ID	Location	Details	Source
2	343m S	Type: Solution Pipe x 2 Superficial Geology: None Bedrock Geology: Chalk Group, Thanet Sand Formation	Simple Bibliography: - Full Bibliography: - Confidentiality: -
4	394m W	Type: Solution Pipe x 3 Superficial Geology: None Bedrock Geology: Chalk Group, Thanet Sand Formation	Simple Bibliography: - Full Bibliography: - Confidentiality: -

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m	**3**

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

Features are displayed on the Ground cavities and sinkholes map on **page 106 >**

ID	Location	Mine Address	Mineral	Data source	Publisher
3	387m W	Meopham, Kent	Chalk	-	-
5	467m SW	Meopham, Kent	Chalk	-	-
6	672m SW	Meopham, Kent	Chalk	-	-

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m	**0**

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

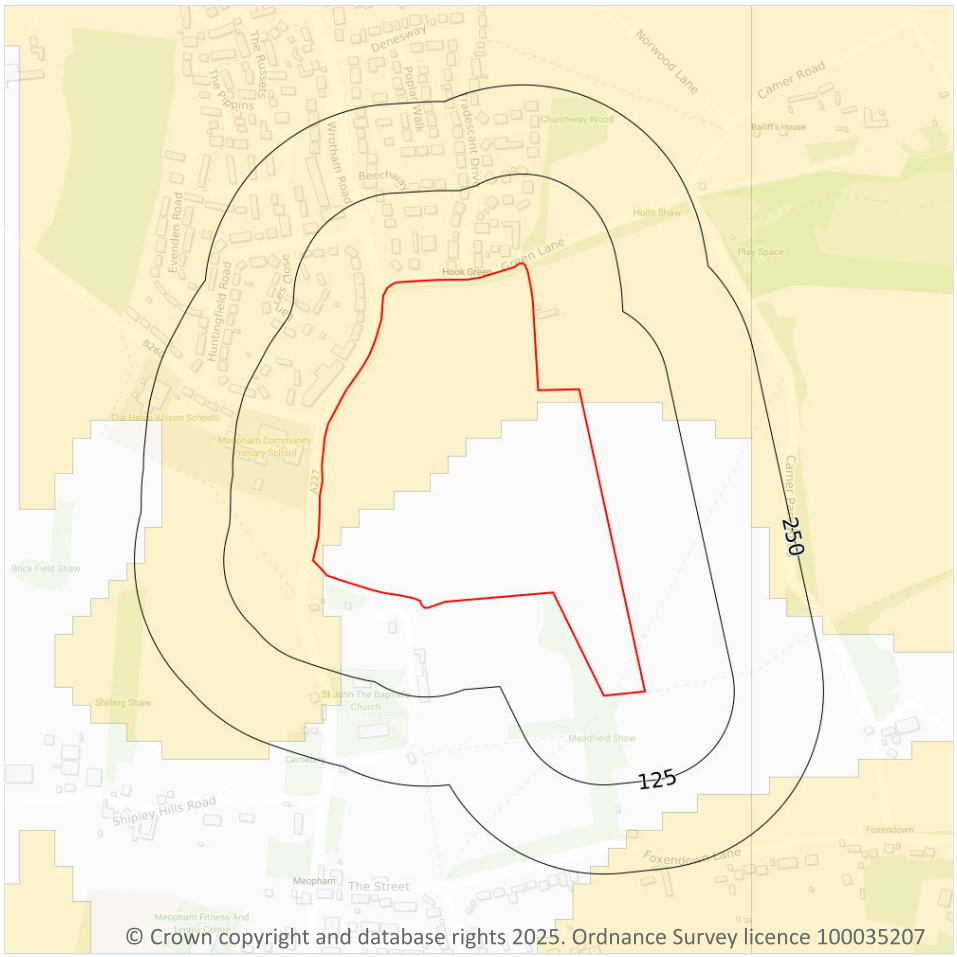
Records within 500m	0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.

This data is sourced from Groundsure.

20 Radon



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	2

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 109 >**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Less than 1%**	**None**

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 **11**

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**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
15m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 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 2

Records within 500m	0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.9 HS2

Records within 500m	0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 ltd.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference ↗.

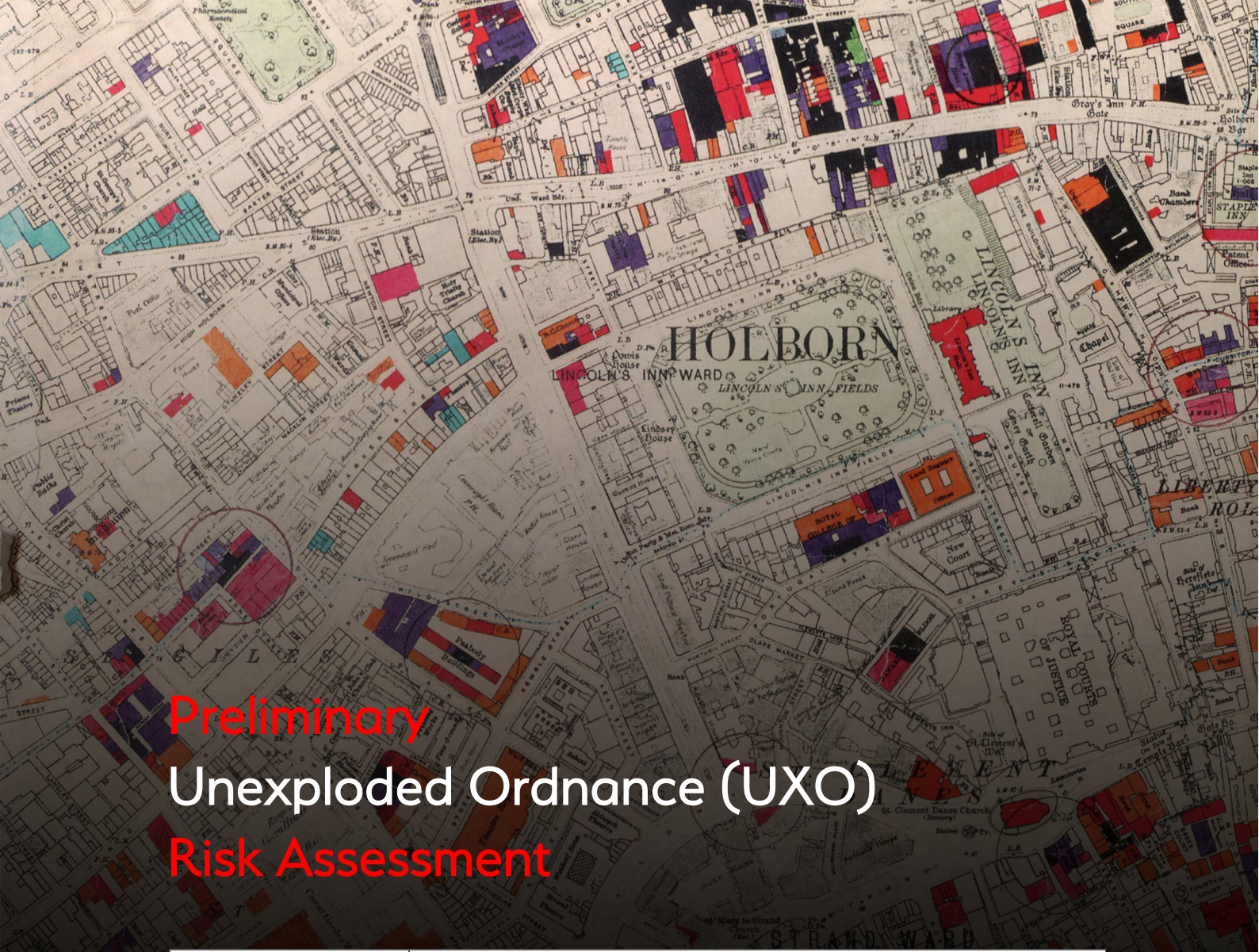
Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: www.groundsure.com/terms-and-conditions-april-2023/ ↗.

MEC
Consulting Group

APPENDICES

APPENDIX E



Preliminary
Unexploded Ordnance (UXO)
Risk Assessment

Project Name	Wrotham Road East, Meopham
Client	MEC Consulting Group
Site Address	Wrotham Road, Meopham, DA13 0JW
Report Reference	PA21698-00
Date	21st March 2025
Author	AL
Quality Assurance	AT

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1ST LINE DEFENCE

Assessment Objective

This preliminary unexploded ordnance (UXO) risk assessment is a qualitative screening exercise to assess the likely potential of encountering UXO at the Wrotham Road (East), Meopham site. The assessment involves the consideration of the basic factors that affect the potential for UXO to be present at a site as outlined in Stage One of the UXO risk management process.

Background

This assessment uses the sources of information available in-house to 1st Line Defence Ltd to enable the placement of a development site in context with events that may have led to the presence of German air-delivered or Allied military UXO. The report will identify any immediate necessity for risk mitigation or additional research in the form of a Detailed UXO Risk Assessment. It makes use of 1st Line Defence's extensive historical archives, library and unique geo-databases, as well as internet resources, and is researched and compiled by UXO specialists and graduate researchers.

The assessment directly follows CIRIA C681 guidelines "Unexploded Ordnance, a Guide for the Construction Industry". The document will therefore assess the following factors:

- Basic Site Data
- Previous Military Use
- Indicators of potential aerial delivered UXO threat
- Consideration of any Mitigating Factors
- Extent of Proposed Intrusive Works
- Any requirement for Further Work

It should be noted that the vast majority of construction sites in the UK will have a low or negligible risk of encountering UXO and should be able to be screened out at this preliminary stage. The report is meant as a common sense 'first step' in the UXO risk management process. The content of the report and conclusions drawn are based on basic, preliminary research using the information available to 1st Line Defence at the time this report was produced. It should be noted that the only way to entirely negate risk from UXO to a project would be to support the works proposed with appropriate UXO risk mitigation measures. It is rarely possible to state that there is absolutely 'no' risk from UXO to a project.

Site Boundary

Risk Assessment Considerations	
Site location and description/current use	The site is located in Meopham, Kent. Recent aerial imagery shows the site to comprise open vegetated land. It was bound to the north by Green Lane, to the east and south by areas of open land with vegetated and woodland areas, and to the west by woodland and Wrotham Road (the A227). The site is approximately centred on the OS grid reference: **TQ 64589 66644.**
Are there any indicators of current/historical military activity on/close to the site?	In-house records do not indicate the site footprint had any former military use. No features, such as WWII defensive positions, encampments, or firing ranges, are recorded to have been located at the site. In addition, no information on ordnance being stored, produced, or disposed of within the proposed site boundary could be found. The closest reference to any form of Allied activity involved the discovery of an item of UXO approximately 1.1km to the northwest. The closest recorded Heavy Anti-Aircraft (HAA) battery was situated approximately 3.2km to the northeast of the site, in the vicinity of Lodge Lane. The conditions in which unexploded anti-aircraft ordnance may have fallen unrecorded within the proposed site are generally analogous to that of German aerial delivered ordnance - see below for further information.
What was the pre- and post-WWII history of the site?	Pre-war OS mapping, dated 1892-1914, showed the site comprised undeveloped, vegetated land. It was bound to the north by further vegetated land and Oliver Shaw, to the east by vegetation and woodland called Prestfield Shaw, to the south by further vegetation and woodland associated with Meopham Court, and to the west by a hardstanding roadway and additional vegetation/undeveloped land. Post-war OS mapping, dated 1948-1973, depicted the site as analogous to the previous mapping edition. However, additional developments were in the surrounding area, including Meopham County Primary School and several residential properties further to the west.
Was the area subject to bombing during WWII?	During WWII, the site was located in the Rural District of Strood. According to official Home Office bombing statistics, this district sustained an overall low-moderate bombing density, with an average of 42.2 items of ordnance recorded per 1,000 acres. This included 1,804 high explosive (HE) bombs, 24 parachute mines, 55 oil bombs, 117 phosphorus bombs, 14 'fire pots', 37 V-1 pilotless aircraft, and nine V-2 long-range rockets, comprising 2,060 items across 48,811 acres. Small-scale Kent Daily Bomb mapping recorded multiple bombing incidents in and around the site - notably in late 1940 and 1941. These were corroborated by bomb mapping for the Medway Group area -where a 'stick' of incidents was recorded approximately 50m to the north.
Is there any evidence of bomb damage on/close to the site?	Considering the recorded bombing in and around the site area, high-quality aerial imagery will be required to determine the site conditions and whether any damage was sustained.
To what degree would the site have been subject to access?	Considering the site's vegetated composition, it is anticipated that the majority of the site area did not experience a frequent and regular access level during WWII, with any access likely caused by roadways further to the north and west; however, any observation would have been reliant on the vigilance of passers by's.

To what degree has the site been developed post-WWII?	There appears to have been minimal development on-site since the previous mapping edition; it remains occupied by open, vegetated land
What is the nature and extent of the intrusive works proposed?	According to communications with MEC Consulting Group, investigation works comprising trial pitting and soil infiltration testing will occur in 2025.

Summary and Conclusions

During WWII, the site was located in the Rural District of Strood. According to official Home Office bombing statistics, this district sustained an overall low-moderate bombing density, with an average of 42.2 items of ordnance recorded per 1,000 acres.

Small-scale Kent Daily Bomb mapping recorded multiple bombing incidents in and around the site - notably in late 1940. These were corroborated by bomb mapping for the Medway Group area - where a 'stick' of incidents was approximately 50m to the north. Further research will be required to determine the exact location of these incidents and whether they would have impacted the site specifically.

Recommendations

Given the findings of this preliminary report, it is recommended that **further research** is undertaken in the form of a **Detailed UXO Risk Assessment** by CIRIA guidelines. Further research determines the exact location of nearby bombing incidents and whether they would have impacted the site directly. It would require acquiring additional archival information such as written records and high-quality aerial imagery. This will allow for a more confident assessment of wartime conditions and subsequent risk of UXO contamination on site.

Before or instead of a Detailed Assessment, it is recommended that appropriate UXO Risk Mitigation Measures are provided for intrusive works proposed. **If the client has any anecdotal or empirical evidence of UXO risk on site, please contact 1st Line Defence.**

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1ST LINE DEFENCE

Front cover image credit: London County Council Bomb Damage Mapping (London Metropolitan Archives)

Detailed
Unexploded Ordnance (UXO)
Risk Assessment

Project Name	Wrotham Road (East), Meopham, Kent
Client	MEC Consulting Group
Site Address	Wrotham Road (East), Meopham, Kent, DA13 0JW
Report Reference	DA21698-00
Date	9th April, 2025
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1ST LINE DEFENCE

Executive Summary

Site Location and Description

The site is located in Meopham, Kent. Recent aerial imagery shows the site to comprise open, vegetated land. It is bound to the north by Green Lane, to the east and south by areas of open land with vegetated and woodland areas, and to the west by woodland and Wrotham Road (the A227).

The site is approximately centred on the OS grid reference: **TQ 64589 66644.**

Proposed Works

According to communications with MEC Consulting Group, investigation works comprising trial pitting and soil infiltration testing will occur in 2025.

Geology and Bomb Penetration Depth

The British Geological Survey (BGS) map shows the site to be underlain by the Thanet Formation – sand of the Paleogene period and the Lewes Nodular Chalk Formation, Seaford Chalk Formation, and Newhaven Chalk Formations, all comprising chalk of the Cretaceous period. The superficial deposits are recorded to be Head – clay, silt, sand, and gravel of the Quaternary period.

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 an overall **Low-Medium Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Low Risk** from Allied unexploded ordnance.

