via springs which caused four light metal drogues with a protruding 5 inch steel cable to deploy in the form of a parachute & wind vane, which armed the device as it span.



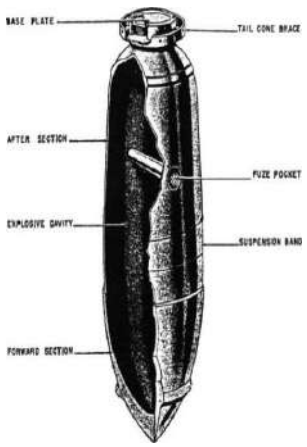
Parachute Mine (Luftmine B / LMB)

Bomb Weight	Approx. 990kg (2176lb)
Explosive Weight	Approx. 705kg (1,554lb)
Fuze Type	Impact/time delay/hydrostatic pressure fuze
Dimensions	2.64m x 0.64m (3.04m with parachute housing)
Use	Against civilian, military and industrial targets. Used as blast bombs and designed to detonate above ground level to maximise damage to a wider area.
Remarks	Deployed a parachute when dropped in order to control its descent. Had the potential to cause extensive damage within a 100m radius.



SC 1000kg

Bomb Weight	Approx. 993-1027kg (2,189-2,264lb)
Explosive Weight	Approx. 530-620kg (1168-1367lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Filling	Mixture of 40% amatol and 60% TNT, but when used as an anti-shipping bomb it was filled with Trialen 105, a mixture of 15% RDX, 70% TNT and 15% aluminium powder.
Bomb Dimensions	2800 x 654mm (110 x 25.8in)
Body Diameter	654mm (18.5in)
Use	SC-type bombs were General Purpose Bombs used primarily for general demolition work. Constructed of parallel walls with comparatively heavy noses, they are usually of three-piece welded construction.



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Project: **Aunt Elms Lane, Caversfield**

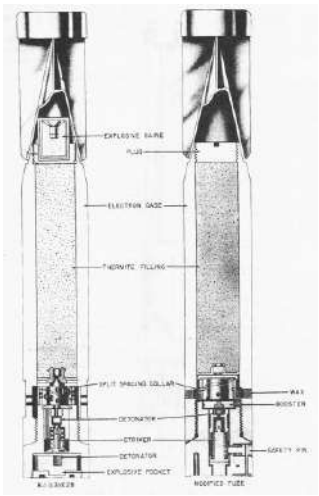
Ref: **DA18287-00**

Source: Various sources

Examples of German Incendiary Bombs

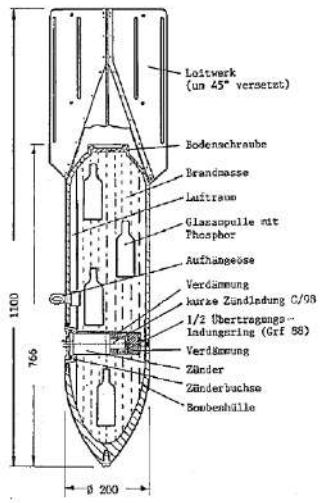
1kg Incendiary Bomb

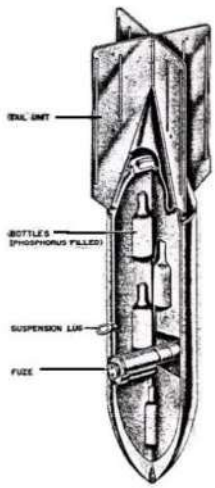
Bomb Weight	Approx. 1.0 - 1.3kg (2.2 and 2.9lb)
Explosive Weight	Approx. 680g (1.5lb) Thermite 8-15gm Explosive Nitropenta
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters on towns and industrial complexes.
Remarks	Magnesium alloy case. Sometimes fitted with high explosive charge. The body is a cylindrical alloy casting threaded internally at the nose to receive the fuze holder and fuze.



C50 A Incendiary Bomb

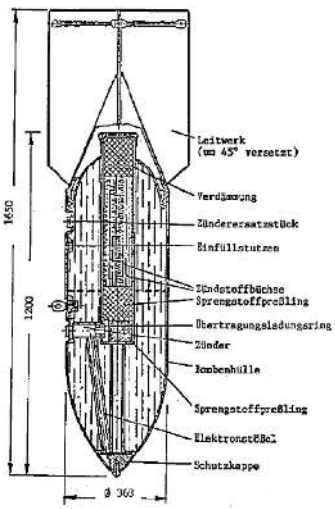
Bomb Weight	Approx. 41kg (90.4lb)
Explosive Weight	Approx. 0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against any targets where an incendiary effect is required.
Remarks	Early fill was a phosphorous/carbon disulphide incendiary mixture.





Flam C-250 Oil Bomb

Bomb Weight	Approx. 125kg (276lb)
Explosive Weight	Approx. 1kg (2.2lb)
Fuze Type	Super-fast electrical impact fuze
Filling	Mixture of 30% petrol and 70% crude oil
Bomb Dimensions	1,650 x 512.2mm (65 x 20.2in)
Body Diameter	368mm (14.5in)
Use	Often used for surprise attacks on ground troops, against troop barracks and industrial installations. Thin casing – not designed for ground penetration.



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Project: **Aunt Elms Lane, Caversfield**

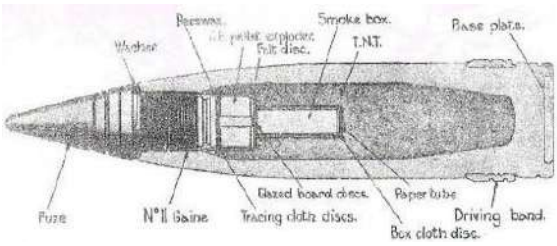
Ref: **DA18287-00**

Source: Various sources

Examples of Anti-Aircraft Projectiles

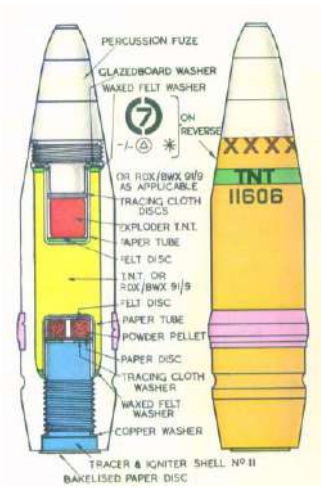
3.7 Inch QF Anti-Aircraft Projectile

Projectile Weight	28lb (12.6 kg)
Explosive Weight	2.52lbs
Fuze Type	Mechanical Time Fuze
Dimensions	3.7in x 14.7in (94mm x 360mm)
Rate of Fire	10 to 20 rounds per minute
Use	The 3.7in AA Mks 1-3 were the standard Heavy Anti-Aircraft guns of the British Army and were commonly used on the Home Front.
Ceiling	30,000ft to 59,000ft



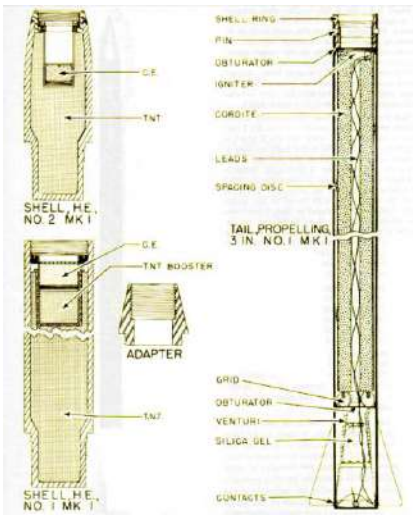
40mm Bofors Projectile

Projectile Weight	1.96lb (0.86kg)
Explosive Weight	300g (0.6lb)
Fuze Type	Impact Fuze
Rate of Fire	120 rounds per minute
Projectile Dimensions	40 x 180mm
Ceiling	23,000ft (7000m)
Remarks	Light quick fire high explosive anti-aircraft projectile. Each projectile fitted with small tracer element. If no target hit, shell would explode when tracer burnt out. Designed to engage aircraft flying below 2,000ft.



3in Unrotated Projectile (UP) Anti-Aircraft Rocket ("Z" Battery)

HE Projectile Weight	3.4kg (7.6lb)
Explosive Weight	0.96kg (2.13lb)
Filling	High Explosive – TNT. Fitted with aerial burst fuzing
Dimensions of projectile	236 x 83mm (9.29 x 3.25in)
Remarks	As a short range rocket-firing anti-aircraft weapon developed for the Royal Navy. It was used extensively by British ships during the early days of World War II. The UP was also used in ground-based single and 128-round launchers known as Z Batteries. Shell consists of a steel cylinder reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor.