The Risk from German Air-Delivered UXO

- During WWII, the site was located within the Rural District of Strood. According to official Home Office bombing statistics, this district was subject to an overall low-moderate bombing density, with an average of 42.2 items of ordnance recorded per 1,000 acres. Bombing in the area can primarily be attributed to Meopham's location along the flight path to London. It was common for Luftwaffe fighters to jettison surplus munitions in opportunistic 'tip and run raids' near confirmed targets (see Luftwaffe Reconnaissance imagery, **Annex H**).
- According to historic OS mapping, the site was occupied by open, vegetated land.
- Kent Daily Bomb mapping (see **Annex I**) recorded numerous incidents of HE and incendiary bombing within the immediate site surroundings, with others in the wider surrounding area, across multiple air raids between August 1940 and April 1941; the exact location of these incidents is not clear from this source, due to the scale of the mapping / lack of detail provided. Additional bomb mapping for the Medway Group area depicted no bombing directly on site however, with the nearest bomb strikes located approximately 150m to the south.
- Available written records largely corroborate the documented bombing of Meopham across the dates specified by the Kent Daily Bomb mapping. Whilst several incidents were recorded within the general surrounding area, no evidence could be found to suggest that any of these incidents directly impacted the site itself. The Kent war diaries appear to suggest that the closest incidents occurred approximately 185m to the west and approximately 220m to the south of the site.
- No obvious evidence of significant bomb damage or cratering can be observed across available WWII-era imagery of the site (see **Annex O**). As the site comprised open vegetated land, any damage would have typically taken the form of cratering, scattered earth, or indentations in the ground. Whilst an area of scattered earth was visible within the site's southernmost section, it is not known if this was due to damage or because this part of the site was used in association with Meopham Court.
- Considering the site was occupied by areas of open land, ground conditions would not have been particularly conducive to the detection of UXO indicators. This is because typical indicators of bombing, such as bomb entry holes, scattered earth, or indentations to the ground, could have been obscured by the natural growth of vegetation.
- Furthermore, considering the site was rural in nature, it is likely that it did not sustain a frequent level of access. This may have increased the likelihood that UXO could have gone unnoticed and unrecorded within the general site area. The proximity of

roadways and small areas of development may have provided the site was some degree of monitor, though this was still likely relatively limited.

- In summary, no positive evidence of bombing having occurred directly within the site boundary could be found within available record sets, and no clear indicators of damage are observable in post-war aerial imagery. However, the possibility of UXO falling unnoticed within the site area cannot be entirely dismissed, due to the site's open nature and the recorded bombing in the nearby surroundings, and for this reason, the risk of UXO remaining on-site has been assessed at a slightly elevated **Low-Medium**. Whilst proactive risk mitigation measures are not thought to be necessary, UXO Safety Awareness Briefings are recommended as a sensible minimum precaution, and a UXO Risk Management Plan should be put in place.

The Risk from Allied UXO

- No evidence could be found to indicate that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA.
- The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding air delivered ordnance.

Post-WWII Redevelopment

- There does not appear to have been any development on-site, and the site remains occupied by open, vegetated land.
- 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 the Wrotham Road (East), Meopham, Kent site:

Activity	Recommended Risk Mitigation Measure
All Works	• UXO Risk Management Plan • Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

Note – proactive on-site UXO support/survey should not be necessary for any works taking place at the location of and down to the depths of significantly worked post-war made ground/post-war fill.

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

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

Site: Wrotham Road (East), Meopham, Kent
Client: MEC Consulting Group

1. Introduction

1.1. Background

1st Line Defence has been commissioned by MEC Consulting Group to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at Wrotham Road (East), Meopham, Kent.

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 Wrotham Road (East), Meopham, Kent. 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 Kent Archives.
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by MEC Consulting Group.
- 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.'

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.

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 Meopham, Kent. It is bound to the north by Green Lane, to the east and south by areas of open land with vegetated and woodland areas, and to the west by woodland and Wrotham Road (the A227).

The site is approximately centred on the OS grid reference: **TQ 64589 66644.**

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

6.2. Site Description

Recent aerial imagery shows the site to comprise open, vegetated land.

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

According to communications with MEC Consulting Group, investigation works comprising trial pitting and soil infiltration testing will occur in 2025.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the site to be underlain by the Thanet Formation – sand of the Paleogene period and the Lewes Nodular Chalk Formation, Seaford Chalk Formation, and Newhaven Chalk Formations, all comprising chalk of the Cretaceous period. The superficial deposits are recorded to be Head – clay, silt, sand, and gravel of the Quaternary period.

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		
Date	Scale	Description
1933-1939	1:2,500	Pre-war OS mapping, dated 1933-1939, depicted the site to comprise undeveloped, vegetated land. It was bound to the north by Olive Shaw and Green Lane, to the east by woodland associated with Priestfield Shaw and open-vegetated land, to the south by vegetated land, woodland, and land associated with Meopham Court, and to the west by Wrotham Road.

Post-WWII		
Date	Scale	Description
1960-1962	1:2,500	Post-war OS mapping, dated 1960-1962, depicted the site as analogous to the previous mapping edition. However, there were new developments in the surrounding area, including new structures and roadways to the west.

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 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 – various.
- 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 relatively low numbers allowed accurate records of strikes to be maintained. These records have mostly survived. There is a negligible risk from unexploded V-weapons on land today. Even if the 1,000kg warhead failed to explode, the weapons are so large that they would have been observed and dealt with at the time. Therefore, any V-weapons referenced in this report are referenced not as a viable risk factor, but primarily in order to help account for evidence of damage and clearance reported.

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. A WWI map of air raids and naval bombardments across the UK was consulted, see **Annex G**.

On the night of the 28th of September 1917, a large-scale German air raid saw Gotha bombers and two Riesenflugzeug (giant aircraft) approach the southern coast.[1] As the raid progressed, bombs were dropped across northern Kent. One area of note was near Meopham when an incendiary bomb fell near the railway line; also, Luddesdown – due south of Meopham, was hit by three HE bombs and an incendiary within a quarter-mile of St. Peter & St. Paul's Church.[2] Nevertheless, despite the confirmed bombing within the general area, there was no positive evidence found to suggest that these incidents directly impacted the site specifically.

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 of Rural District of Strood

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 Rural District of Strood, which sustained an overall low-moderate density of bombing, as represented by bomb density data figures, see Section 11.3. Any bombing likely occurred due to Strood's (and Meopham's) proximity to London and the River Thames; as such, it was susceptible to opportunistic 'tip and run' raids – whereby Luftwaffe fighters would indiscriminately drop surplus ordnance on the way to and from confirmed targets. These targets included RAF Gravesend, and associated industrial works located approximately 4.2km to the north-east (see **Annex H** for more details).

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.

[1] Castle, I. (2021b). *28 Sept 1917 Booked: Kent, Essex & Suffolk.* ZEPPELINS, GOTHAS & "GIANTS" THE STORY OF BRITAIN'S FORGOTTEN BLITZ 1914-1918. https://www.iancastlezeppelin.co.uk/25-sep-1917

[2] (Castle, 2021)

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 Rural District of Strood between 1940 and 1945.

Record of German Ordnance Dropped on the Rural District of Strood		
Area Acreage		48,811
Weapons	High Explosive bombs (all types)	1,804
	Parachute mines	24
	Oil bombs	55
	Phosphorus bombs	117
	Fire pots	14
	Pilotless aircraft (V-1)	37
	Long range rocket bombs (V-2)	9
Total		2,060
Number of Items per 1,000 acres		42.2
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. Kent Daily Bomb Maps

Kent Daily bomb mapping showing HE bombs, incendiary bomb strikes, parachute mines and plane crashes were obtained from Kent History & Library Centre. It should be noted that this mapping was recorded on small scale maps, and depicted the whole county. As a result, it is not possible to definitively determine the exact location of individual strikes beyond establishing the approximate locality of the incident. Furthermore, available evidence obtained from written ARP incident records indicate that single plotted incidents can actually denote multiple HE bomb strikes within that depicted area. As such, the presence of bombing within an area increases the likelihood that additional items of ordnance were deployed unobserved and unnoticed within the area. The section showing the area of the site is described in the table below, and presented in **Annex I.**

Kent Daily Bomb Maps – **Annex I1-I5**	
Date Range	Comments
August 17th, 1940	An HE bomb strike was recorded in the wider area south-west of the site.
September 2nd, 1940	A British fighter jet reportedly crashed in the general area west of the site.
September 8th, 1940	An incendiary bomb strike was recorded immediately west of the site.
September 15th, 1940	An incendiary bomb strike was recorded in the wider surrounding area to the south-west.
September 21st, 1940	A parachute mine is recorded in the wider surrounds to the north-east.
September 29th, 1940	An incendiary bomb strike was recorded to the north-west of the general site area.
October 16th, 1940	An HE bomb strike was recorded immediately south of the site.
October 21st, 1940	One HE bomb strike was recorded in close proximity to the north of the site, with another further west.
November 1st, 1940	One HE bomb strike was recorded in general proximity south of the site.
November 29th-30th, 1940	One HE bomb strikes was recorded to the immediate west of the site.
January 12th, 1941	HE and incendiary bomb strikes were recorded in the general surrounds to the south-east.
March 19th, 1941	An incendiary bomb strike was recorded within the southern site area, with a HE bomb recorded further to the north-east.
April 19th, 1941	HE bombing was recorded in the surrounding area to the east and west of the site.
April 20th, 1941	An incendiary bomb strike was recorded across the approximate site area.

11.5. Medway Group Bomb Map

A local bomb map compiled by the Chatham Observer showing HE bomb strikes, parachute mines, flying bombs and rockets on the borough was obtained from Kent Archives. The section showing the area of the site is described in the table below and presented in **Annex J.**

Medway Group Bomb Map	
Date Range	Comments
1940-1945	No bombing incidents were recorded on or along the site boundary within this bomb map. However, there were several in the surrounding area; with the closest being a stick of bombs recorded approximately 150m south of the site.

11.6. Kent V-1 Bomb Map

A local bomb map showing V-1 flying bomb strikes on the borough was obtained from The Evening News. The section showing the area of the site is described in the table below and presented in **Annex K**.

Essex V-1 Bomb Map	
Date Range	Comments
29th September, 1944	No bombing incidents were recorded in or around the general site area.

11.7. Kent War Diaries

Kent War Daires for the Rural District of Strood and the Medway group were obtained from Kent Archives. The War Diaries comprise a set of written records that detail the location and time of bombing incidents on a district or borough. Records are often updated as incidents develop, often with further details regarding the exact location of strikes and any damage caused. Incidents are sometimes accompanied by a map reference, which is not always sufficient to pinpoint the exact incident location due to the broad area they cover.

A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex L**.

Kent War Diary – **Annex L**			
Date	Size of bomb	Record Transcription	Comments
16th August 1940	13 x HE	13 HE Meopham, MR1367. 1 HE Marstead Lane MR1367.	*The site was located within the civil parish of Meopham. The exact location of these incidents is unclear.*
15th September 1940	200 IBs	Meopham. Minor bombing at 15.00. Approx 200 IBs in corn stubble.	
21st September 1940	Parachute Mine	Parachute mine exploded in Camer Park, Meopham, MR 097855	*Camer Park is 250m east of the site at its closest point. The provided grid reference is approximately 450m east of the site.*
16th October 1940	5 HE 1 UEB	Minor bombing at Meopham at 22.00 hrs. 5 HEs and one UEB. Electricity main damaged. Whitehall Road blocked M.R. 086846.	*Whitehall Road is located approximately 420m south of the site at its closest point. The provided map reference is approximately 520m south of the site.*
21st October 1940	3 Delayed Action	Minor bombing incident at 15.29 hours at Meopham MR 089859 and 075859. Three delayed action bombs were dropped.	*The provided map references were located approximately 330m north and 1.2km north-west of the site.*
1st November 1940	1 HE 2 Oil Bombs	Minor bombing at 03.50. One HE and two oil bombs at Meopham MR 090845	*The provided map reference is situated approximately 650m south of the site.*
19th November 1940	IBs	Meopham 20.05 hrs. IBs at MR 085846. No details	*The provided map reference is located approximately 550m south of the site.*
29th November 1940	8 x HE	Hooks Green MMR 082858	*The provided map reference is situated 550m north-west of the site.*

19th March 1940	IBs	Meopham MR 087848, fire reported	*The provided map reference is situated approximately 320m south of the site.*
	2 x HE	Meopham M.R. 087849	*The provided grid reference is situated approximately 220m south of the site*
20th April 1941	4 x HE	Meopham MR 082854	*The provided grid reference is situated approximately 390m west of the site.*
	4 x HE	Meopham. Norwood Lane.	*Norwood Lane was situated approximately 350m north-east of the site.*
2nd November 1943	1 HE	Meopham. Correct MR 084/851	*The provided grid reference is situated approximately 185m west of the site.*

11.8. Kent UXB Schedule

A Kent UXB Schedule was obtained from Kent Archives. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex M**.

Kent UXB Schedule – **Annex M**			
Date	Size of bomb	Record Transcription	Comments
2nd March, 1944	1 x HE	Meopham. MR 077856. Cleared 18.4.44.	*This incident was located approximately 900m west of the site.*
21st January, 1944	2 x HE	Meopham. 093853. Cleared. Meopham. 094852. Cleared.	*These incidents were located approximately 320m and 420m to the east.*

11.9. WWII-Era Aerial Photography

WWII-era aerial photography for the site area was obtained from the National Monuments Record Office (Historic England) and Google Earth. 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 O**).

WWII-Era Aerial Photography	
Date/Title	Description
1940s 11th October 1946	WWII-era aerial imagery shows a small area of scattered ground within the site's southern section. No obvious evidence of significant bomb damage can be observed across the site boundary. As the site was occupied by open land, damage would typically take the form of cratering, circular depressions, scattered earth, or indentations to the ground.

11.10. 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.

11.11. 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, MEC Consulting Group will be advised.

11.12. Evaluation of German Air Delivered UXO Records

German Air Delivered UXO Records Summary	
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 located within the Rural District of Strood. According to official Home Office bombing statistics, this district was subject to an overall low-moderate bombing density, with an average of 42.2 items of ordnance recorded per 1,000 acres. Any incidents are believed to have been largely sporadic, caused by Strood's proximity to London and the River Thames. Such attacks were called 'tip and run' raids, and they were opportunistic, indiscriminate attacks to areas near confirmed targets (see **Annex H** for more details). Kent Daily Bomb mapping recorded numerous incidents of HE and incendiary bombing across / surrounding the general site area across multiple air raids between August 1940 and April 1941; it has not been possible to determine the exact location of these incidents via this source due to the scale of this mapping however (see **Annex I** for more details). Nevertheless, a Medway Group Bomb map depicted no bombing incidents specifically on-site; though bombing was depicted in the nearby vicinity, with the closest incident being a stick of bombs situated approximately 150m south of the site (**Annex J**). Available written records largely corroborated the presence of bombing within Meopham across the dates specified on Kent Daily Bomb Mapping. Whilst several incidents were recorded within the general surrounding area, no details were found to suggest that any incidents of bombing directly impacted the site itself. The Kent war diaries appear to suggest that the closest incidents occurred approximately 185m west of the site and 220m south of the site.

Damage *If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids. 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.*	As the site comprised open vegetated land, any major bomb damage would have likely taken the form of cratering, circular depressions, scattered earth, or indentations to the ground. No obvious evidence of significant bomb damage or cratering can be observed across available WWII-era imagery of the site (see **Annex O** for more details). Whilst an area of scattered earth was visible within the site's southernmost section, it is not known if this was due to damage or because this part of the site was used in association with Meopham Court.
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.*	According to OS mapping and post-war aerial imagery, the site was predominantly occupied by open vegetated land. As such, it is expected that the nature of the ground cover present during the war was largely unconducive to the detection of UXO indicators. This is because features such as disturbed ground and bomb entry holes (which could be as small as 20cm in diameter) could have been easily overlooked or obscured in such conditions.
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.*	It is anticipated that the majority of the site area did not experience a frequent and regular level of access during WWII, with any access likely caused by the site's proximity to nearby roadways and structures. These included Green Lane to the north, Priestfield Shaw to the east, Meopham Court to the south, and Wrotham Road to the west. Their proximity would ensure that the site was likely still subject to some degree of monitor, though this was likely relatively limited.
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.

It should be highlighted that there is no evidence that the site formerly had any military occupation or usage that could have led to contamination with such items of Allied ordnance. Despite this, urban areas, such as the location of the site, can be at risk from buried unexploded anti-aircraft projectiles fired during WWII – as addressed below.