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Project: **Aunt Elms Lane, Caversfield**

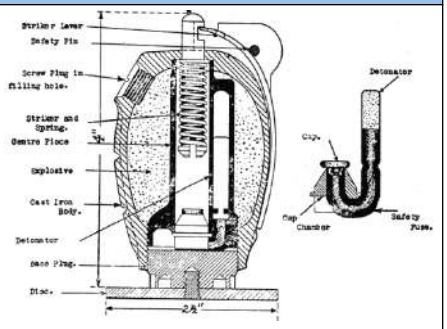
Ref: **DA18287-00**

Source: Various sources

Examples of Land Service Ammunition – Grenades

No. 36 'Mills' Grenade

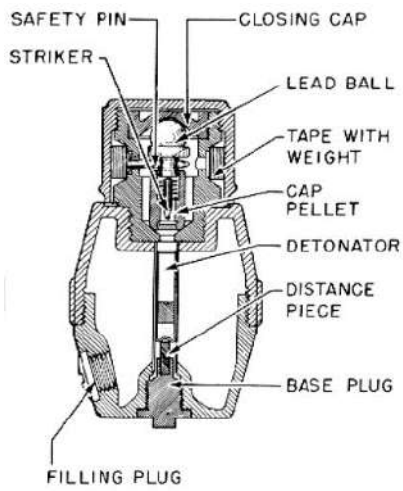
Weight	Approx. 765g filled (1lb 11.25oz)
Explosive Weight	71g (2oz) filling.
Fuze Type	4-7 second delay hand-throwing fuze. No. 6 Detonator
Dimensions	95 x 61mm (4 x 2.4in)
Use	Fragmentation explosive at approx. 30m range 100m range of damage.
Remarks	First introduced in 1915, its classic grooved, cast-iron 'pineapple' design was designed to provide uniform fragmentation. The detonator is inserted before use after removing the base plug.



Left: baseplate and detonator removed

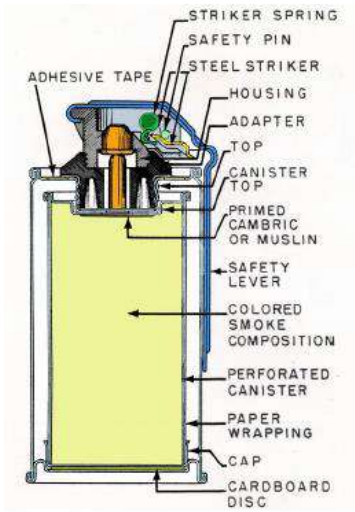
No. 69 Grenade

Weight	Approx. 383g (13.5oz)
Fill Weight	93g (3.25 oz) of either Amatol, Baratol or Lyddite
Fuze Type	'All-ways' fuze. Comprised of a safety cap, a weighted streamer attached to a steel ball bearing and a safety bolt designed to detonate from any point of impact.
Dimensions	115 x 60mm (4.5 x 2 .4 in)
Use	A blast grenade for use as an offensive weapon. Detonator was inserted before use.
Remarks	Introduced December 1940 and made from the plastic Bakelite as opposed to conventional metals. Detection is difficult due to this low metal content.



No. 83 Smoke Grenade

Weight	Approx. 680g (1.5lb)
Explosive Weight	Approx. 170-200g. (6-7 oz)
Fuze Type	Originally used a friction system using a match head composition. Later developed to a striker lever ignition system.
Dimensions	Approx. 62 x 140mm (2.44 x 5.5 in)
Use	Use as a target or landing zone marking device and as a screening method for troop / unit movement.
Remarks	This basic design stayed relatively unchanged up to the 1980's. The letters CCC were often etched into the body of the grenade in the colour of the smoke.



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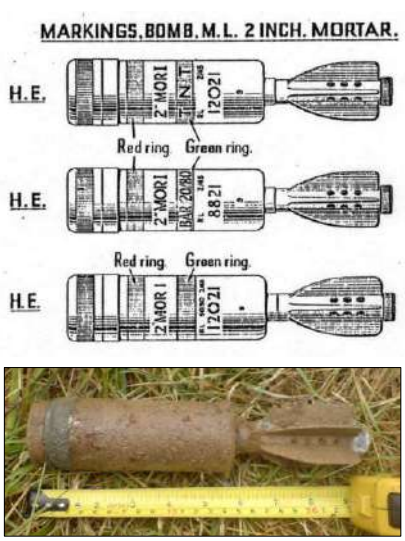
Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00** Source: Various sources

2 inch Mortar High Explosive

Weight	Approx. 1.02kg (2.25lb)
Maximum Range	460m (500yards)
Filling	200g RDX/TNT
Dimensions	51 x 290mm (2in x 11.4 in)
Fuze Type	An impact fuze which detonates the fuze booster charge and in turn the high explosive charge.
Use	It had greater range and firepower over hand and rifle grenades, and was used to attack targets behind cover with high explosive rounds.
Identification	HE has a rounded edge to a flat back. Can either be a black body colour with red and yellow band or dark green with yellow band. Brass cap on top. Practice will have hole all the way through the top.



2 inch Mortar Smoke

Weight	Approx. 910g (2lb)
Maximum Range	460m (500yards)
Filling	White phosphorus and smoke fill
Dimensions	51 x 290mm (2in x 11.4 in)
Fuze Type	An impact fuze which initiates a bursting charge. This ruptures the mortar bomb's body and disperses the phosphorus filler.
Identification	Smoke mortars have a recess and emission holes. May still see light green body paint. Look for stained ground around munition.
Use	As a screening device for unit movement or to impair enemy field of vision.

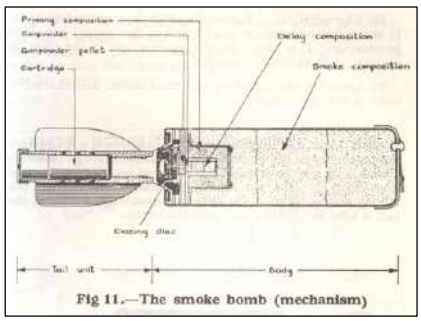
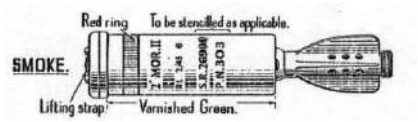
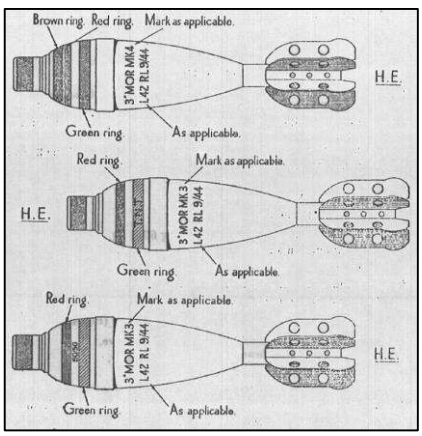


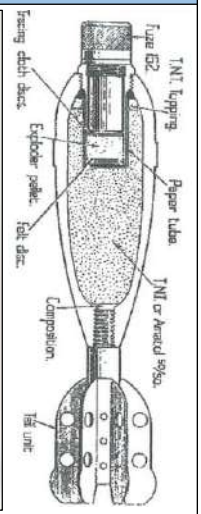
Fig 11.—The smoke bomb (mechanism)



3 inch Mortar High Explosive

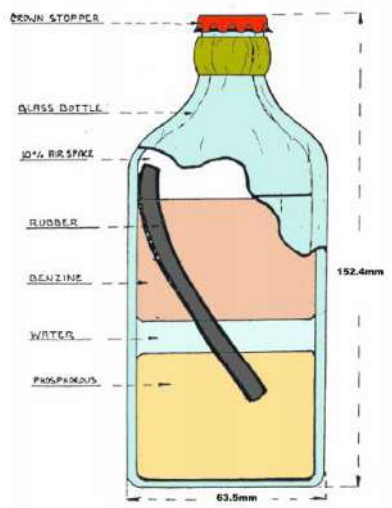
Weight	Approx. 4.5kg (10lb)
Maximum Range	1,460 (Mk1) – 2,560m (Mk2) (1,600 – 2,800yds)
Dimensions	81mm (3in)
Filling	Amatol
Firing Mechanism	Drop, fixed striker
Remarks	Fin-stabilised bomb fired by means of a charge consisting of a primary cartridge in the tail and four secondary cartridges.
Identification	An old style mortar. No way of telling if HE or practice, so treat as HE.





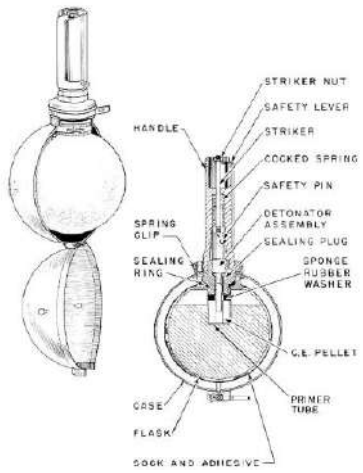
No. 76 Self Igniting Phosphorous (SIP) Grenade

Weight	Approx. 1lb 3oz
Filling	White Phosphorous and Benzene
Design	The filling was contained in a ½ pint sized glass bottle with water and a strip of rubber. Over time the rubber dissolved to create a sticky which would self ignite when the bottle broke.
Use	Originally intended as an anti-tank incendiary weapon deployed by hand. Designed to be produced cheaply without consuming materials needed to produce armaments on the front line.
Remarks	The Home Guard hid caches of these grenades during the war. Not all locations were officially recorded and some caches were lost and encountered post-war. In all cases, the grenades are still found to be dangerous.