12.2. 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.

12.3. 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	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.			

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

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. Evaluation of Contamination Risk from Allied UXO

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

Allied UXO Records Summary	
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.
Anti-Aircraft Defences *Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.*	1st Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAA was located approximately 3.2km north-east of the site, in the vicinity of Lodge Lane. Despite this distance the maximum effective range of an AA projectile can be up to 15km. 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.
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.*	No information of ordnance being stored, produced, or disposed of within the proposed site could be found.
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 was not situated within the perimeters or vicinity of a military airfield.

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, Kent Daily Bomb mapping, Medway Group Bomb map, Kent V-1 Flying Bomb mapping, the Kent War Diary, a UXB Schedule, Home Intelligence Summary Files, post-war aerial imagery and available anecdotal information. The record set is generally considered to be of a reasonable quality. While Kent Daily Bomb mapping depicted bombing across the area, the scale of this mapping does not allow for a precise location to be determined; written records for the district are relatively comprehensive however, and indicated that there was no positive evidence of bombing on-site.
German Air-Delivered Ordnance	• During WWII, the site was located within the Rural District of Strood. According to official Home Office bombing statistics, this district was subject to an overall low-moderate bombing density, with an average of 42.2 items of ordnance recorded per 1,000 acres. Bombing in the area can primarily be attributed to Meopham's location along the flight path to London. It was common for Luftwaffe fighters to jettison surplus munitions in opportunistic 'tip and run raids' near confirmed targets (see Luftwaffe Reconnaissance imagery, **Annex H**). • According to historic OS mapping, the site was occupied by open, vegetated land. • Kent Daily Bomb mapping (see **Annex I**) recorded numerous incidents of HE and incendiary bombing within the immediate site surroundings, with others in the wider surrounding area, across multiple air raids between August 1940 and April 1941; the exact location of these incidents is not clear from this source, due to the scale of the mapping / lack of detail provided. Additional bomb mapping for the Medway Group area depicted no bombing directly on site however, with the nearest bomb strikes located approximately 150m to the south. • Available written records largely corroborate the documented bombing of Meopham across the dates specified by the Kent Daily Bomb mapping. Whilst several incidents were recorded within the general surrounding area, no evidence could be found to suggest that any of these incidents directly impacted the site itself. The Kent war diaries appear to suggest that the closest incidents occurred approximately 185m to the west and approximately 220m to the south of the site. • No obvious evidence of significant bomb damage or cratering can be observed across available WWII-era imagery of the site (see **Annex O**). As the site comprised open vegetated land, any damage would have typically taken the form of cratering, scattered earth, or indentations in the ground. Whilst an area of scattered earth was visible within the site's southernmost section, it is not known if this was due to damage or because this part of the site was used in association with Meopham Court. • Considering the site was occupied by areas of open land, ground conditions would not have been particularly conducive to the detection of UXO indicators. This is because typical indicators of bombing, such as bomb entry holes, scattered earth, or indentations to the ground, could have been obscured by the natural growth of vegetation. • Furthermore, considering the site was rural in nature, it is likely that it did not sustain a frequent level of access. This may have increased the likelihood that UXO could have gone unnoticed and unrecorded within the general site area. The proximity of roadways and small areas of development may have provided the site was some degree of monitor, though this was still likely relatively limited. • In summary, no positive evidence of bombing having occurred directly within the site boundary could be found within available record sets, and no clear indicators of damage are observable in post-war aerial imagery. However, the possibility of UXO falling unnoticed within the site area cannot be entirely dismissed, due to the site's open nature and the recorded bombing in the nearby surroundings, and for this reason, the risk of UXO

	remaining on-site has been assessed at a slightly elevated **Low-Medium**. Whilst proactive risk mitigation measures are not thought to be necessary, UXO Safety Awareness Briefings are recommended as a sensible minimum precaution, and a UXO Risk Management Plan should be put in place.
Allied Ordnance	• No evidence could be found to indicate that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA. • The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding air delivered ordnance.

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

There does not appear to have been any development on-site, and the site remains occupied by open, vegetated land.

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.

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.

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-Medium Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is 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-Medium', 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 Wrotham Road (East), Meopham, Kent:

Recommended Risk Mitigation Measures	
Activity	Recommended Risk 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 **9/4/2025**

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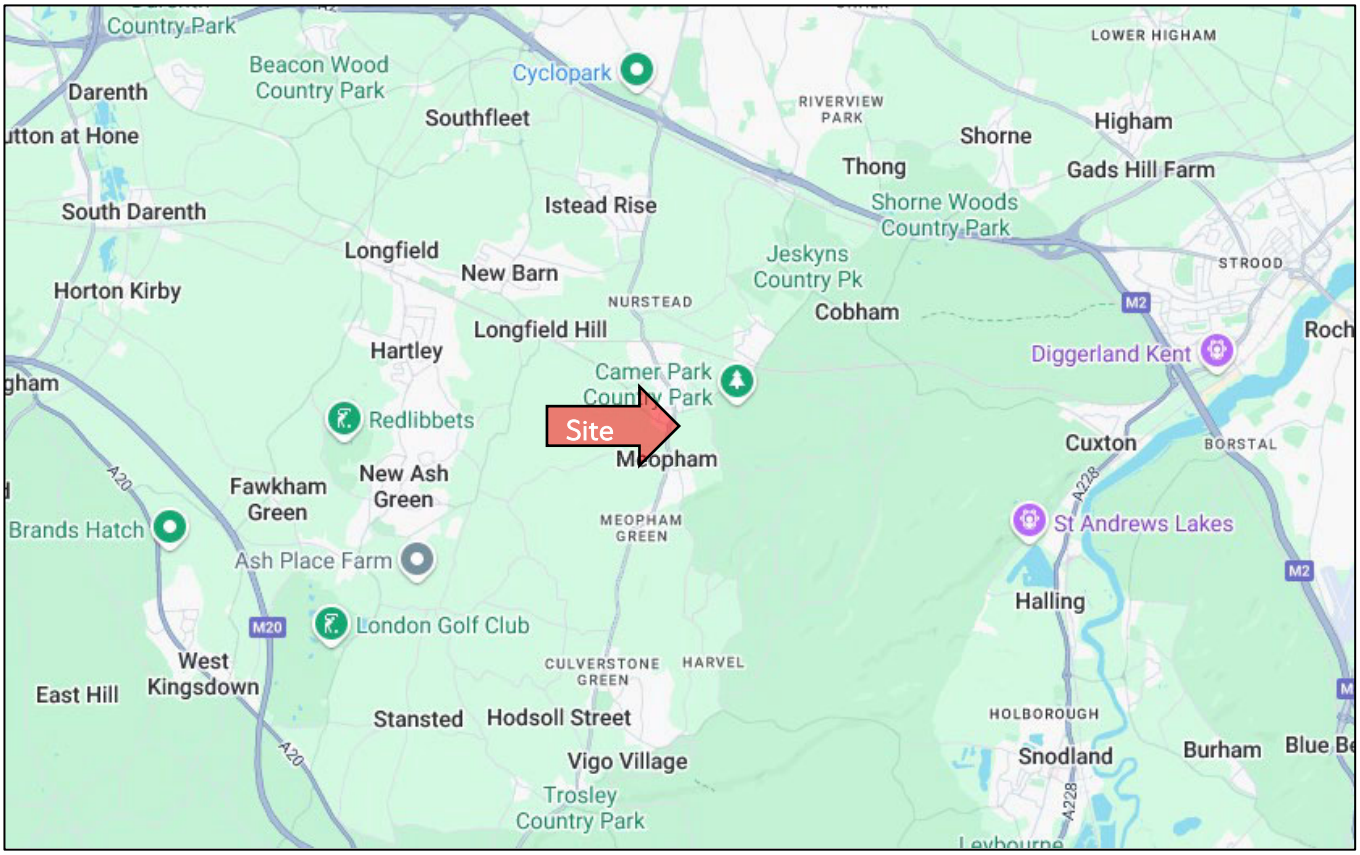
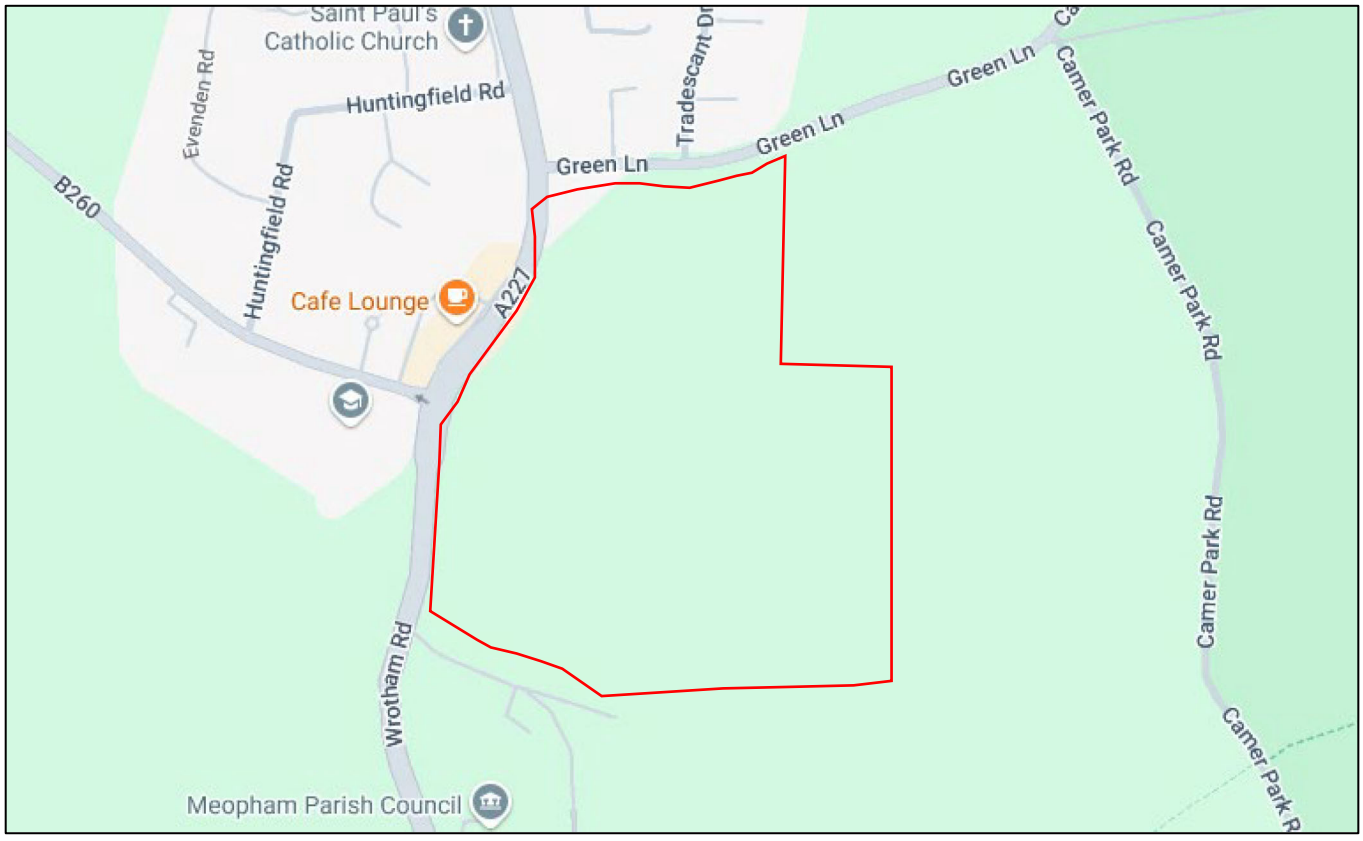
This report has been prepared by 1st Line Defence Limited with all reasonable care and skill. The report contains historical data and information from third party sources. 1st Line Defence Limited has sought to verify the accuracy and comprehensiveness of this information where possible but cannot be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





1ST LINE DEFENCE

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

Client: MEC Consulting Group

Approximate site boundary

N

Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00

Source: Google Maps

Recent Aerial Photography

Annex: B

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Source: Google Earth

Client Provided Site Plan

Annex: C

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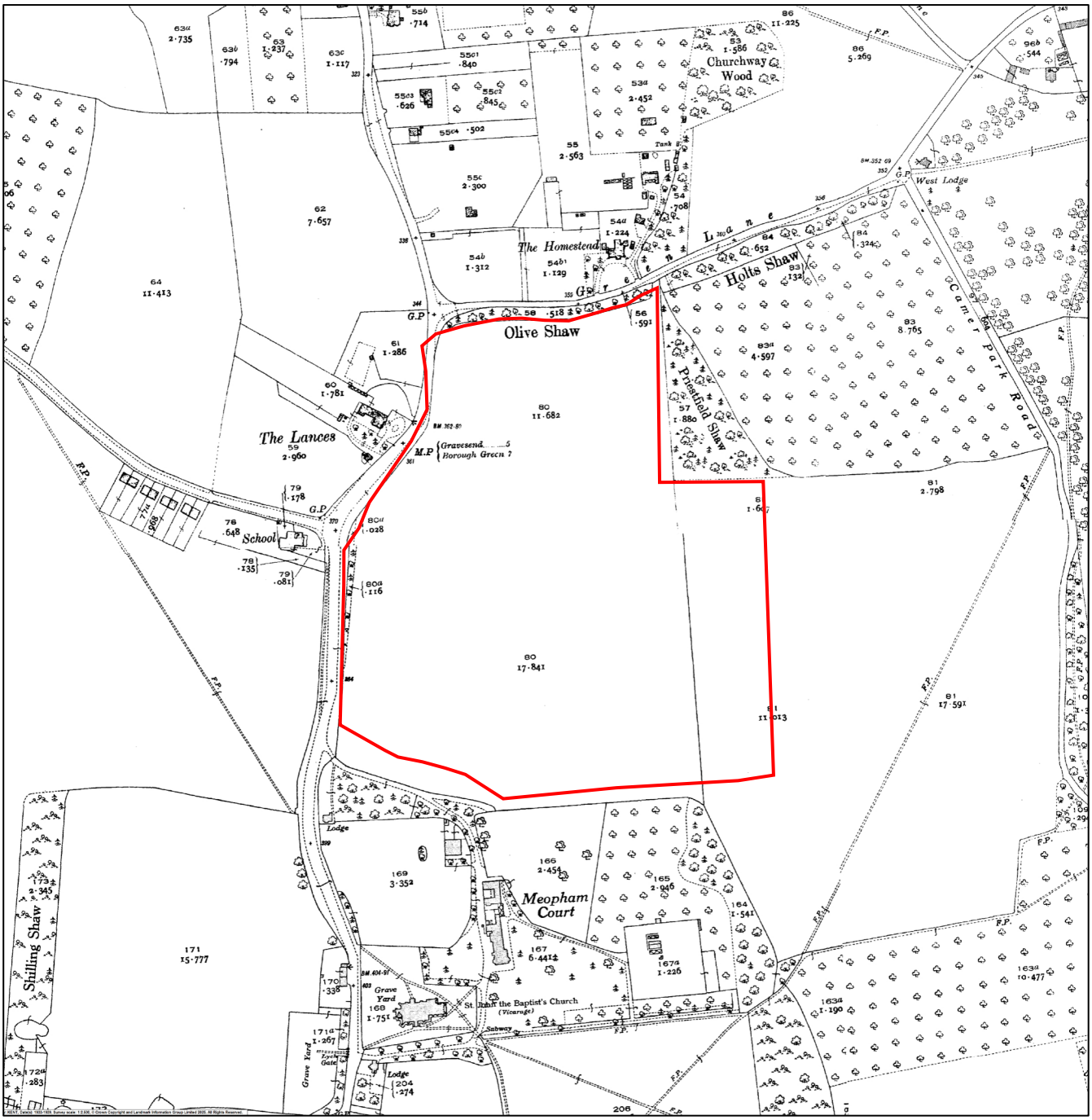
Source: MEC Consulting Group