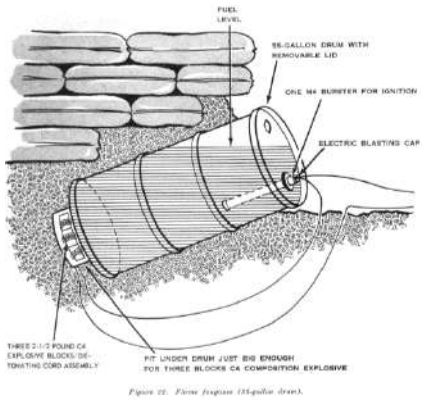
No. 74 Grenade ("Sticky Bomb") Mk1

Weight	Approx. 1.1kg (2.25lb)
Filling	Approx. 600g Nobel's No.283 (Nitro-glycerine) (1.33lb)
Design	A glass ball on the end of a Bakelite (plastic) handle. The inside of the ball would contain the explosive filling and the outside a very sticky adhesive coating.
Use	An anti-tank grenade primarily issued to the home guard. It required the user to come in very close proximity of the target and smash the glass explosive container against it.
Remarks	Timer fuze was located in the handle. This would explode after 3-6 secs.



Flame Fougasse Bomb

Weight	Various
Filling	Initially a mixture of 40% petrol and 60% gas. Ammonal provided the propellant charge.
Design	Usually constructed from a 40-gallon drum dug into a roadside and camouflaged.
Use	As an improvised anti-tank bomb. When triggered the Fougasse could project a beam of burning sticky fuel in a fixed direction from up to 3m (10ft) wide and 27m (30yards) long.
Remarks	A highly unorthodox weapon designed by the Petroleum Warfare Department to address a critical lack of weapons in 1940. 50,000 are estimated to have been distributed around the UK.



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Client: **Mewies Engineering Consultants Ltd.**

Project: **Aunt Elms Lane, Caversfield**

Ref: **DA18287-00**

Source: Various sources

Examples of Small Arms Ammunition

Cannon Ammunition

.303 British Rifle Ammunition

Bullet Diameter	7.92mm
Case length	56.44mm
Overall length	78.11mm
Type	Rifle Ammunition
Propellant	Originally black powder. Later Cordite followed by Nitrocellulose
Remarks	First produced in 1889 and still in use today, the .303inch cartridge has progressed through ten 'marks' which eventually extended to a total of around 26 variations.

Bullet Type	Colour of tip	Colour of Annulus
Armour Piercing	Green	Green
Ball	None	Purple
Incendiary	Blue	Blue
Observing	Black	Black
Proof	None	Yellow
Tracer Short Range	White	Red
Tracer Dark Ignition	Grey	Red
Tracer Long Range	Red	Red

Buried and Decayed Ammunition

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APPENDICES

APPENDIX F

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Doc. Ref.	27877-CALC-0401
Sheet	1 of 14
Engineer	DW
Date	03/08/2023
Revision	-

SOIL INFILTRATION CALCULATIONS FRONT SHEET

SCHEME	Land at Aunt Ems Lane, Caversfield
CLIENT	Richborough Estates Ltd
ASPECTS OF SCHEME TO BE DESIGNED	Soil Infiltration Rate Testing
CODES OF PRACTICE, DESIGN SPECIFICATIONS & BRITISH STANDARDS	Soil Infiltration Rate testing and calculations completed in general accordance with BRE Digest 365 utilising the gravel fill method.
NOTES	The results indicate that infiltration varies across the site dependent on the extent of weathering and fracturing within the limestone bedrock. The results are also impacted by the presence of perched groundwater or damp soils towards the base of the test pits. In general, the infiltration curves flatten out at depths ranging between 1.20m and 1.50m suggesting that infiltration is concentrated within the shallower more weathered layers and limited within the base of the pit where fractures are 'silted up' and the materials are damp and/or water bearing. Tentative infiltration rates have been derived for SA02-SA04 ranging between 1.53 and 3.79 x 10^{-5} m/s, however these cannot be used for design purposes due to the presence of groundwater at shallow depth and only reflect infiltration into the pits sides within the stated depth ranges. The results suggest that the limestones near surface are underlain by impermeable clay strata which is allowing the ponding of percolating water. Further deeper investigation is required, possibly involving rotary drilled boreholes, to confirm the potential for infiltration at greater depth.

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INDEX

Pages	Calculations	Checked by	Approved By	Date
3	Exploratory Hole Location Plan			
4	SA01 – Test 1 Insufficient drainage to derive infiltration rate.			
5	SA02 – Test 1			
6	SA02 – Test 2 lowest result = 1.53 x 10^{-5} m/s			
7	SA02 – Test 3			
8	SA03 – Test 1			
9	SA03 – Test 2 lowest result = 2.49 x 10^{-5} m/s	DT	EM	03/08/2023
10	SA03 – Test 3			
11	SA04 – Test 1			
12	SA04 – Test 2 lowest result = 3.79 x 10^{-5} m/s			
13	SA04 – Test 3			
14	SA04 – Test 4			

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EXPLORATORY HOLE LOCATION PLAN

Project: Aunt Ems Lane, Caversfield

File Ref: 27877

O.S. Grid Ref: 458372, 225038

Postcode: OX27 8TH

- Soakaway Test Location

- Site Boundary

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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	4
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

Soil Infiltration Test - Gravel Filled Method

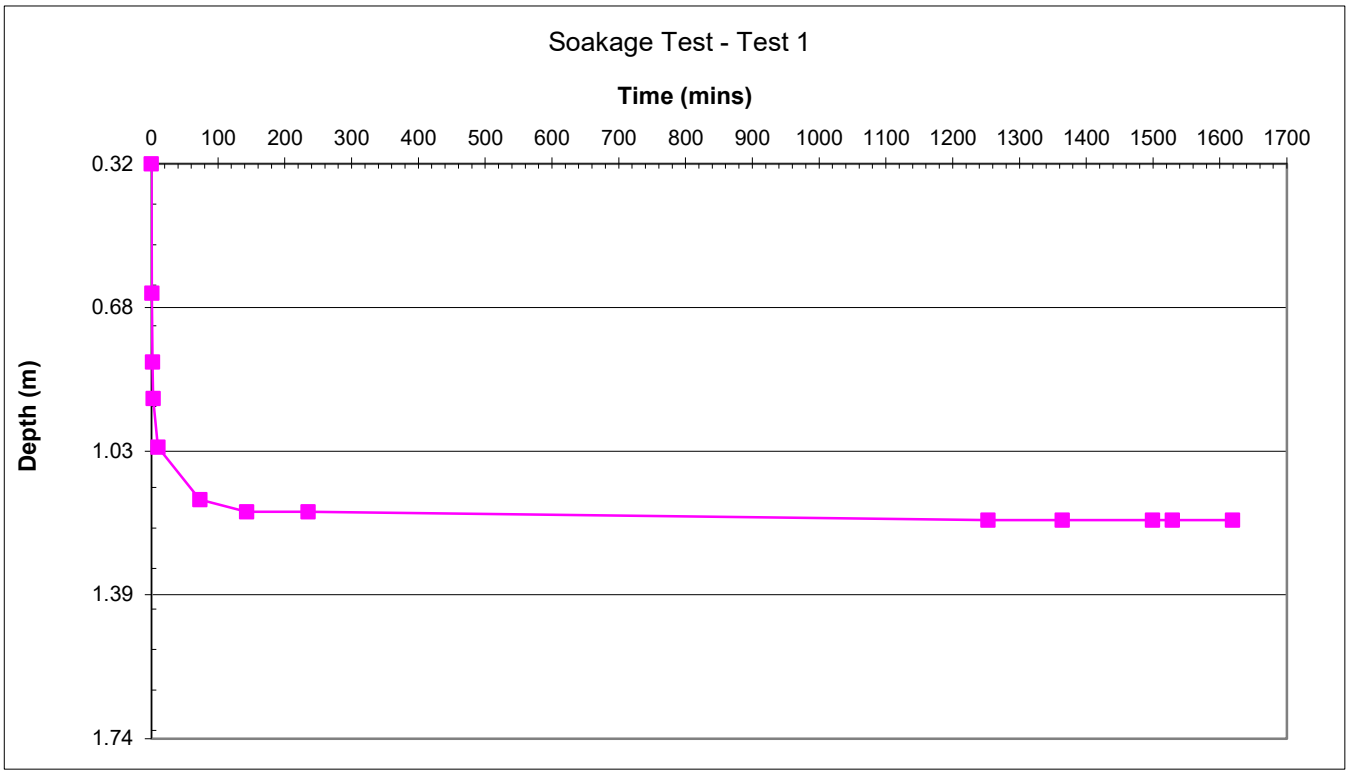
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA01**	**Test 1**
Length	**2.00** m	
Width	**0.45** m	
Depth	**1.74** m	
Ground water level	**Seepage at 1.70m**	
Ground conditions	**0.00-0.25m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.25-0.35m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.35-1.74m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.32
1	0.64
2	0.81
3	0.90
10	1.02
73	1.15
143	1.18
235	1.18
1253	1.20
1364	1.20
1499	1.20
1529	1.20
1619	1.20

Effective storage depth =	1.42	m
75% effective storage depth =	1.07	m
(ie depth below GL) =	0.68	m
25% effective storage depth =	0.36	m
(ie depth below GL) =	1.39	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	1.2	mins
Time to fall to 25% effective depth =	-	mins
Void Ratio =	40%	
V (75%-25%) =	0.26	m^3
a (50%) =	4.38	m^2
t (75%-25%) =	#VALUE!	mins

Insufficient drainage to derive an infiltration rate.