Approximate site boundary

N

Pre-WWII Historical Map, 1933-1939

Annex: D1



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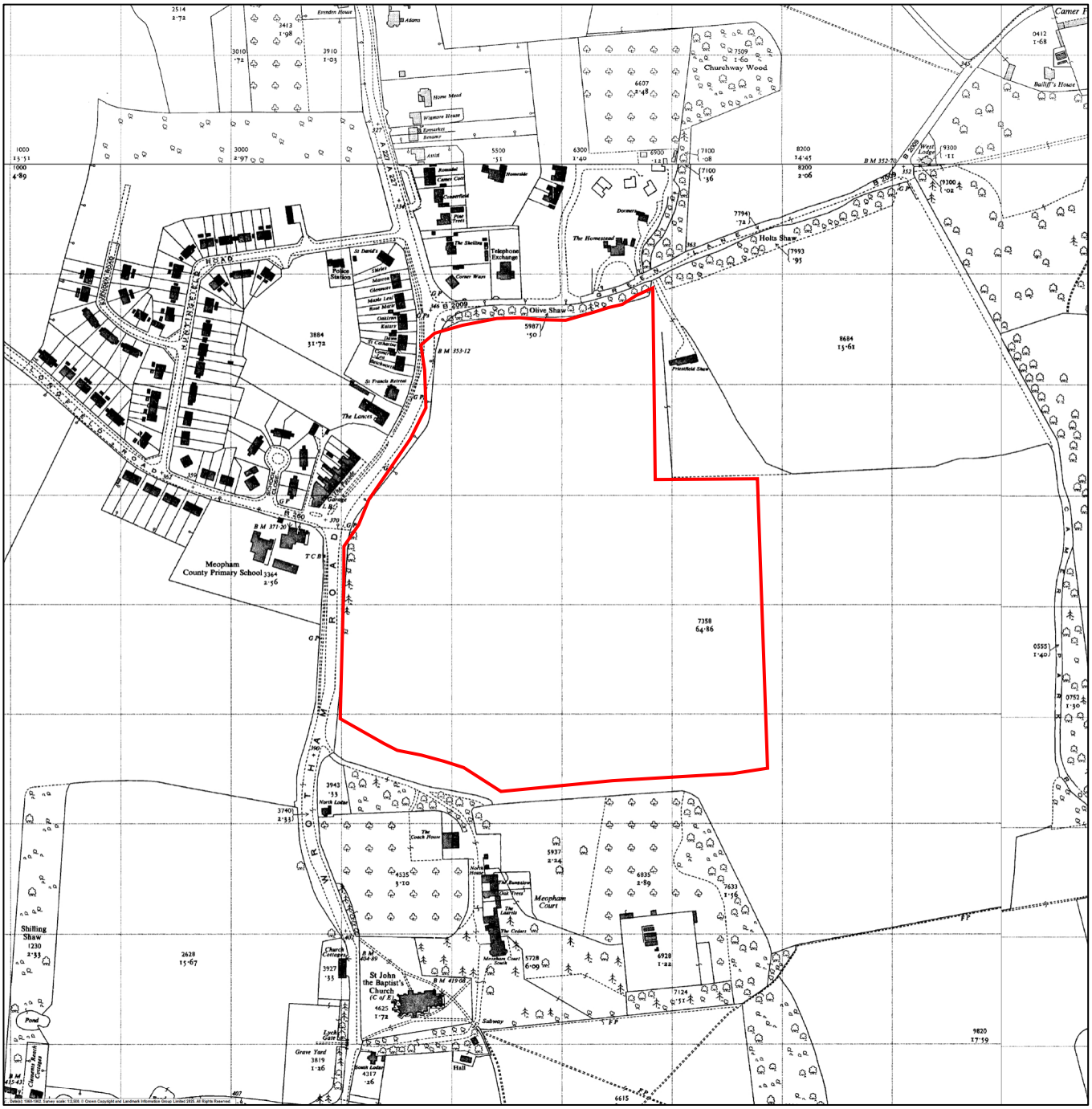
Source: Landmark Maps

Post-WWII Historical Map, 1960-1962

Annex: D2



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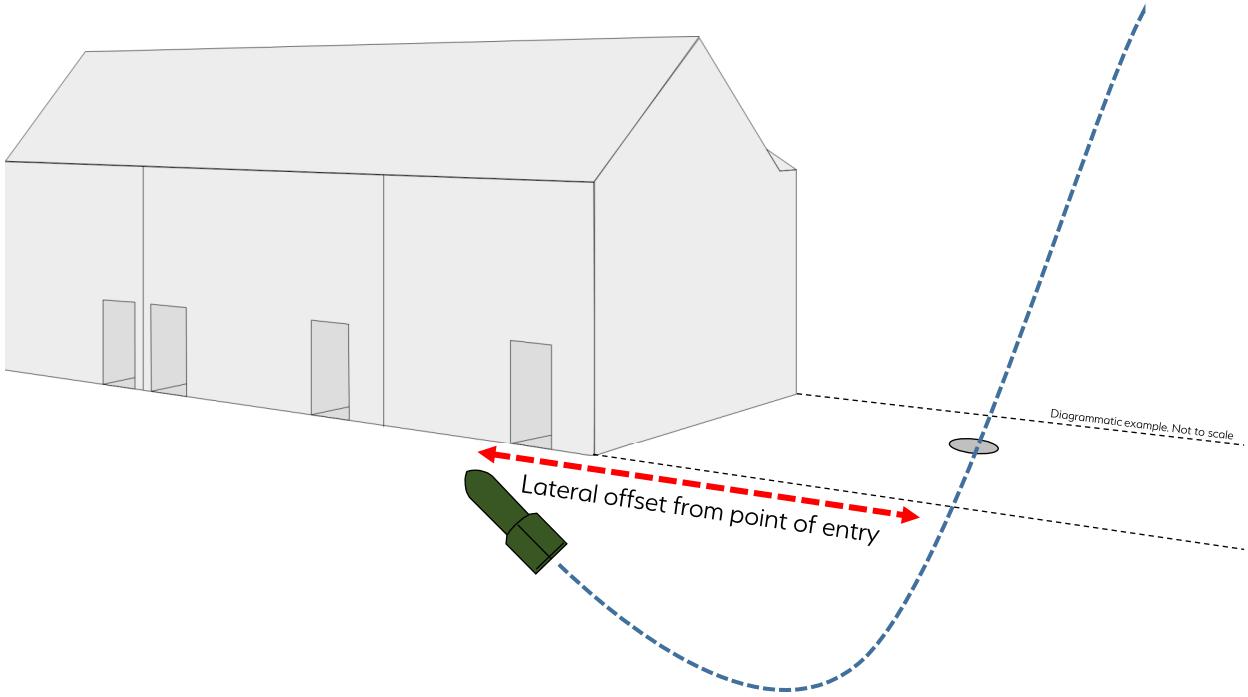
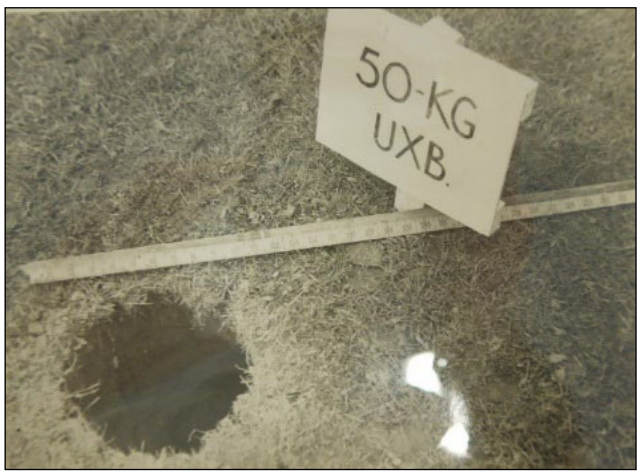
Example of UXO Entry Hole / The 'J-curve' Effect Principle





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: DA21698-00 **Source:** Various sources

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

BBC NEWS

Plymouth unexploded WW2 bomb: Thousands of people displaced

A 500kg (1,102lb) German World War Two bomb that forced the evacuation of thousands of people in Plymouth has been detonated at sea.

The unexploded device was **found in a garden** on St Michael Avenue on Tuesday, sparking four days of disruption.

On Friday police closed roads and rail and bus services were stopped as the bomb was transported 1.4 miles (2.3km) through the city's streets.

The device was taken by boat beyond the breakwater and detonated at 21:51 GMT.

500kg German HE Bomb, February 2024

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Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00 **Source:** BBC News

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

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

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

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

GRAVESEND Reporter

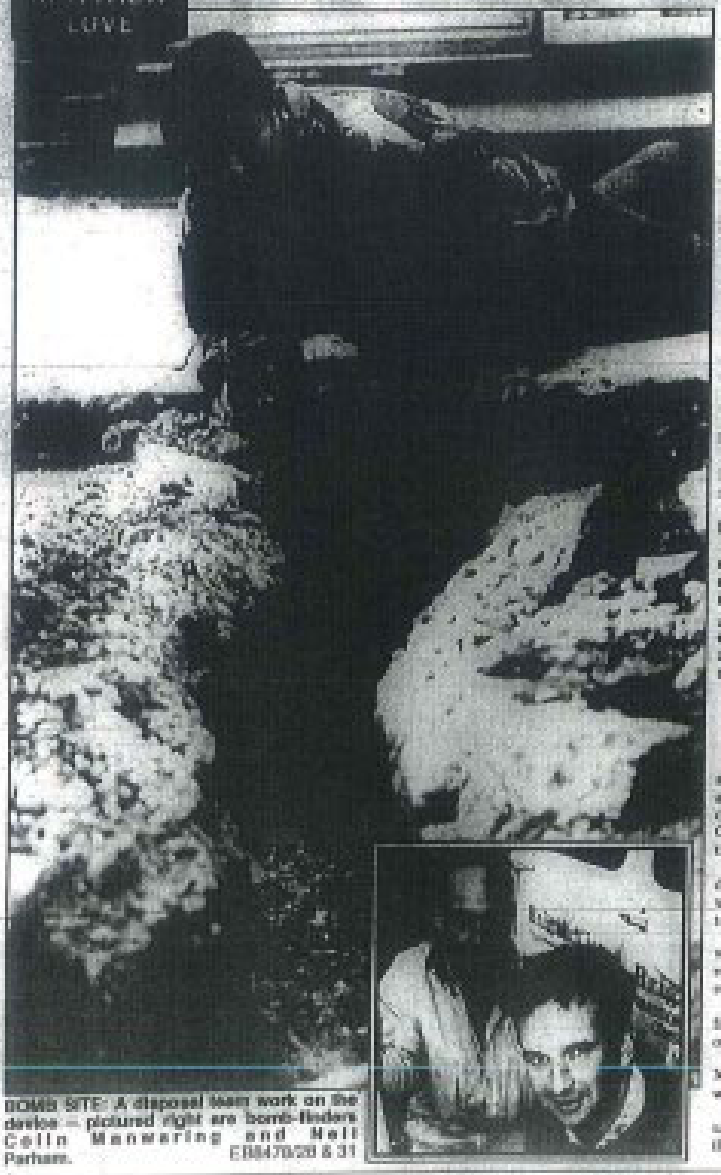
Newsdesk 0474 363363

Est in 1856

Thursday 3rd September 1992 • Display 0474 363363 • Classified 0474 333666

BOMB ESTATE EVACUATED

EXCLUSIVE action picture by MATTHEW LOVE



BOMB SITE: A disposal team work on the device – pictured right are bomb-finders Colin Manwaring and Neil Parham. EB8470/28 & 31

50 homes cleared after workmen dig up pipe bomb

By ALISON SMITH

POLICE evacuated 50 homes on the Riverview Park housing estate on Tuesday when workmen discovered a wartime bomb.

Bomb disposal experts were called in after the suspect device was spotted in a front garden in Imperial Drive.

Many householders returned from work to discover their homes cordoned off as fears grew for safety.

The six-hour drama began just after 2pm when builders Neil Parham and Colin Manwaring were digging foundations for an extension.

They had been working on the site for several days and had decided to finish the last bit of digging by hand.

Neil explained: "It could have been quite bad if we had used a mechanical digger. Luckily we had hooked a gas main out which stopped us digging and we decided to finish it by hand. We uncovered about 15 feet of the pipe bomb and then we decided to call the police. We knew there was a possibility of danger because of the area and the bombs that have been dug up here in the past."

Major operation

The find comes three years after the army announced it was to mount Operation Cobwick, a major initiative to clear unexploded wartime devices from the area which once housed Gravesend airfield. Families were moved out of their homes until the area gave the all clear.

Large numbers of long, pipe-like explosive devices were planted around airfields during the war so the fuses could be blown up if the enemy tried to invade.

This Tuesday, officers arrived on the scene within minutes and immediately evacuated residents in parts of Imperial Drive and other roads close by.

After an emergency call, explosive experts from the bomb disposal unit at Chatham arrived on the scene to inspect the site.

More of the bomb was exposed and special X-ray equipment brought in to determine whether it was fused.

But after a sapper test the device was declared safe and residents were finally allowed back to their homes just after 8pm.

Police claim crime clear-up success

Gravesend Reporter, April 26, 1990

CRIME-LINE

GRENADE FOUND BY KIDS ON ESTATE

CRIME-LINE
OUR FIGHT FOR YOUR TOWN
GRAVESEND
564444

TWO youngsters playing on a building site wrenched a grenade from the ground and carried it to a nearby house.

The young boys found the World War II explosive without its safety pin at the McCleans Homes site, Coldharbour Road, Northfleet, on Sunday.

The device is believed to have been buried beneath the former school playing field for nearly 50 years.

And the find has sparked renewed calls from police and army for the public to be wary of explosives.

Earlier this month two boys were officially cautioned by police for possession of illegal weapons after picking up a mortar bomb at a munitions dump in Vigo.

An army spokesman said 58 explosive devices had been found nationwide since January.

The youngsters took the grenade to McCleans official, Alan Rogers who had returned on Sunday afternoon to work.

Mr Rogers said: "I was just looking through some paper work and these little lads appeared saying: Look we've found a grenade.

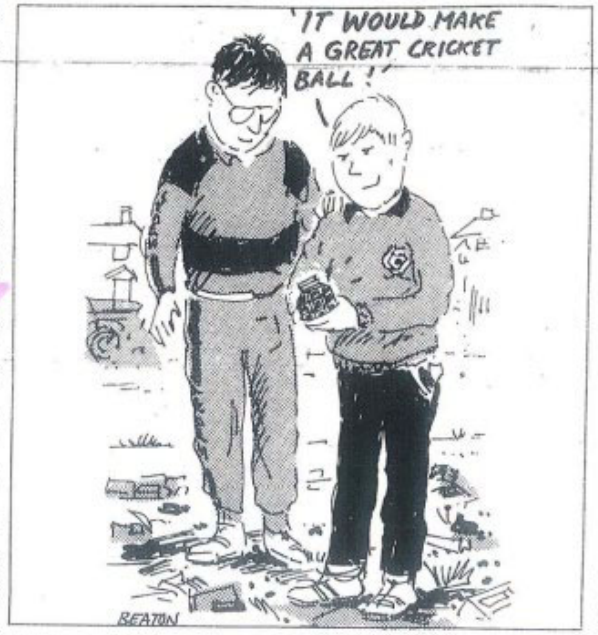
"Then they gave it to me! It was silly of them to pick it up but I suppose they did the right thing handing it over."

Knowing the danger Mr Rogers took the explosive to the end of the garden and called the police: "I didn't look at it too closely but I realised it was highly explosive. I just wanted to get rid of it as soon as possible."

The army this week revealed the site was scanned and given the all clear after the grenade was detonated on Monday. Coldharbour Road was cordoned off while they worked.

An army spokesmen said it had probably been thrown and it was unclear whether there was a detonator in it.

He said: "Our advice to anyone who finds what they think could be an explosive is not to touch it at all but to phone the police who will contact us."



Evacuation plans for bomb estate

ARMY chiefs have confirmed thousands of residents will be asked to leave their homes because of nearby World War II explosives.

At packed meetings at Thamesview School, Gravesend, this week, bomb experts outlined plans to remove underground anti-invasion devices from Riverview Park estate, built on the site of the former Gravesend airfield.

About 1,200 homes on the estate and Thong village could be evacuated while the demolition pipes are removed because of the risk of explosion.

Report by Olga English

Head of the clean-up operation Major Mike Lauder said on Monday: "There is a risk of explosion while the pipes are being removed which could cause flying fragments of metal and shock waves resulting in broken windows."

He said three of the 15 pipes found were known to contain explosives but none had charges attached to them. Most of the pipes were removed at the end of the war.

He said: "There is no risk at all from these pipes until they are disturbed."

Major Lauder said the 3in-wide steel tubes vary from 15 to 75 feet long and would be dug up by remote controlled excavators.

The explosives will be flushed out by water and taken away to be burned.

Brigadier Tony Piggott, commander at Chatham Garrison, said it is highly unlikely there are pipelines running under homes. "Contractors building the homes would have found them if they had been there," he added.

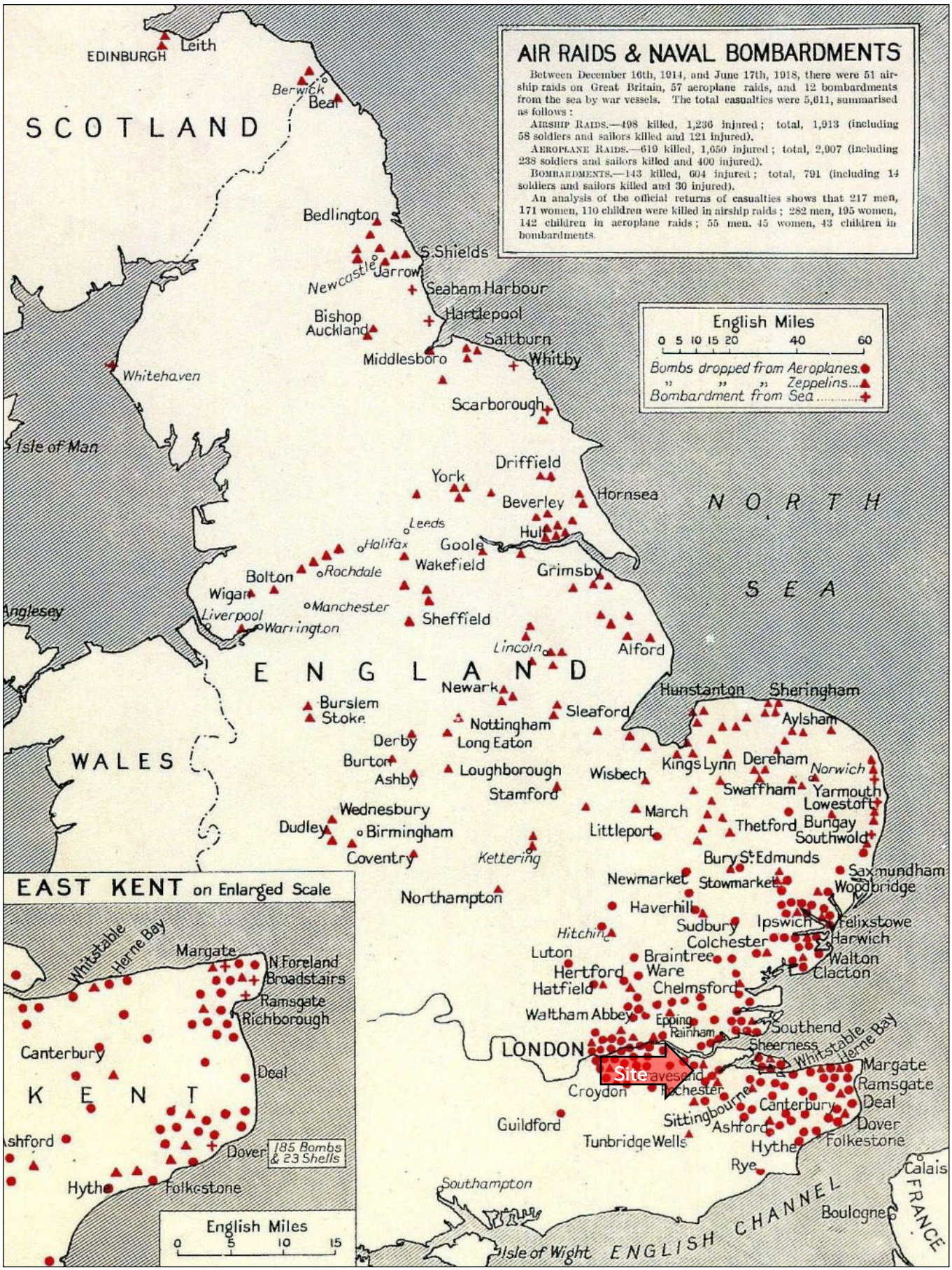
Royal Engineers using powerful modern detectors discovered the pipes when searching an area due for development.

Mr Pigott stressed: "There is no danger whatsoever of these pipelines exploding until touched in the process of removal. They have been there undisturbed for 45 years."

There will be no compulsory evacuation when work begins on April 17, but householders are advised to leave their homes between 8am and 6pm during the 10 day-operation.

Police chief Ken Tappenden said patrols will ensure homes were safe while residents were away.

WWI Map of Air Raids and Naval Bombardments



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Client: MEC Consulting Group

Project: Wrotham Road (East), Meopham, Kent

N

Ref: DA21698-00

Source: J. Morris, German Air Raids on Britain

4th June, 1939

Gravesend, Kent

RAF Gravesend (centre image)

The Pobjoy Airmotors Factory

The southern section of this image was located approximately 3.7km to the north-east.

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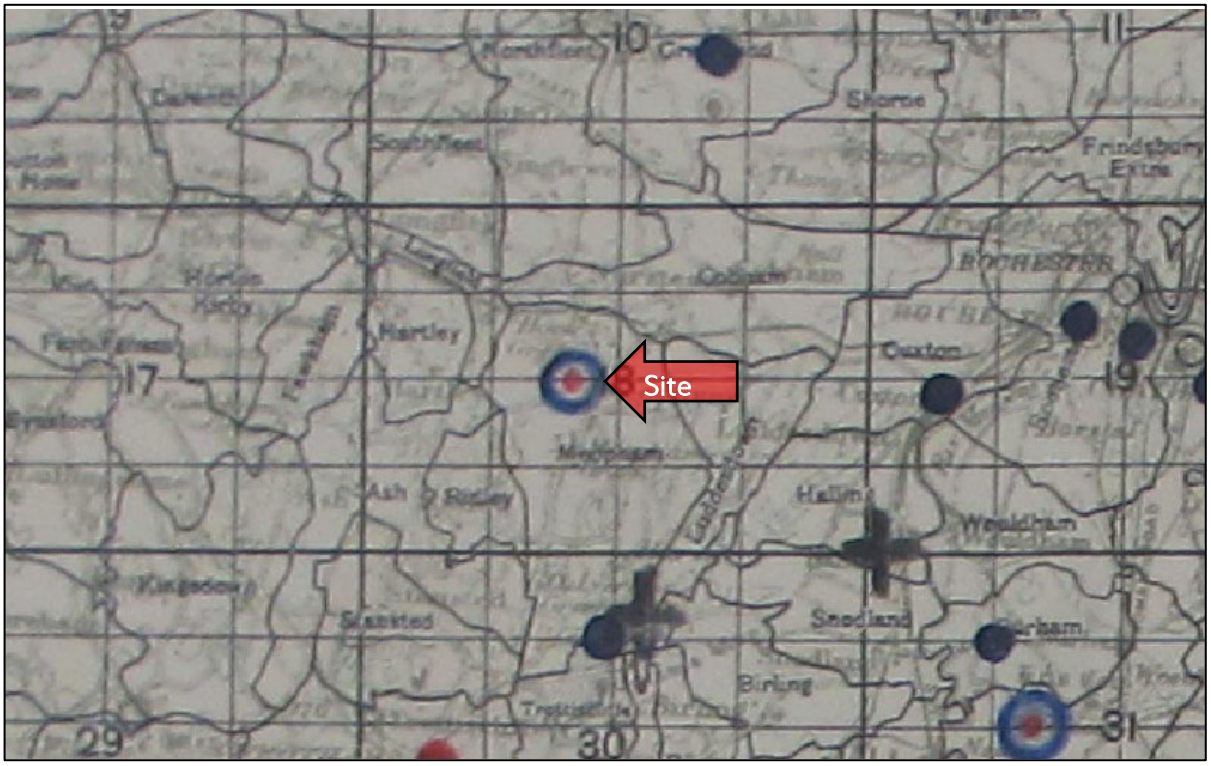
Source: Nigel J. Clarke, "Adolf Hitler's Home Counties Holiday Snaps"

N

August 17th, 1940

September 2nd, 1940



HE bomb strikes

Incendiary Bomb Strike

British Aircraft Crash

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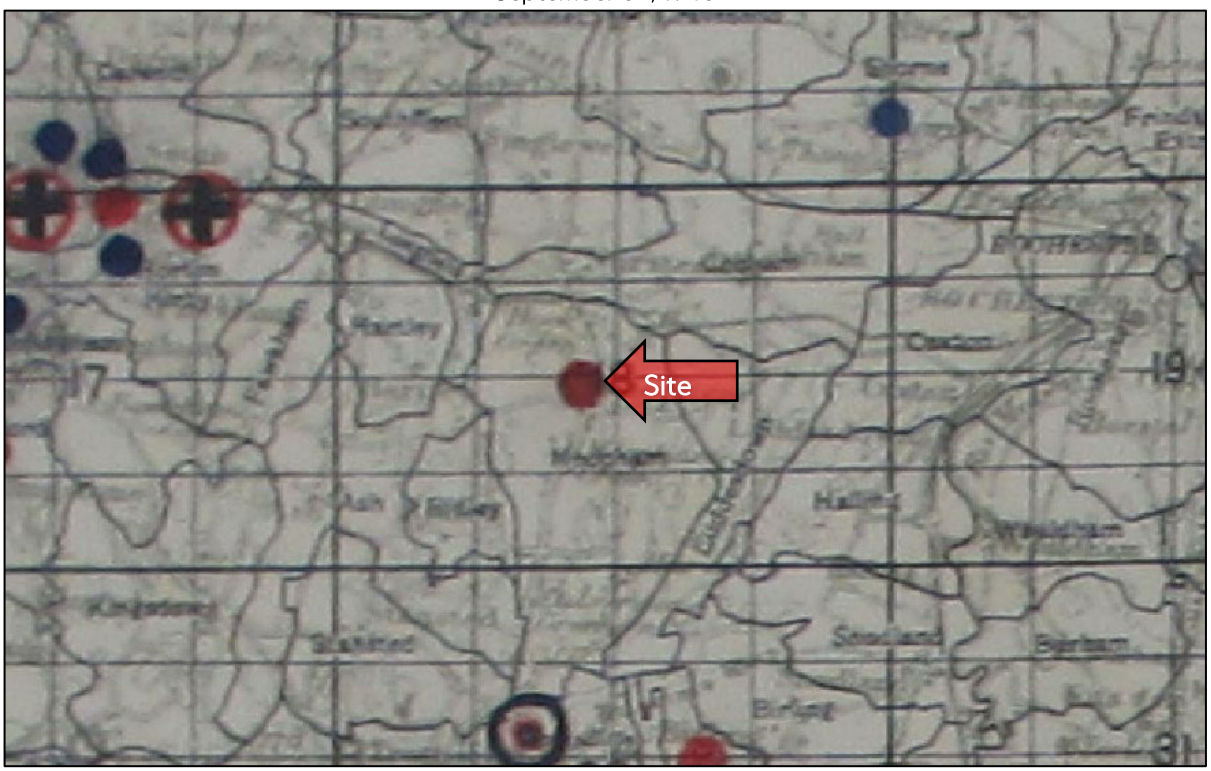
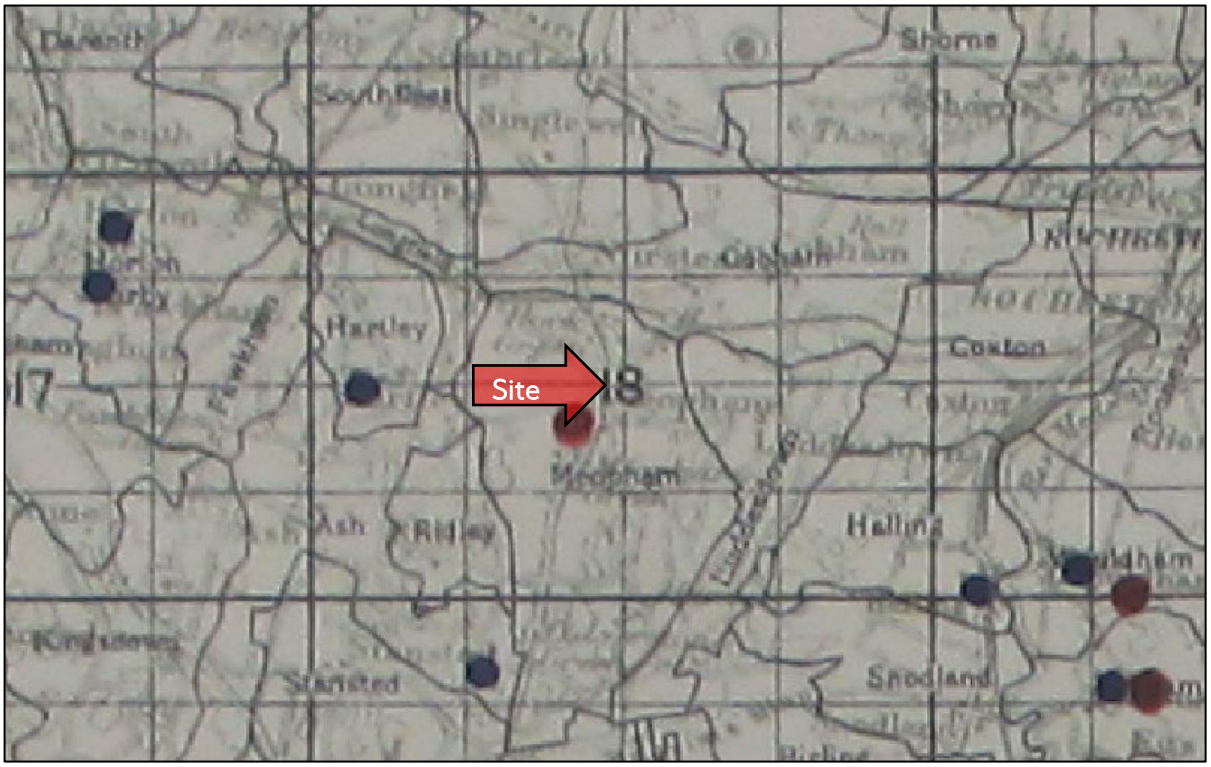
Source: Kent History Centre