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	5
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

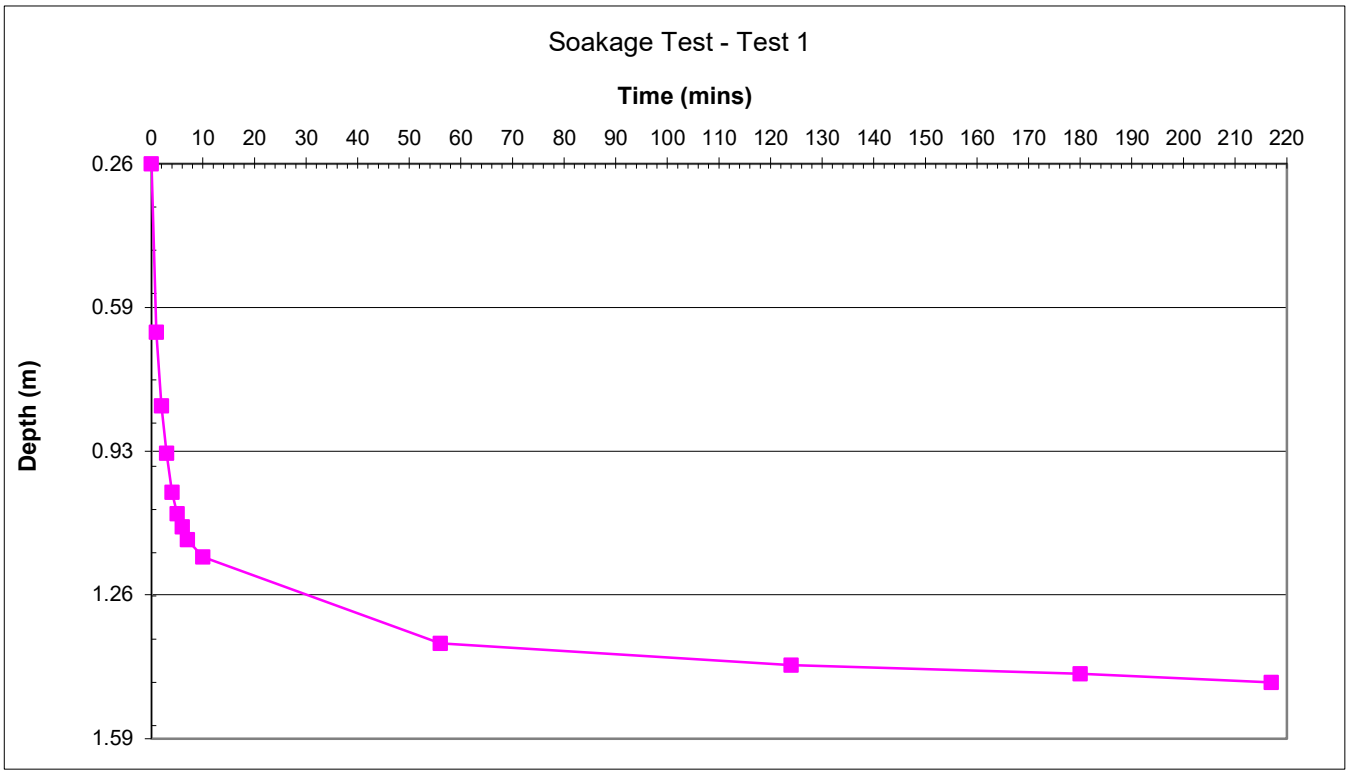
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref. **SA02** **Test 1**
Length **2.00** m
Width **0.45** m
Depth **1.59** m
Ground water level **Slight seepage at base of pit**
Ground conditions **0.00-0.30m Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
0.30-0.40m Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.
0.40-1.59m Weak, cream LIMESTONE.

Time (mins)	Depth to water (m bgl)
0	0.26
1	0.65
2	0.82
3	0.93
4	1.02
5	1.07
6	1.10
7	1.13
10	1.17
56	1.37
124	1.42
180	1.44
217	1.46

Effective storage depth =	1.33	m
75% effective storage depth =	1.00	m
(ie depth below GL) =	0.59	m
25% effective storage depth =	0.33	m
(ie depth below GL) =	1.26	m
effective storage depth 75%-25% =	0.67	m
Time to fall to 75% effective depth =	0.85	mins
Time to fall to 25% effective depth =	32	mins
Void Ratio =	40%	
V (75%-25%) =	0.24	m^3
a (50%) =	4.16	m^2
t (75%-25%) =	31.15	mins
SOIL INFILTRATION RATE =	**3.08E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	6
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

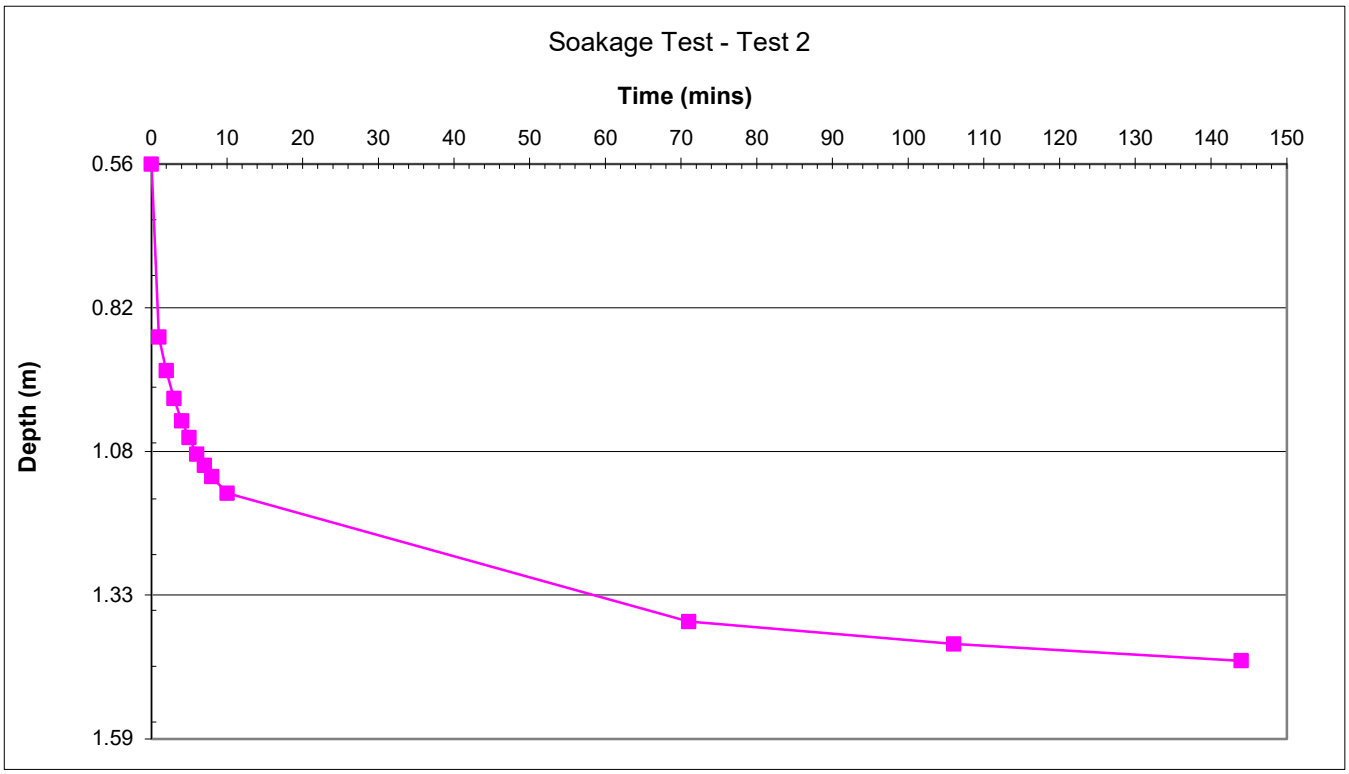
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA02**	**Test 2**
Length	**2.00** m	
Width	**0.45** m	
Depth	**1.59** m	
Ground water level	**Slight seepage at base of pit**	
Ground conditions	**0.00-0.30m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.30-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.59m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.56
1	0.87
2	0.93
3	0.98
4	1.02
5	1.05
6	1.08
7	1.10
8	1.12
10	1.15
71	1.38
106	1.42
144	1.45