September 8th, 1940



September 15th, 1940



HE bomb strikes

Incendiary Bomb Strike

British Aircraft Crash

German Aircraft Crash

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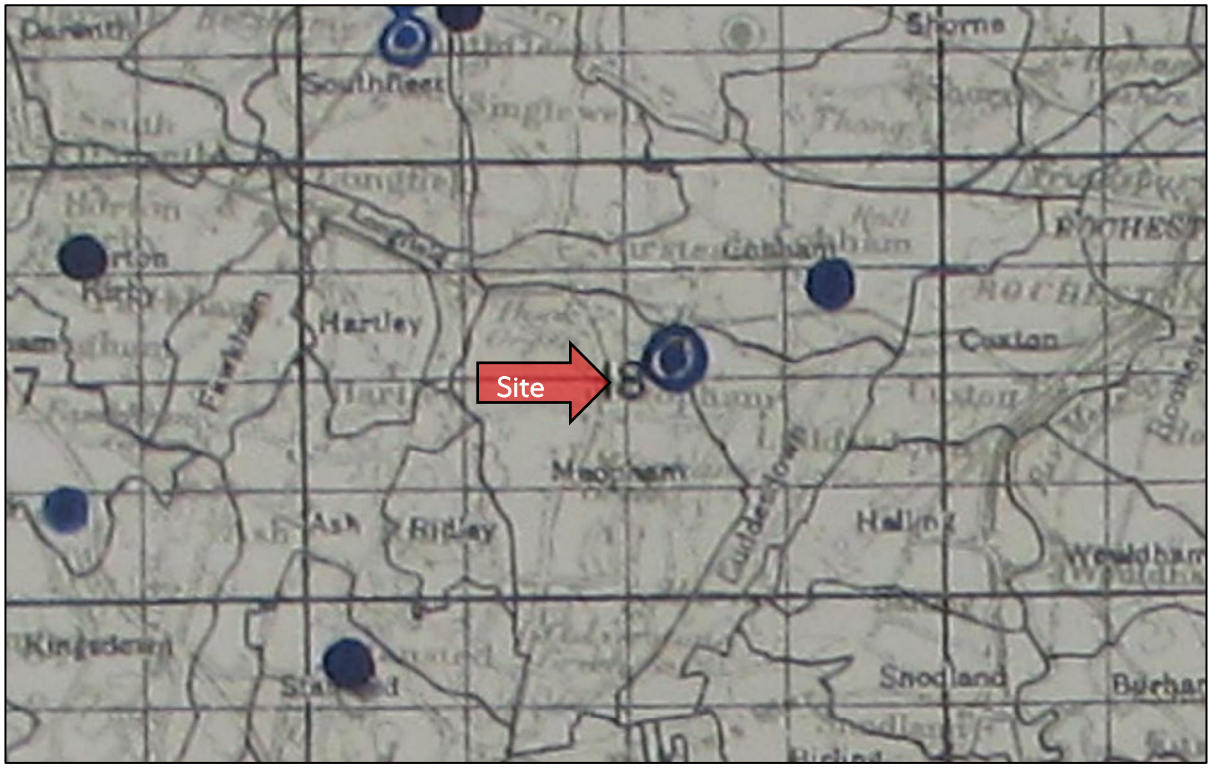
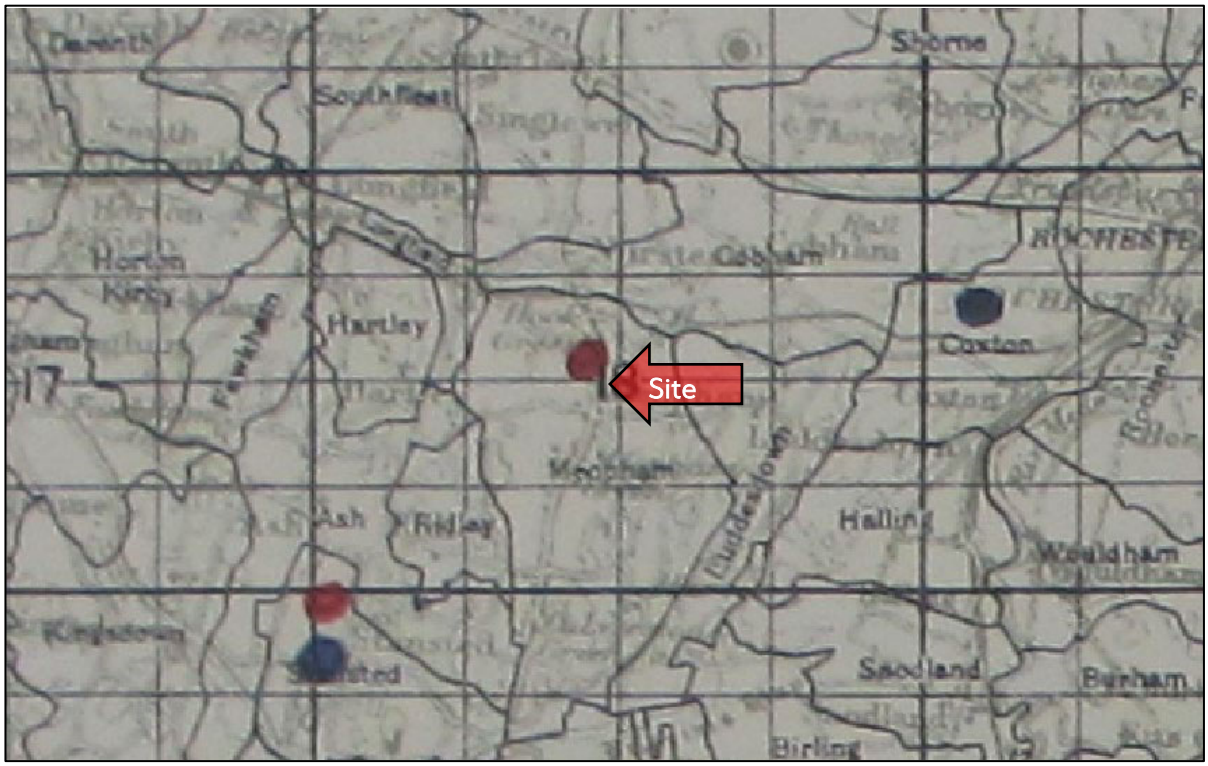
Source: Kent History Centre

September 21st, 1940



September 29th, 1940



HE bomb strikes Incendiary Bomb Strike PM

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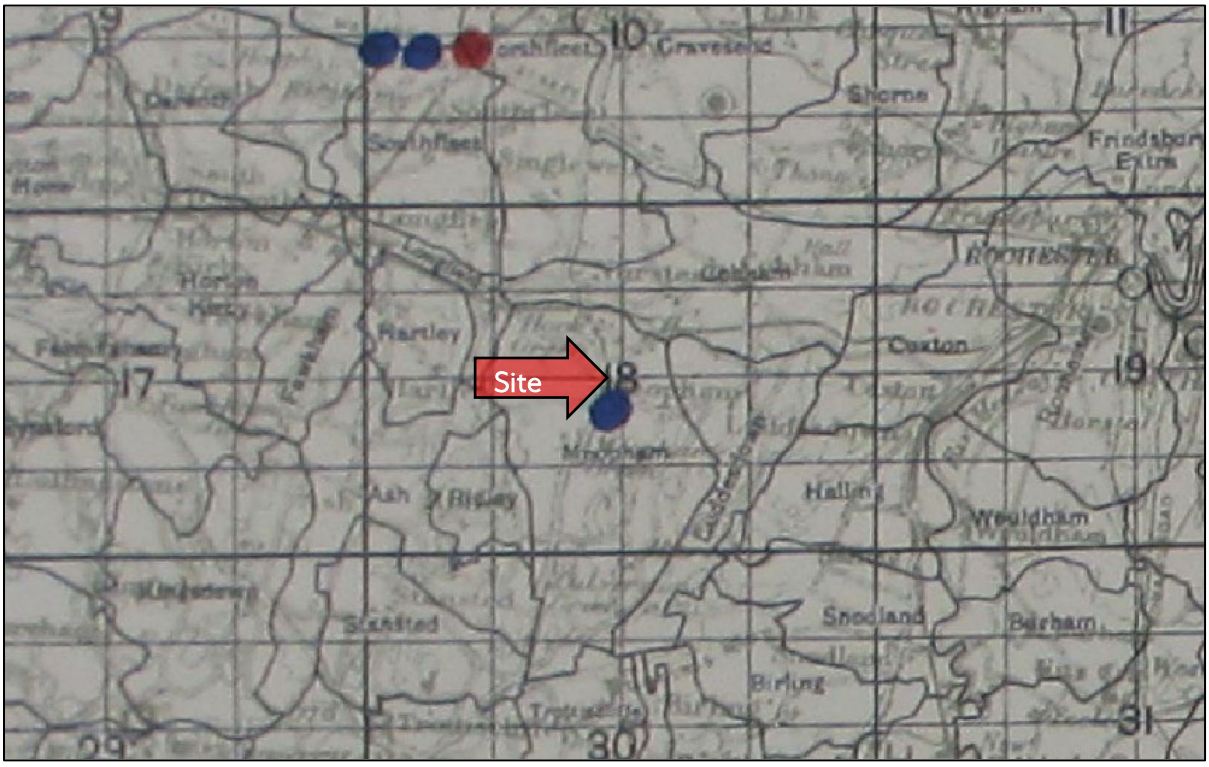
Source: Kent History Centre

October 16th, 1940



October 21st, 1940

HE bomb strikes Incendiary Bomb Strike

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November 1st, 1940

November 29th/30th 1940

HE bomb strikes Incendiary Bomb Strike

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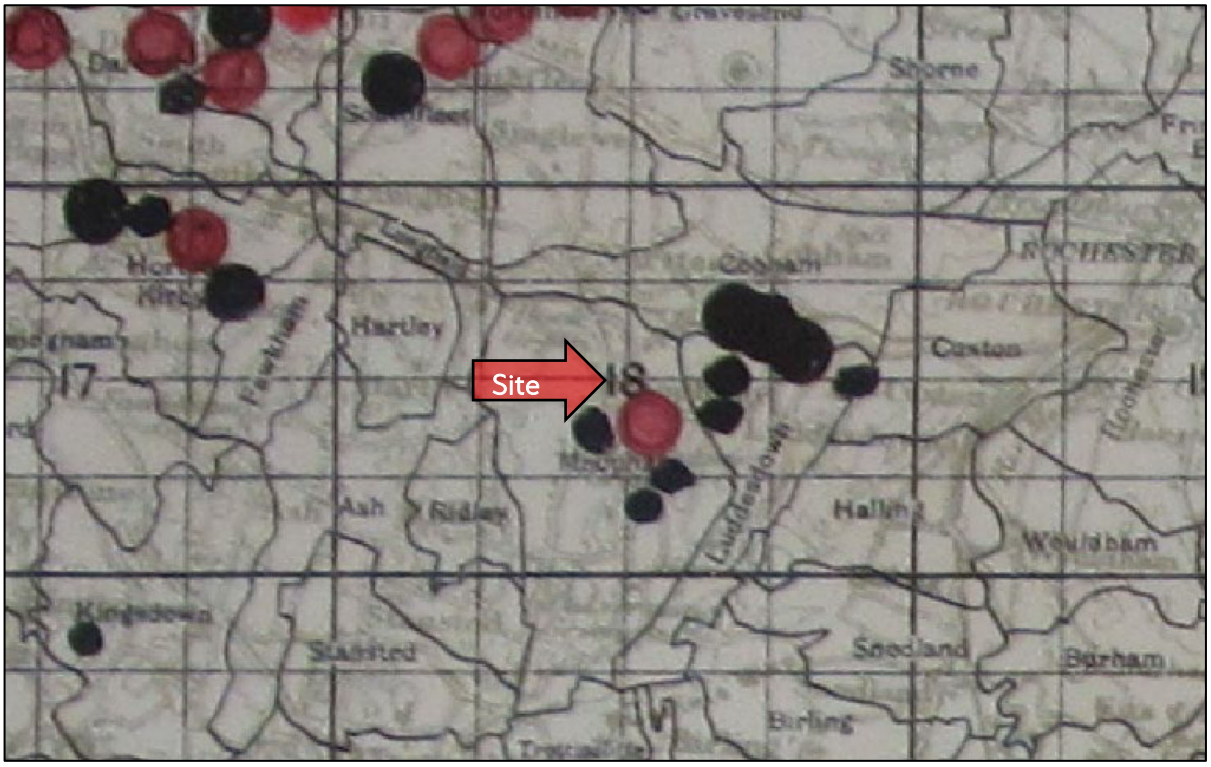
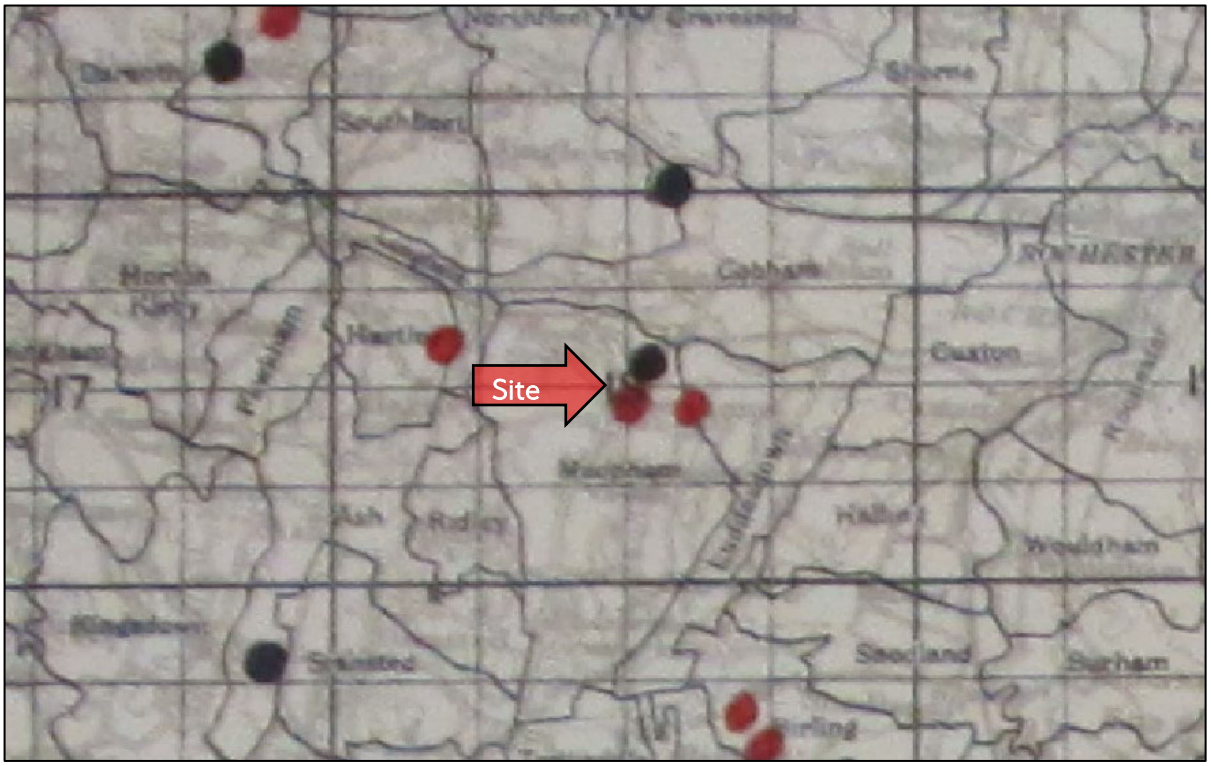
January 12th, 1941



March 19th, 1941



HE bomb strikes Incendiary Bomb Strike

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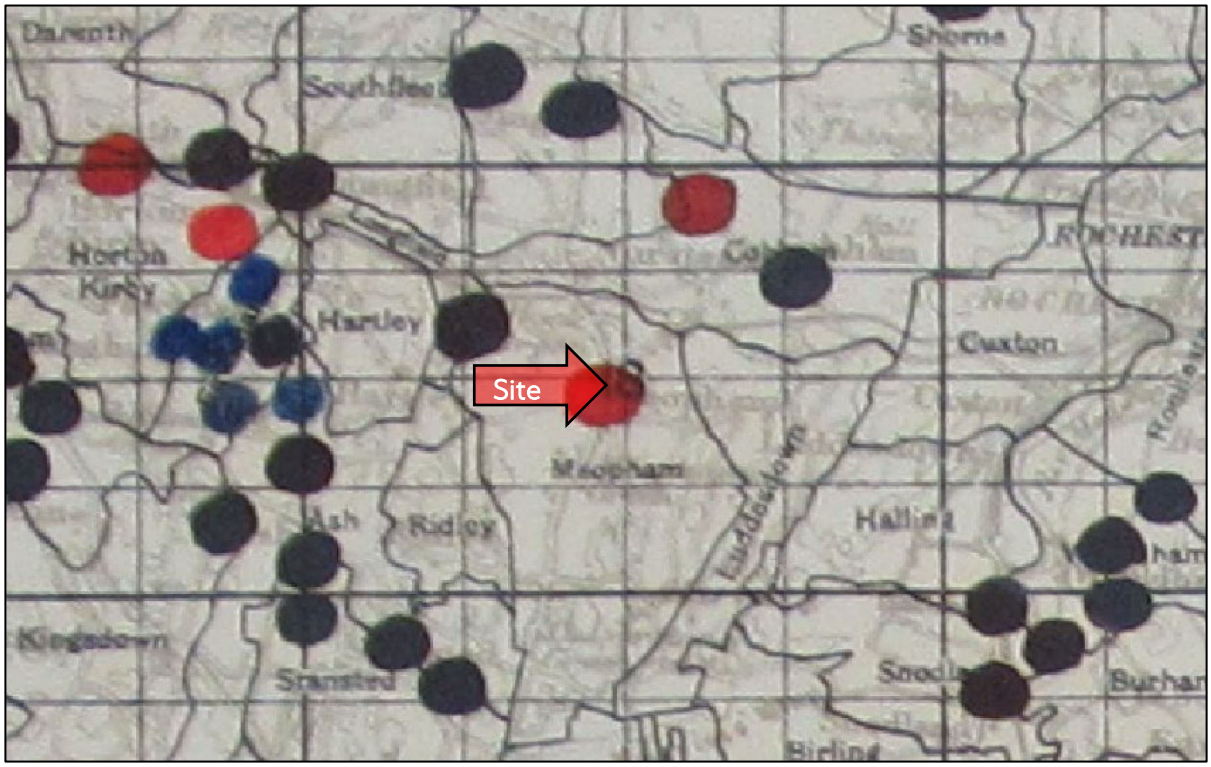
April 19th, 1941