Effective storage depth =	1.03	m
75% effective storage depth =	0.77	m
(ie depth below GL) =	0.82	m
25% effective storage depth =	0.26	m
(ie depth below GL) =	1.33	m
effective storage depth 75%-25% =	0.52	m
Time to fall to 75% effective depth =	0.85	mins
Time to fall to 25% effective depth =	60	mins
Void Ratio =	40%	
V (75%-25%) =	0.19	m^3
a (50%) =	3.42	m^2
t (75%-25%) =	59.15	mins
SOIL INFILTRATION RATE =	**1.53E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	7
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

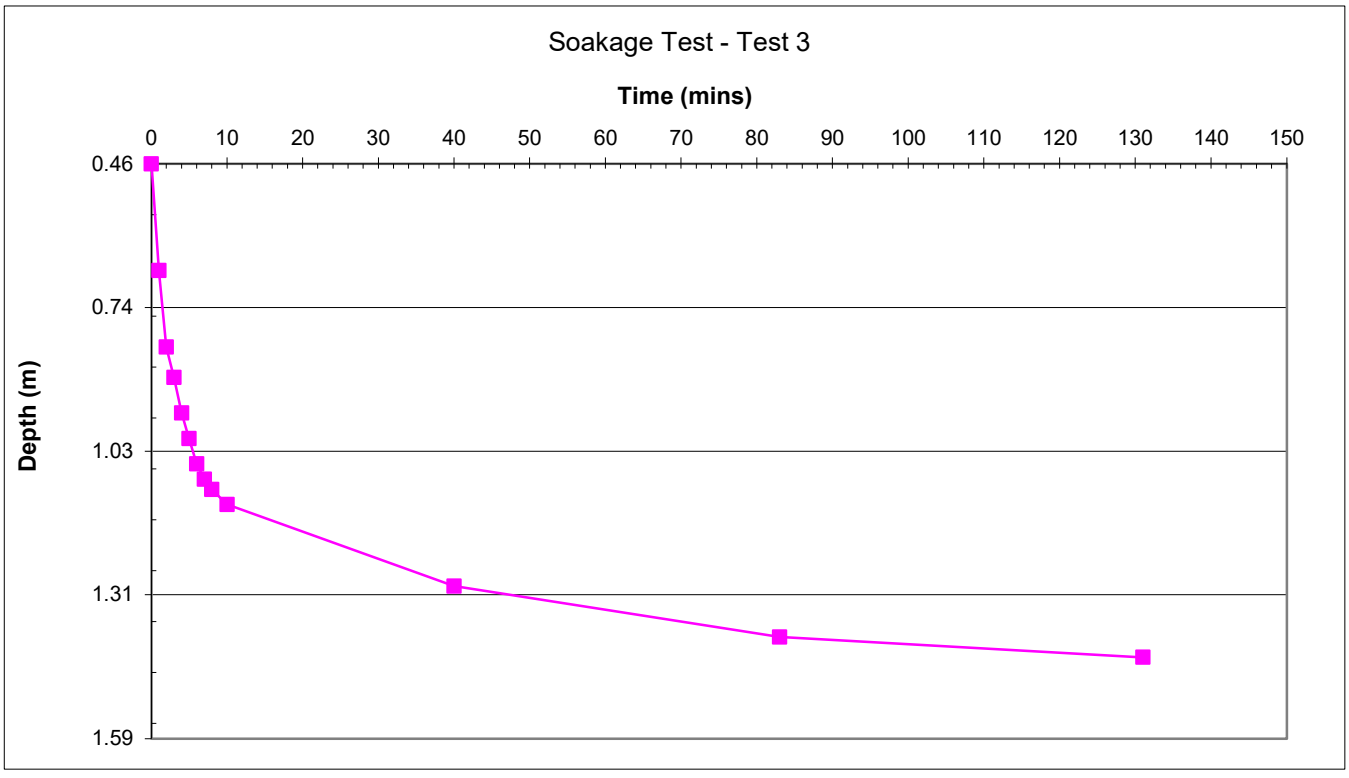
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA02**	**Test 3**
Length	**2.00** m	
Width	**0.45** m	
Depth	**1.59** m	
Ground water level	**Slight seepage at base of pit**	
Ground conditions	**0.00-0.30m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.30-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.59m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.46
1	0.67
2	0.82
3	0.88
4	0.95
5	1.00
6	1.05
7	1.08
8	1.10
10	1.13
40	1.29
83	1.39
131	1.43

Effective storage depth =	1.13	m
75% effective storage depth =	0.85	m
(ie depth below GL) =	0.74	m
25% effective storage depth =	0.28	m
(ie depth below GL) =	1.31	m
effective storage depth 75%-25% =	0.57	m
Time to fall to 75% effective depth =	1.5	mins
Time to fall to 25% effective depth =	49	mins
Void Ratio =	40%	
V (75%-25%) =	0.20	m^3
a (50%) =	3.67	m^2
t (75%-25%) =	47.50	mins
SOIL INFILTRATION RATE =	**1.95E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	8
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

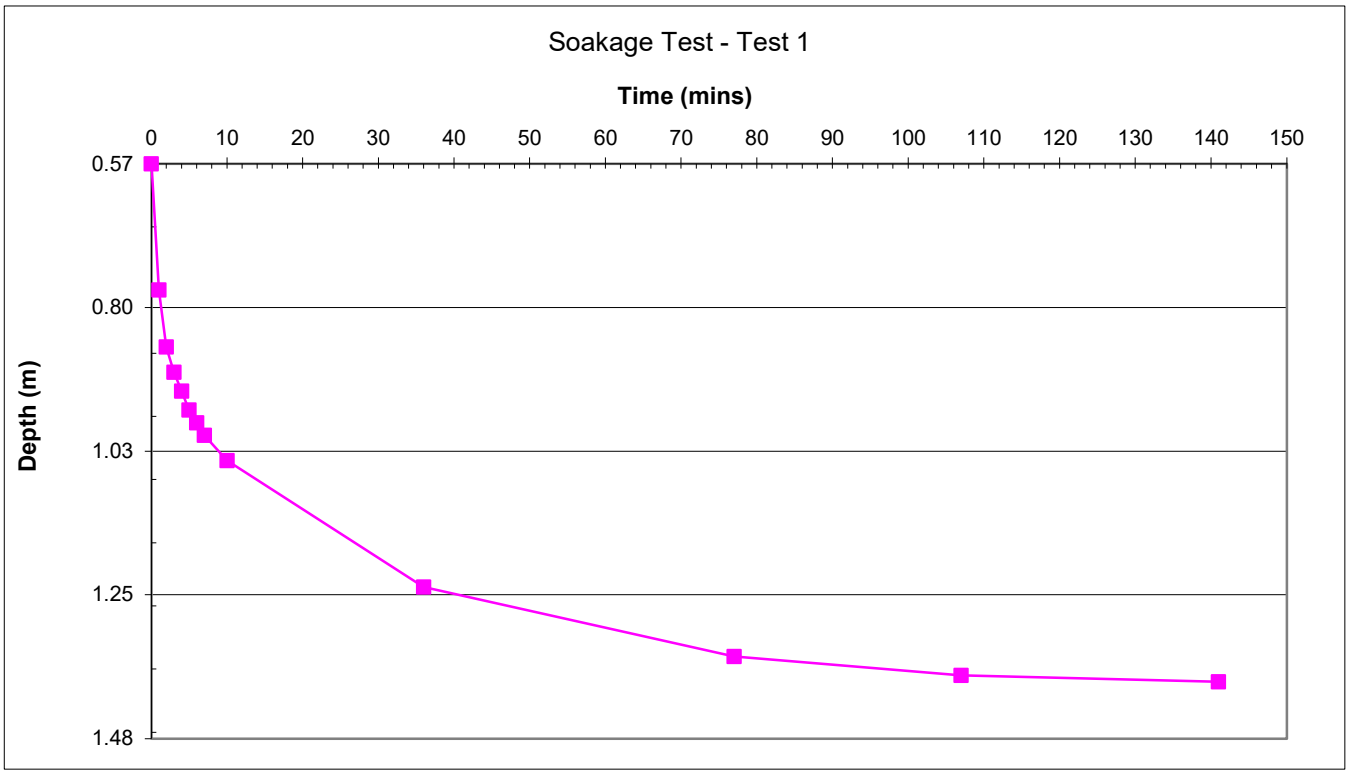
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA03**	**Test 1**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.48** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.30m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.30-0.45m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.45-1.51m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.57
1	0.77
2	0.86
3	0.90
4	0.93
5	0.96
6	0.98
7	1.00
10	1.04
36	1.24
77	1.35
107	1.38
141	1.39