April 20th, 1941



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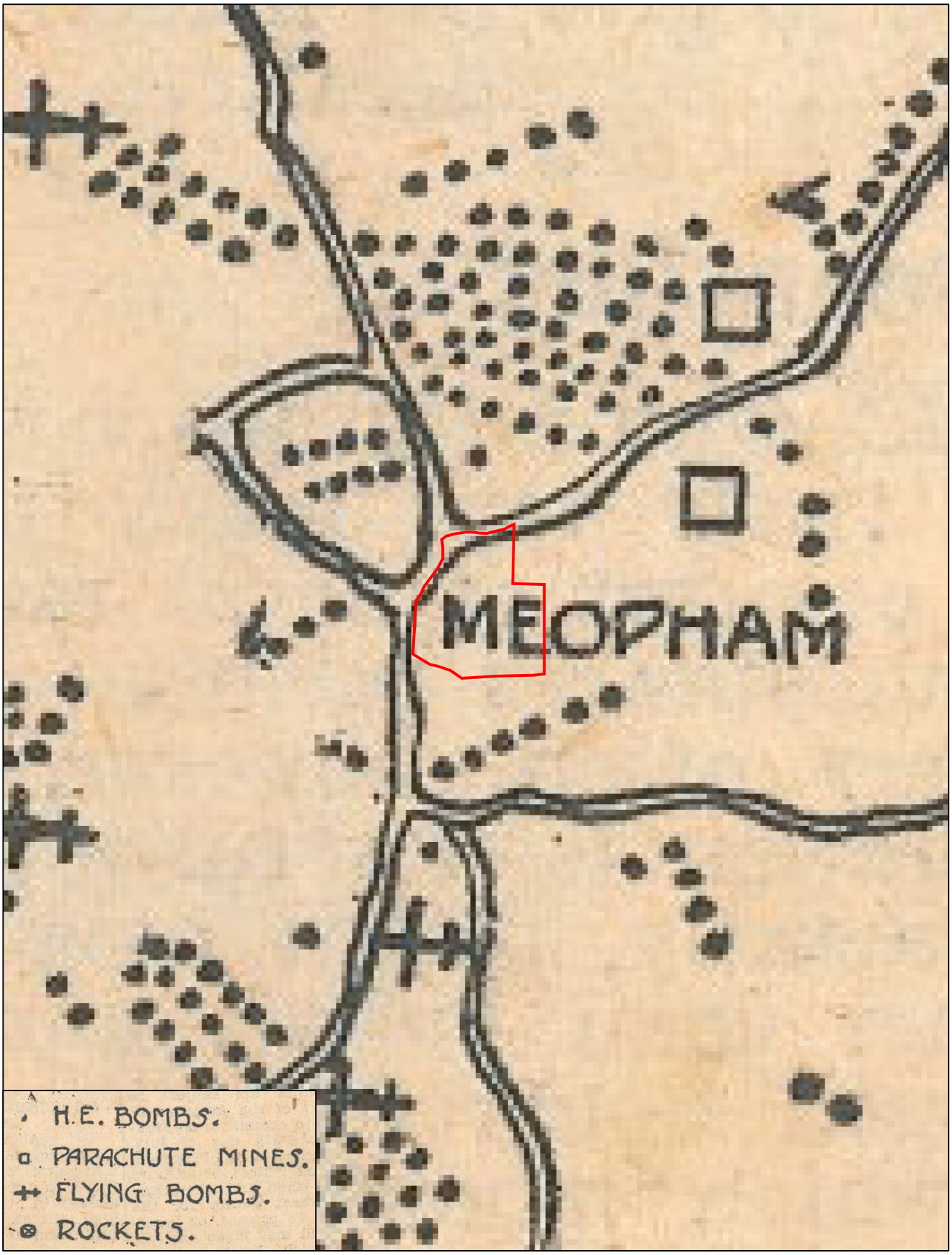

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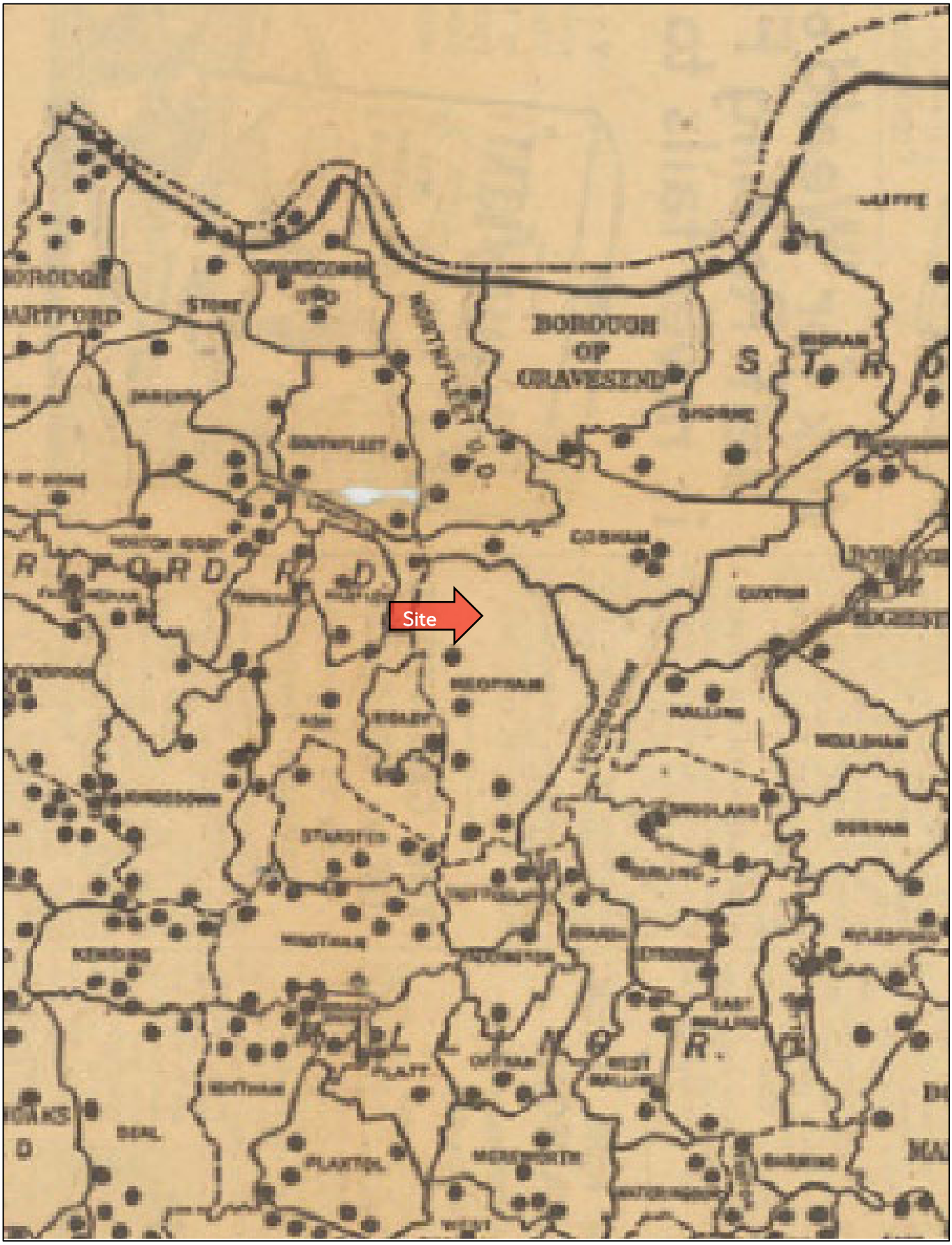
Source: Kent Archives



V-1 Flying Bomb

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Source: Kent Archives

Message Number	Date	Time Origin	Time Receipt	Parish	Time of Incident	Type of Bomb	No.	Information	Casualties K.	S.I.	SL.I.	Damage	Action taken and remarks	Initial of Officer making entry
												Fire at Colyer Rd		
50	-	-	19.56	20.27	-	-		REF. 16.41. Amended Casualties -	25	8	10		NOTED	
				STROOD	12.40	H.E.	22	13 H.E. Meopham M.R. 1367	NIL			NIL		
								1 H.E. Inurated Line M.R. 1367				Telephone wires		
								4 H.E. near Birt House M.R. 1369				Telephone wires	NOTED	
								1 H.E. High Halstow M.R. 1173				Slight		

WAR DIARY.

MEDWAY GROUP INCIDENTS II 15/9/40

MESSAGE NO.	Date	Time ORIGIN	Time RECEIPT	LOCAL AUTHORITY	Information	CASUALTIES K	S.I.	S.L.	DAMAGE	ACTION TAKEN and Remarks	Initial of Officer making entry
89	15.9.40	18.37	18.52	M.G.C.	STROOD. MEOPHAM. MINOR BOMBING AT 15.00. APPROX. 200 I.B'S IN CORN STUBBLE.	NIL			NIL		RAB

WAR DIARY.

MEDWAY GROUP INCIDENTS. 21-9-40

MESSAGE No.	Date	Time ORIGIN	Time RECEIPT	LOCAL AUTHORITY	Information	CASUALTIES K	S.I.	L.I.	DAMAGE	ACTION TAKEN and Remarks	Initial of Officer making entry
19	21-9-40	09.20	10.05	M.G.C.	STROOD. PARACHUTE MINE EXPLODED IN CAMER PARK, MEOPHAM M.R. 097855 AT 04.00	NIL			DAMAGE TO PROPERTY	Region NO ACTION	RAB

WAR DIARY.

MEDWAY GROUP SHEET III 16-10-40

MESSAGE NUMBER.	Date	Time ORIGIN	Time RECEIPT	LOCAL AUTHORITY.	Information	CASUALTIES K	SI	LI	DAMAGE	ACTION TAKEN AND Remarks	Initial of Officer making entry
102	16-10-40	23.14	23.19	M.G.C.	STROOD RURAL AT 23.00 hrs. MINOR BOMBING AT MEOPHAM AT 22.00 HRS. 5 H.E'S AND ONE U.E.B.		NIL		ELECTRICITY MAIN DAMAGED. WHITEHALL ROAD BLOCKED. M.R. 088846		RAB

WAR DIARY.

SHEET II

MEDWAY GROUP INCIDENTS. 21.10.40

MESSAGE No	Date	Time ORIGIN	Time RECEIPT	LOCAL AUTHORITY	Information	CASUALTIES K	SI	LI	DAMAGE	ACTION TAKEN and Remarks	Initial of Officer making entry
42.	21.10.40	1740	1754	MEDWAY GROUP	SITUATION REPORT. STROOD. MINOR BOMBING INCIDENT AT 15.29 HOURS AT MEOPHAM M/R 089859 AND 075859. THREE DELAYED ACTION BOMBS WERE DROPPED.	N	I	L	NIL	NONE	RAB

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Client: MEC Consulting Group

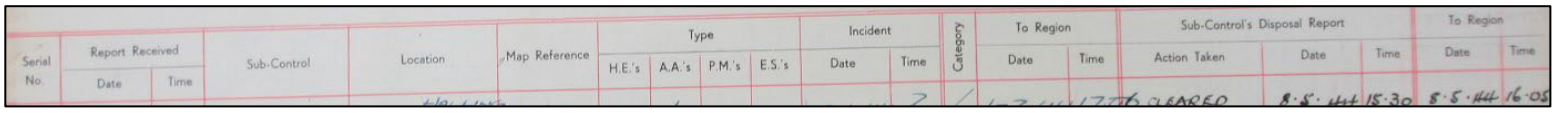
Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00 **Source:** Kent Archives

4	1-11-40	06.55	07.08	Do.	STROOD RURAL MINOR BOMBING AT 03.50 ONE H.E. AND TWO OIL BOMBS, AT MEOPHAM M.R. 040845			NIL	NIL	NO ACTION	R18.
41	Do.	2050	2056	Strood R.D.	Meopham. 2005 hrs. 18 x 1 M.R. 085846 No details						
44	-Do-	2230	2239	Strood R.D.	Thin 2050 - fire extinguished			None	Flight to Rochester.		
14	30-11-40	11.20	11.30	STROOD R.D.	22.15/29	H.E	1	m.m.R. 979859 to 995865 CALVERSTONE GREEN m.m.R. 076816	NIL	NIL	NIL
				GILLINGHAM	23.05/29 19.15/29	H.E³	8	HOOK'S GREEN m.m.R. 082858 ref 20.35/29. Total number	NIL	NIL	NIL
	81	19-3-41	22.20	22.37	STROOD R.D.	21.50	1.B³	MEOPHAM M.R. 087848. FIRE REPORTED.			
70	..	21.26	21.29	STROOD R.D.	21.00 approx:	H.E	2	MEOPHAM M.R. 087849.			
131	20-4-41	17.23	17.29	STROOD R.	03.06	H E	4	MEOPHAM. M.R 082854.	N I L	NIL.	No action NO ACTION.
23.	20.4.41.	02.40	02.44	Strood R.	02.25.	H.E.	4	Meopham. Norwood Lane.			

STROOD RURAL INCIDENTS. WAR DIARY. Date Nov. 2nd '43

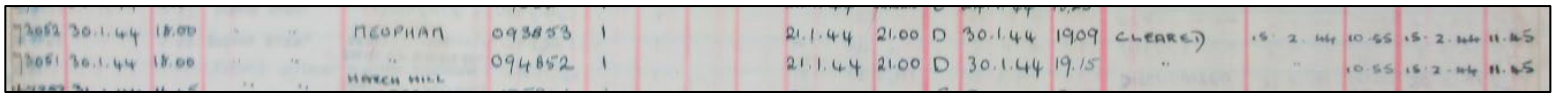
Message Number	Date	Time Origin	Time Receipt	Local Authority	Time of Incident	Type of Bomb	No.	Information	Casualties K.	S.I.	SL. I.	Damage	Action Taken and Remarks	Initial of Officer making entry
13	2/11/43	19.26	19.39	Strood R.	19.24	HE.	1	EXPRESS At Meopham MR081/865					Region 19.40	SJSA
17	..	19.57	20.05	"	19.27	"	1	Between Burston & Sudbourne M.R 12/85					Region 20.08	SJSA
19	..	20.28	20.32	"				FIRST INTERIM - REF 19.26 Meopham. Corner M.R. 081/851	None			Damage to houses & electricity	Region 20.34	SJSA



Serial No.	Report Received Date	Report Received Time	Sub-Control	Location	Map Reference	Type H.E.'s	Type A.A.'s	Type P.M.'s	Type E.S.'s	Incident Date	Incident Time	Category	To Region Date	To Region Time	Sub-Control's Disposal Report Action Taken	Sub-Control's Disposal Report Date	Sub-Control's Disposal Report Time	To Region Date	To Region Time
13276	23 2 44	18.30	"	COBHAM	095877		1			23.2.44	01.05	-	23.2.44	19.00	CLEARED				
54180	1.3.44	22.37	"	MEOPHAM	094864		1			23.2.44		-	1.3.44	22.44	CLEARED	3.3.44	19.25	3.3.44	19.40
54181	2.3.44	11.00	"	MEOPHAM	077866	1				2.3.44	03.15	A	2.3.44	12.30	CLEARED	18.4.44	19.00	18.4.44	19.35
54184	6.3.44	11.10	"	COBHAM	115875		1			2.3.44		-	6.3.44	11.35	CLEARED	5.3.44	11.35	5.3.44	12.45
54185	"	"	"	MEOPHAM	083825		1			"		-	6.3.44	11.40	CLEARED	3.3.44	08.30	3.5.44	09.35
													6.3.44	11.42		3.3.44	19.25	3.3.44	19.40

Relevant Transcription: (Serial Number) 54181. (Report received date) 2/3/44. (Location) Meopham. (Map reference) 077856. (Type) HE. (Incident date) 2/3/44.