Effective storage depth =	0.91	m
75% effective storage depth =	0.68	m
(ie depth below GL) =	0.80	m
25% effective storage depth =	0.23	m
(ie depth below GL) =	1.25	m
effective storage depth 75%-25% =	0.46	m
Time to fall to 75% effective depth =	1.3	mins
Time to fall to 25% effective depth =	41	mins
Void Ratio =	40%	
V (75%-25%) =	0.22	m^3
a (50%) =	3.57	m^2
t (75%-25%) =	39.70	mins
SOIL INFILTRATION RATE =	**2.57E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	9
Client	**Richborough Estates Ltd**	**Calcs by**	DW
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		Date	02/08/23

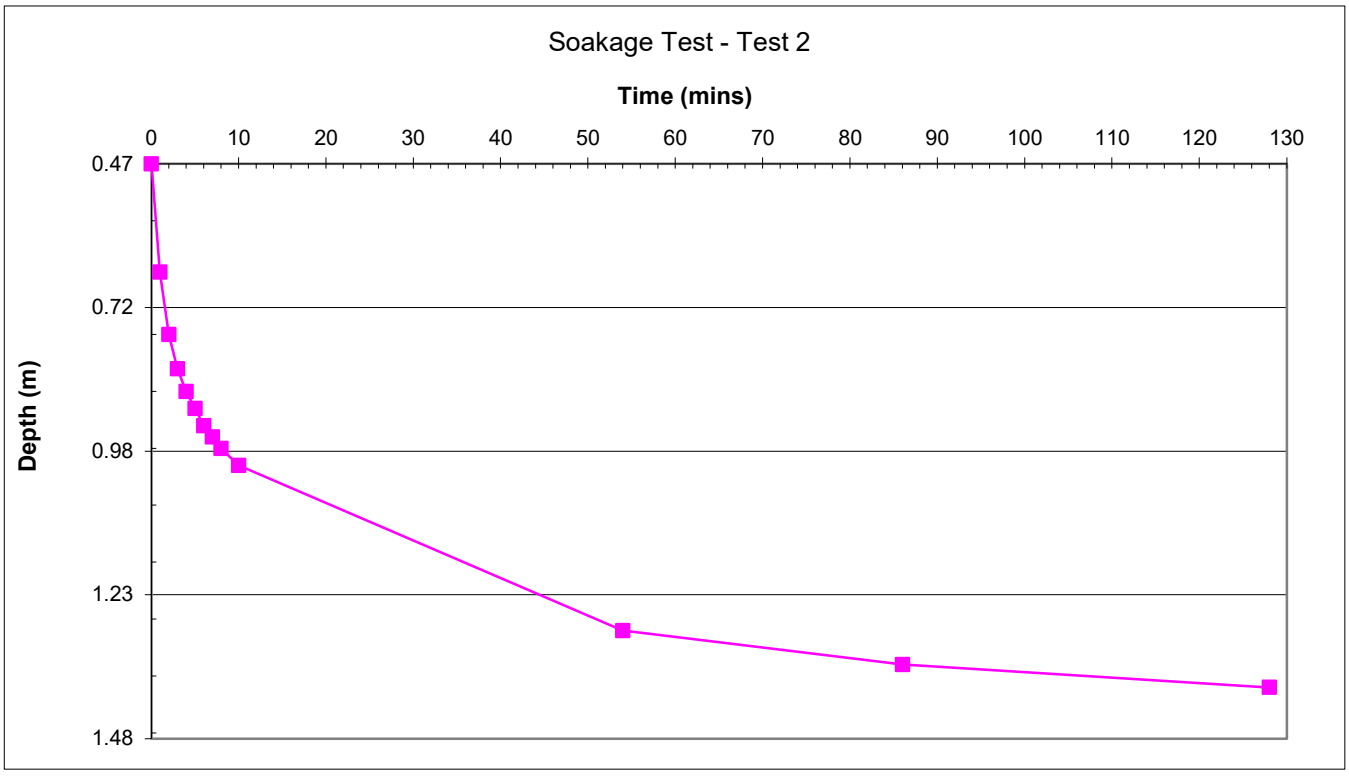
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA03**	**Test 2**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.48** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.30m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.30-0.45m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.45-1.51m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.47
1	0.66
2	0.77
3	0.83
4	0.87
5	0.90
6	0.93
7	0.95
8	0.97
10	1.00
54	1.29
86	1.35
128	1.39

Effective storage depth =	1.01	m
75% effective storage depth =	0.76	m
(ie depth below GL) =	0.72	m
25% effective storage depth =	0.25	m
(ie depth below GL) =	1.23	m
effective storage depth 75%-25% =	0.51	m
Time to fall to 75% effective depth =	1.6	mins
Time to fall to 25% effective depth =	44	mins
Void Ratio =	40%	
V (75%-25%) =	0.24	m^3
a (50%) =	3.83	m^2
t (75%-25%) =	42.40	mins
SOIL INFILTRATION RATE =	**2.49E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	10
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

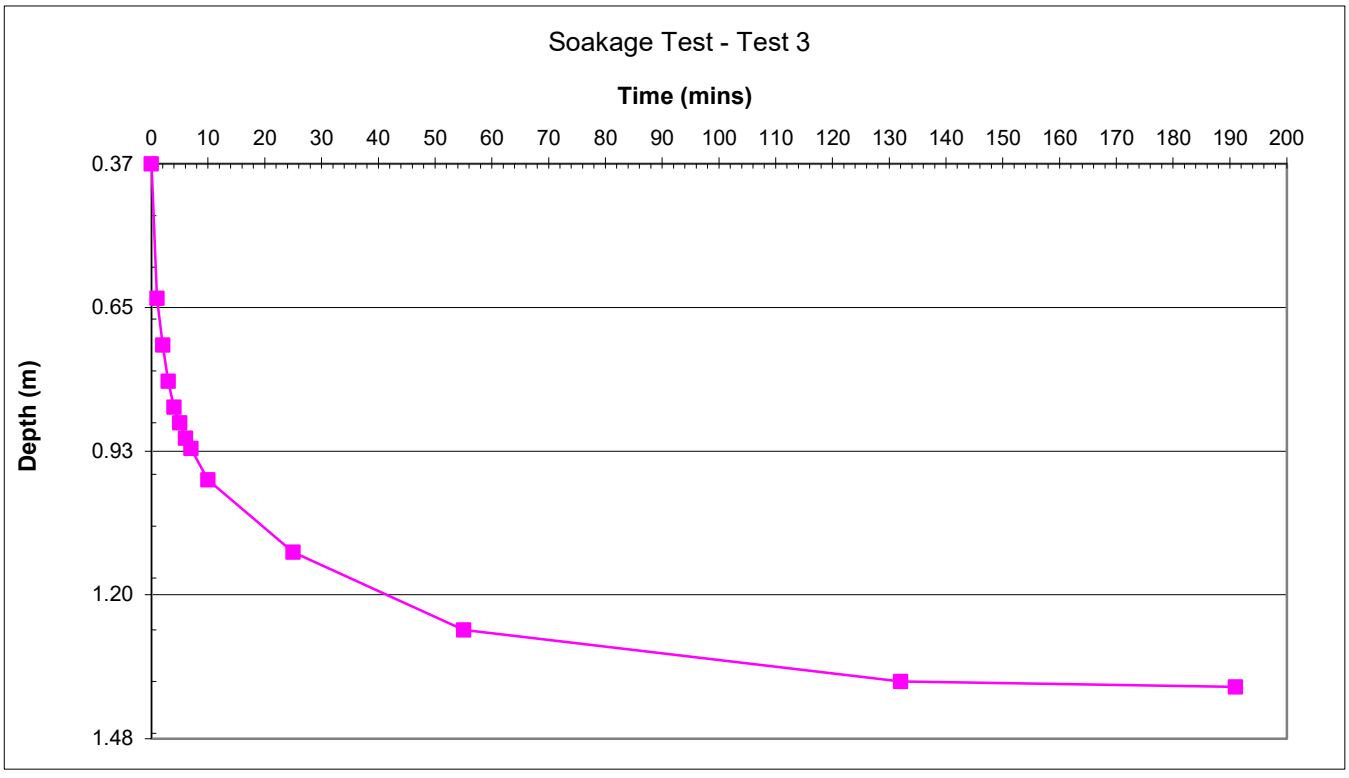
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA03**	**Test 3**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.48** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.30m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.30-0.45m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.45-1.51m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.37
1	0.63
2	0.72
3	0.79
4	0.84
5	0.87
6	0.90
7	0.92
10	0.98
25	1.12
55	1.27
132	1.37
191	1.38

Effective storage depth =	1.11	m
75% effective storage depth =	0.83	m
(ie depth below GL) =	0.65	m
25% effective storage depth =	0.28	m
(ie depth below GL) =	1.20	m
effective storage depth 75%-25% =	0.56	m
Time to fall to 75% effective depth =	1.2	mins
Time to fall to 25% effective depth =	42	mins
Void Ratio =	40%	
V (75%-25%) =	0.27	m^3
a (50%) =	4.09	m^2
t (75%-25%) =	40.80	mins
SOIL INFILTRATION RATE =	**2.66E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	11
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

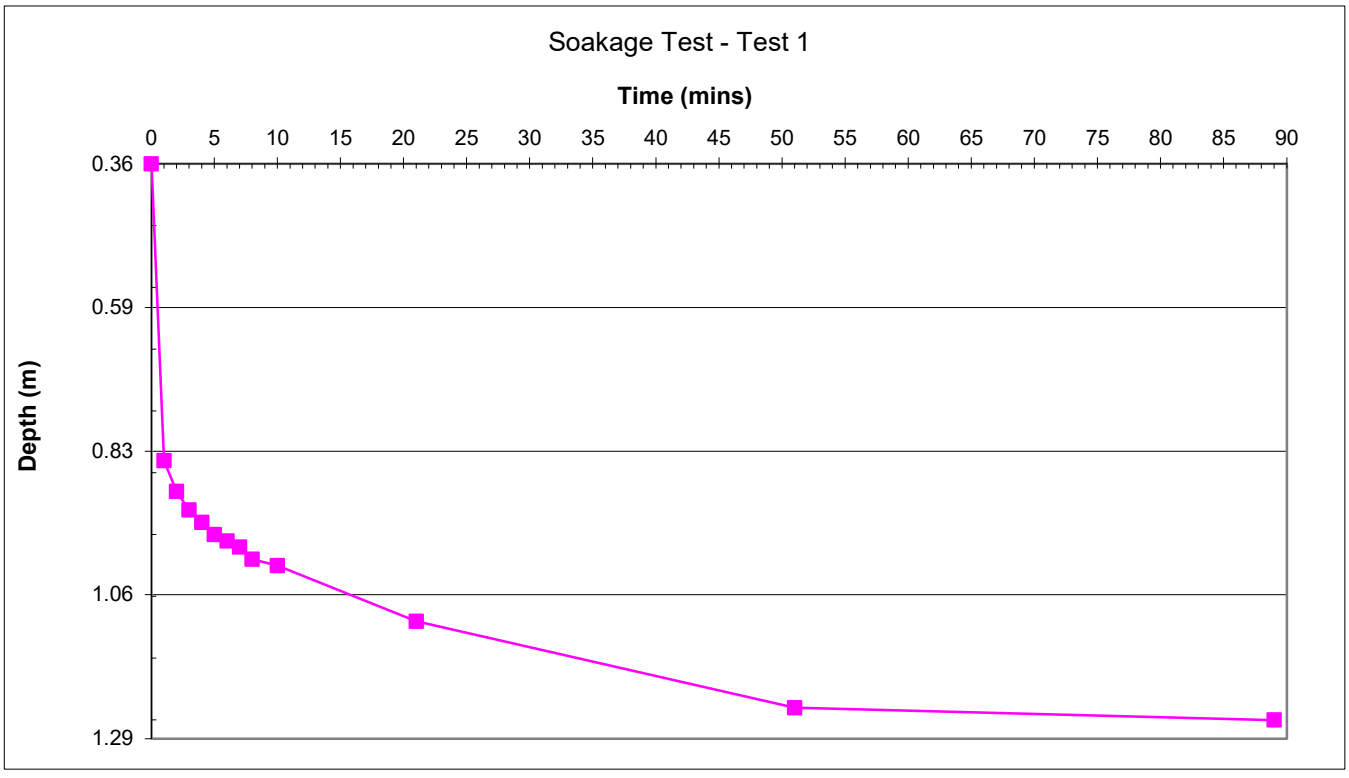
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA04**	**Test 1**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.29** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.25m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.25-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.29m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.36
1	0.84
2	0.89
3	0.92
4	0.94
5	0.96
6	0.97
7	0.98
8	1.00
10	1.01
21	1.10
51	1.24
89	1.26

Effective storage depth =	0.93	m
75% effective storage depth =	0.70	m
(ie depth below GL) =	0.59	m
25% effective storage depth =	0.23	m
(ie depth below GL) =	1.06	m
effective storage depth 75%-25% =	0.47	m
Time to fall to 75% effective depth =	0.5	mins
Time to fall to 25% effective depth =	16	mins
Void Ratio =	40%	
V (75%-25%) =	0.22	m^3
a (50%) =	3.62	m^2
t (75%-25%) =	15.50	mins
SOIL INFILTRATION RATE =	**6.63E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	12
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

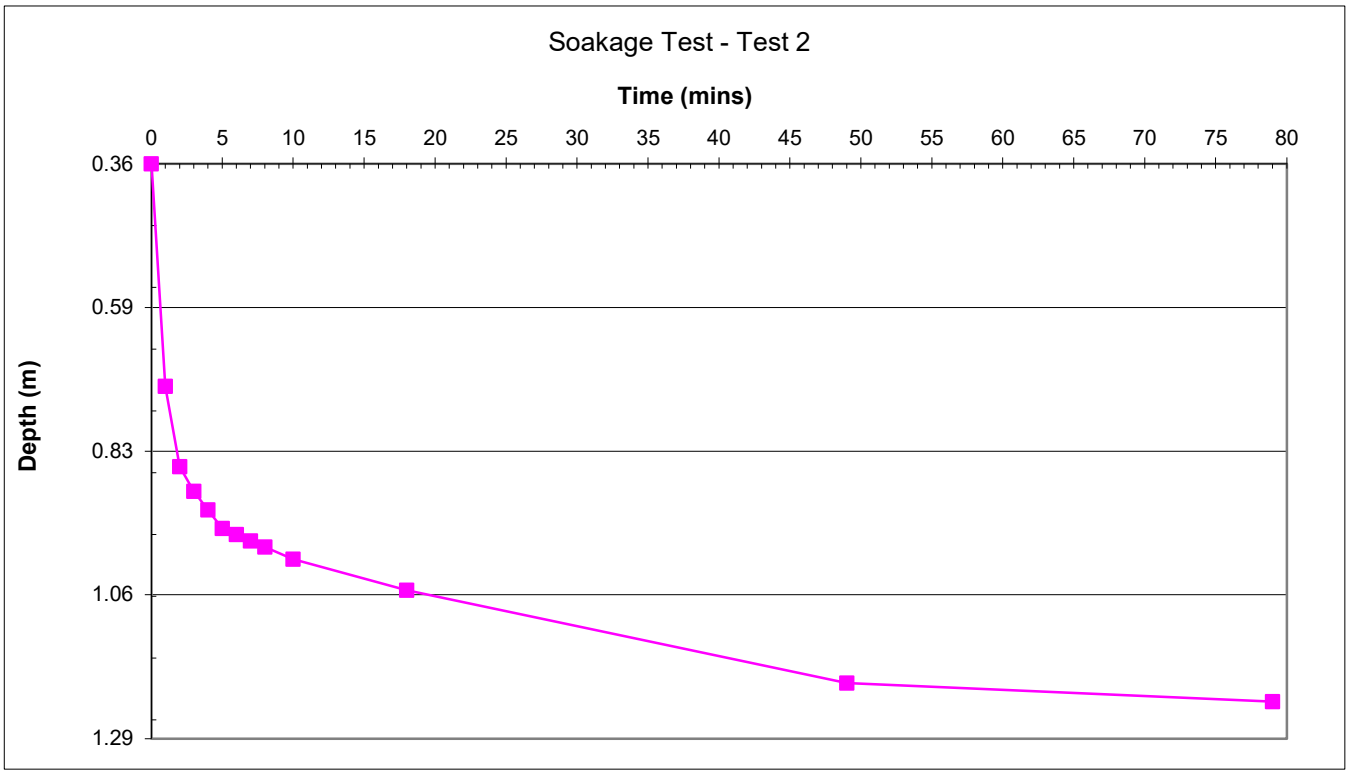
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA04**	**Test 2**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.29** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.25m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.25-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.29m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.36
1	0.72
2	0.85
3	0.89
4	0.92
5	0.95
6	0.96
7	0.97
8	0.98
10	1.00
18	1.05
49	1.20
79	1.23

Effective storage depth =	0.93	m
75% effective storage depth =	0.70	m
(ie depth below GL) =	0.59	m
25% effective storage depth =	0.23	m
(ie depth below GL) =	1.06	m
effective storage depth 75%-25% =	0.47	m
Time to fall to 75% effective depth =	0.65	mins
Time to fall to 25% effective depth =	20	mins
Void Ratio =	40%	
V (75%-25%) =	0.22	m^3
a (50%) =	3.62	m^2
t (75%-25%) =	19.35	mins
SOIL INFILTRATION RATE =	**5.31E-05**	**m/s**



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Scheme	**Aunt Ems Lane, Caversfield**	**Page No.**	13
Client	**Richborough Estates Ltd**	**Calcs by**	DW
Job ref.	**27877**	**Checked By**	DT
		Date	02/08/23

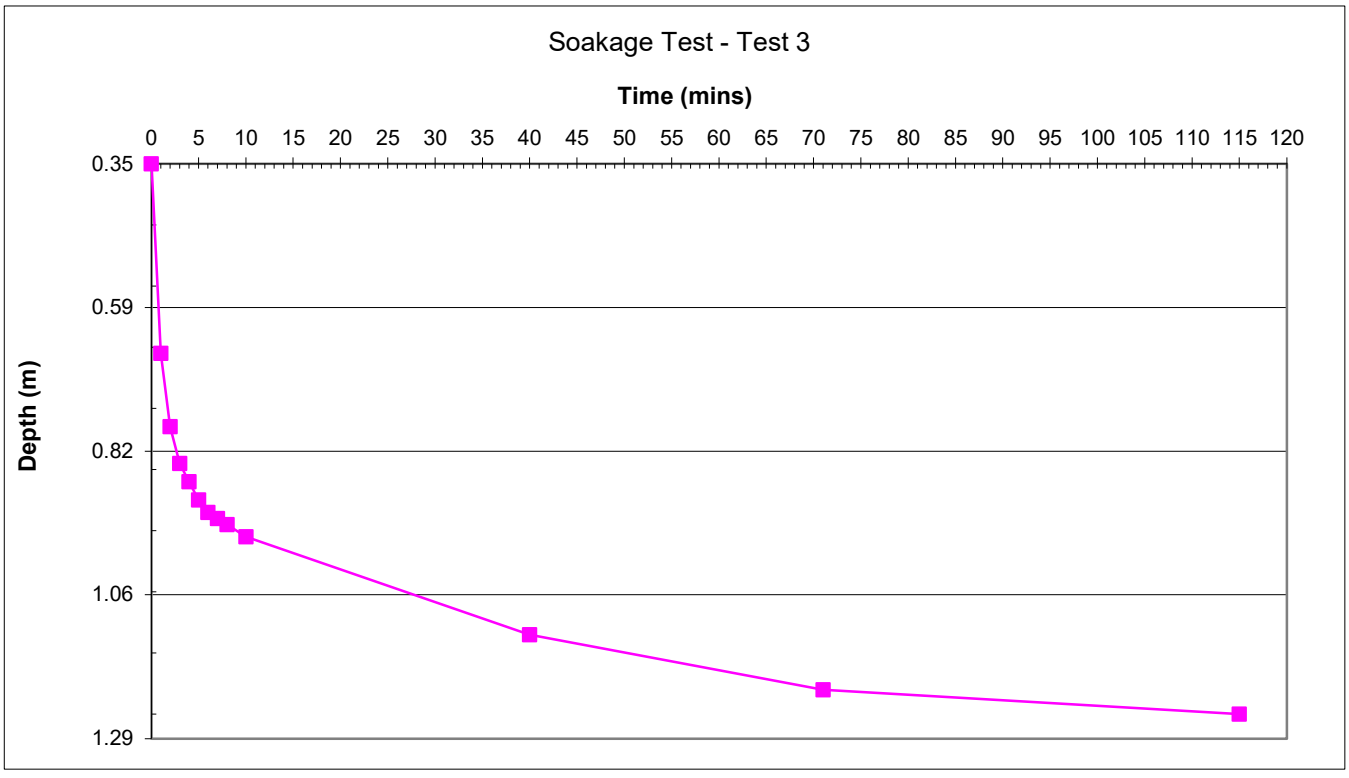
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA04**	**Test 3**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.29** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.25m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.25-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.29m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.35
1	0.66
2	0.78
3	0.84
4	0.87
5	0.90
6	0.92
7	0.93
8	0.94
10	0.96
40	1.12
71	1.21
115	1.25

Effective storage depth =	0.94	m
75% effective storage depth =	0.71	m
(ie depth below GL) =	0.59	m
25% effective storage depth =	0.24	m
(ie depth below GL) =	1.06	m
effective storage depth 75%-25% =	0.47	m
Time to fall to 75% effective depth =	0.8	mins
Time to fall to 25% effective depth =	28	mins
Void Ratio =	40%	
V (75%-25%) =	0.23	m^3
a (50%) =	3.64	m^2
t (75%-25%) =	27.20	mins
SOIL INFILTRATION RATE =	**3.79E-05**	**m/s**



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Client	**Richborough Estates Ltd**	**Calcs by**	DW
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		Date	02/08/23

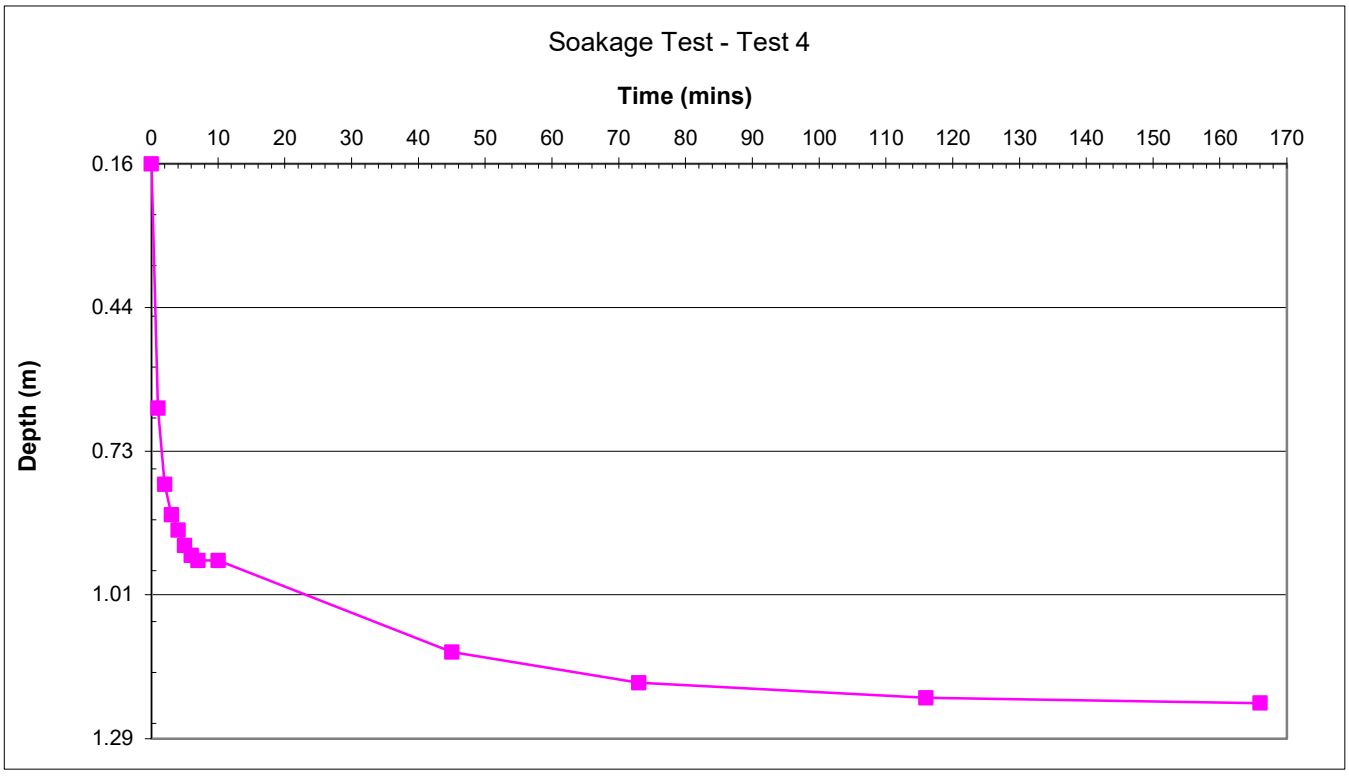
Soil Infiltration Test - Gravel Filled Method

(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA04**	**Test 4**
Length	**2.00** m	
Width	**0.60** m	
Depth	**1.29** m	
Ground water level	**Damp at base of pit**	
Ground conditions	**0.00-0.25m**	**Grass over brown, silty, sandy clay TOPSOIL with rare angular, fine to coarse limestone.**
	0.25-0.40m	**Brown, clayey, silty GRAVEL of angular, fine to coarse limestone.**
	0.40-1.29m	**Weak, cream LIMESTONE.**

Time (mins)	Depth to water (m bgl)
0	0.16
1	0.64
2	0.79
3	0.85
4	0.88
5	0.91
6	0.93
7	0.94
10	0.94
45	1.12
73	1.18
116	1.21
166	1.22

Effective storage depth =	1.13	m
75% effective storage depth =	0.85	m
(ie depth below GL) =	0.44	m
25% effective storage depth =	0.28	m
(ie depth below GL) =	1.01	m
effective storage depth 75%-25% =	0.57	m
Time to fall to 75% effective depth =	0.6	mins
Time to fall to 25% effective depth =	24	mins
Void Ratio =	40%	
V (75%-25%) =	0.27	m^3
a (50%) =	4.14	m^2
t (75%-25%) =	23.40	mins
SOIL INFILTRATION RATE =	**4.67E-05**	**m/s**



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