This incident was located approximately 900m west of the site.



Serial No.	Report Received Date	Report Received Time	Sub-Control	Location	Map Reference	Type H.E.'s	Type A.A.'s	Type P.M.'s	Type E.S.'s	Incident Date	Incident Time	Category	To Region Date	To Region Time	Sub-Control's Disposal Report Action Taken	Sub-Control's Disposal Report Date	Sub-Control's Disposal Report Time	To Region Date	To Region Time
72052	30.1.44	18.00	"	MEOPHAM	093853	1				21.1.44	21.00	D	30.1.44	1909	CLEARED	15.2.44	10.55	15.2.44	11.45
73051	30.1.44	18.00	"	"	094852	1				21.1.44	21.00	D	30.1.44	19.15	"	"	10.55	15.2.44	11.45
				MARCH HILL															

Relevant Transcription: (Serial number) 72052. (Date) 21/1/44. (Location) Meopham. (Map Reference) 093853. (Type) 1x HE. (Action taken) Cleared.
(Serial Number) 73051. (Date) 30/1/44. (Location) Meopham. (Map Reference) 094852. (Bomb number) 1. (Action taken) Cleared.

These incidents were located approximately 320m and 420m to the east.

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Approximate site boundary

Project: Wrotham Road (East), Meopham, Kent

N

Ref: DA21698-00

Source: Google Earth

RAF Aerial Photography, 11th October 1946

Annex: N2

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Client: MEC Consulting Group

Approximate site boundary

N

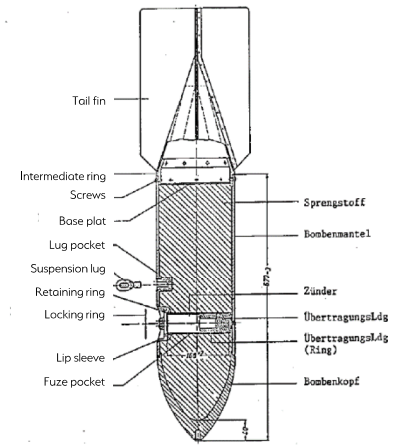
Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00

Source: National Monuments Record Office (Historic England)

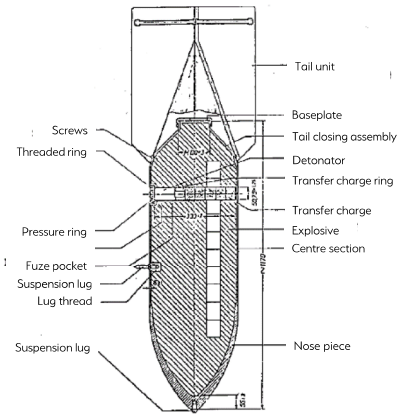
SC 50kg High Explosive Bomb

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.



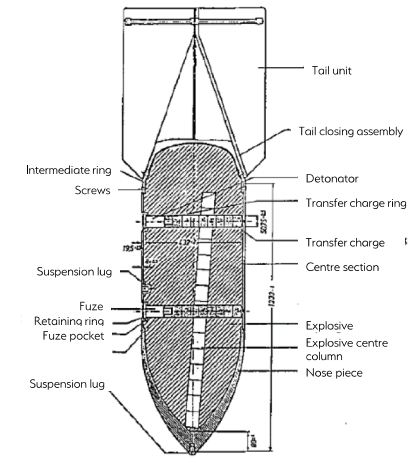
SC 250kg High Explosive Bomb

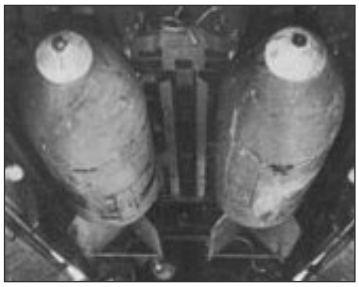
Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground 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).



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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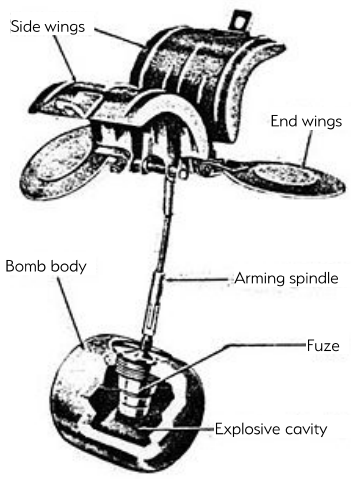
Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00

Source: Various sources

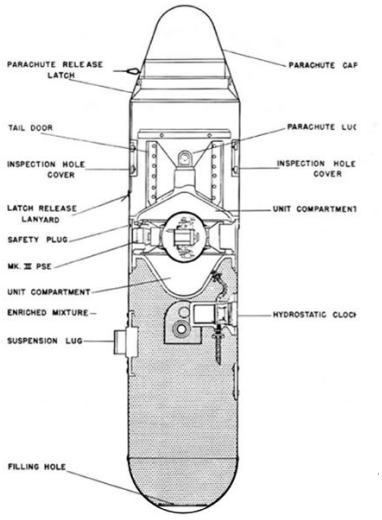
SD2 Anti-Personnel 'Butterfly Bomb'

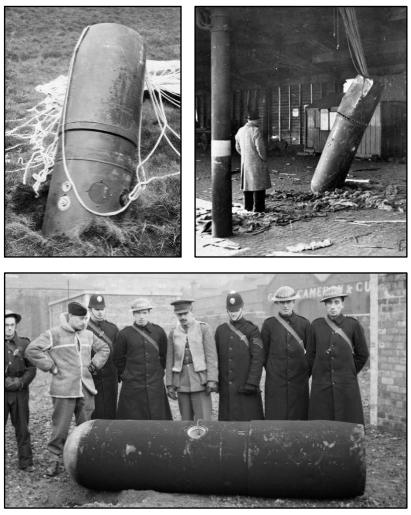
Bomb Weight	Approx. 2kg (4.41lb)
Explosive Weight	Approx. 7.5oz (225 grams) of Amatol surrounded by a layer of bituminous composition.
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long
Use	Designed as an 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)

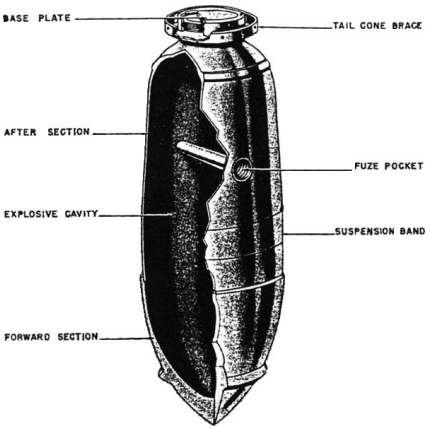
Bomb Weight	Approx. 990kg (2176lb)
Explosive Weight	Approx. 705kg (1,554lb)
Fuze Type	Impact/time delay/hydrostatic pressure fuze
Dimensions	2.64m x 0.64m (3.04m with parachute housing)
Use	Against civilian, military and industrial targets. Used as blast bombs and designed to detonate above ground level 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 High Explosive Bomb

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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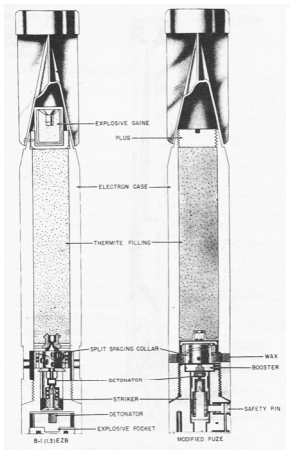
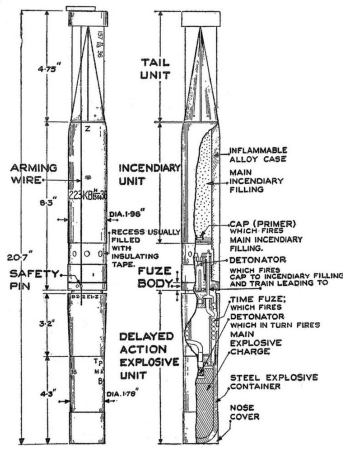
Ref: DA21698-00

Source: Various sources

1kg Incendiary Bomb

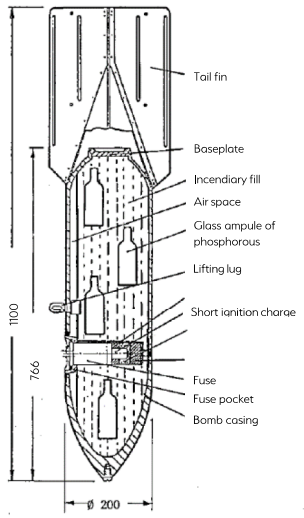
Bomb Weight	Approx. 1.0 - 1.3kg (2.2 and 2.9lb)
Explosive Weight	Approx. 680g (1.5lb) Thermite 8-15gm Explosive Nitropenta
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters on towns and industrial complexes.
Remarks	Magnesium 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.

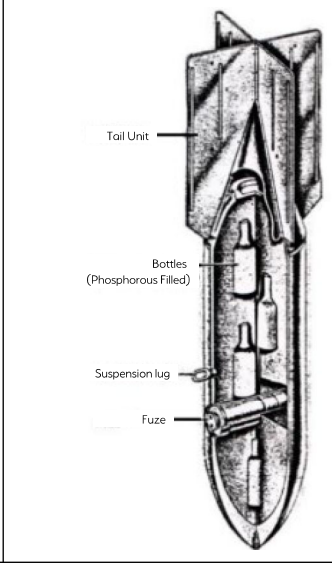




C50 A Incendiary Bomb

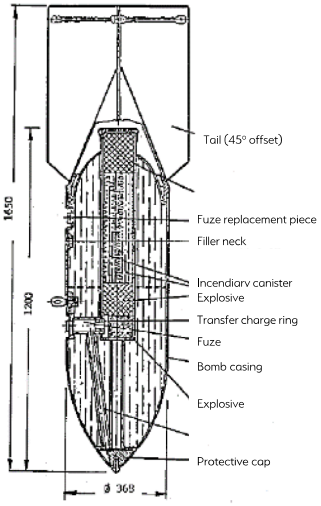
Bomb Weight	Approx. 41kg (90.4lb)
Explosive Weight	Approx. 0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against any targets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





Flam C-250 Oil Bomb

Bomb Weight	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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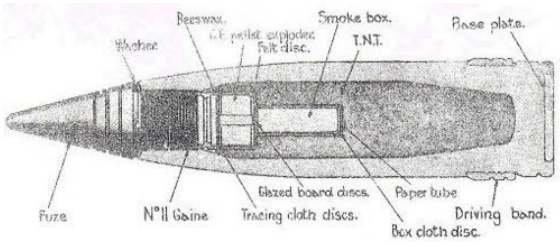
Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00

Source: Various sources

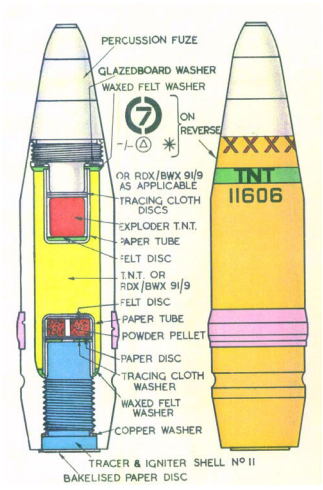
3.7 Inch QF Anti-Aircraft Projectile

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.

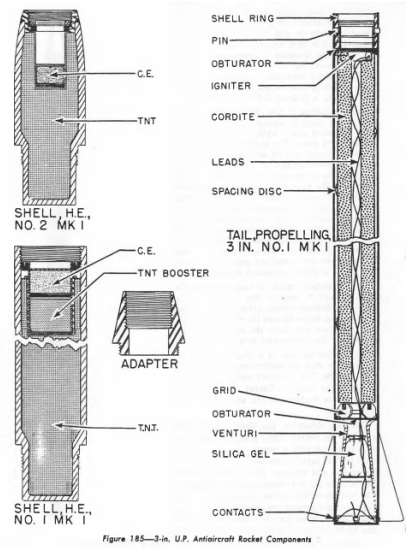


Figure 185.—3-in. U.P. Antiaircraft Rocket Components

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Client: MEC Consulting Group

Project: Wrotham Road (East), Meopham, Kent

Ref: DA21698-00 **Source:** Various sources

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1ST LINE DEFENCE

Front cover image credit: London Bomb Census Mapping, The National Archives (HO 193)

MEC
Consulting Group

APPENDICES

APPENDIX F

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Doc. Ref.	29473-CALC-0401
Sheet	1 of 25
Engineer	RF
Date	16.04.25
Revision	-

SOIL INFILTRATION CALCULATIONS FRONT SHEET

SCHEME	Land East of Wrotham Road, Meopham
CLIENT	Richborough
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 pit method.
NOTES	The soil infiltration rate test results reported below applies to the specific test depth range as stated on the calculation sheet. Testing was undertaken in five locations within the Seaford Chalk Formation (SA04-SA06, SA08-SA09), and one location within the Thanet Formation strata (SA07). The locations of the soil infiltration test pits are shown on the attached exploratory hole location plan. Groundwater was not encountered during the formation of the soil infiltration testing pits. Head deposits were recorded to overly the Chalk bedrock, generally at a greater thickness in the north, relative to the west and centre. Calculated infiltration rates from testing in the Chalk bedrock range between 1.02×10^{-5} m/s and 1.72×10^{-3} m/s. The highest rates were consistently recorded in SA09, in the north-east, where the pit could not be fully filled with water during the second and third tests due to the speed at which drainage was occurring. The lowest rates were recorded in SA06, in the north-west, with calculated values ranging between 6.76×10^{-5} and 1.02×10^{-5} m/s. It is likely that the rates at this location were restricted by the significant thickness of Head deposits encountered (1.80m), with testing completed across both superficial and bedrock strata. Insufficient soakage was recorded in SA07 during a single test to enable the calculation of a representative infiltration rate in accordance with BRE 365. Based on the available results, it is considered that soakaways within the Chalk bedrock will be feasible, and the lowest calculated value of 1.02×10^{-5} m/s would be applicable for design purposes. This represents a conservative value for infiltration based on the results from SA06, and it is likely that soakaways in the Chalk bedrock would yield higher infiltration rates based on the remaining results. Soakaways in the Thanet Formation will not be feasible. The infiltration rates reported apply to the specific depth ranges at the test locations as stated on the calculation sheets.

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5	**SA04 – Test 2**	**Result = 3.12 x 10^{-5} m/s**			
6	SA04 – Test 3	Result = 5.75 x 10^{-5} m/s			
7	SA05 – Test 1	Result = 2.82 x 10^{-4} m/s			
8	SA05 – Test 2	Result = 1.97 x 10^{-4} m/s			
9	**SA05 – Test 3**	**Result = 1.65 x 10^{-4} m/s**			
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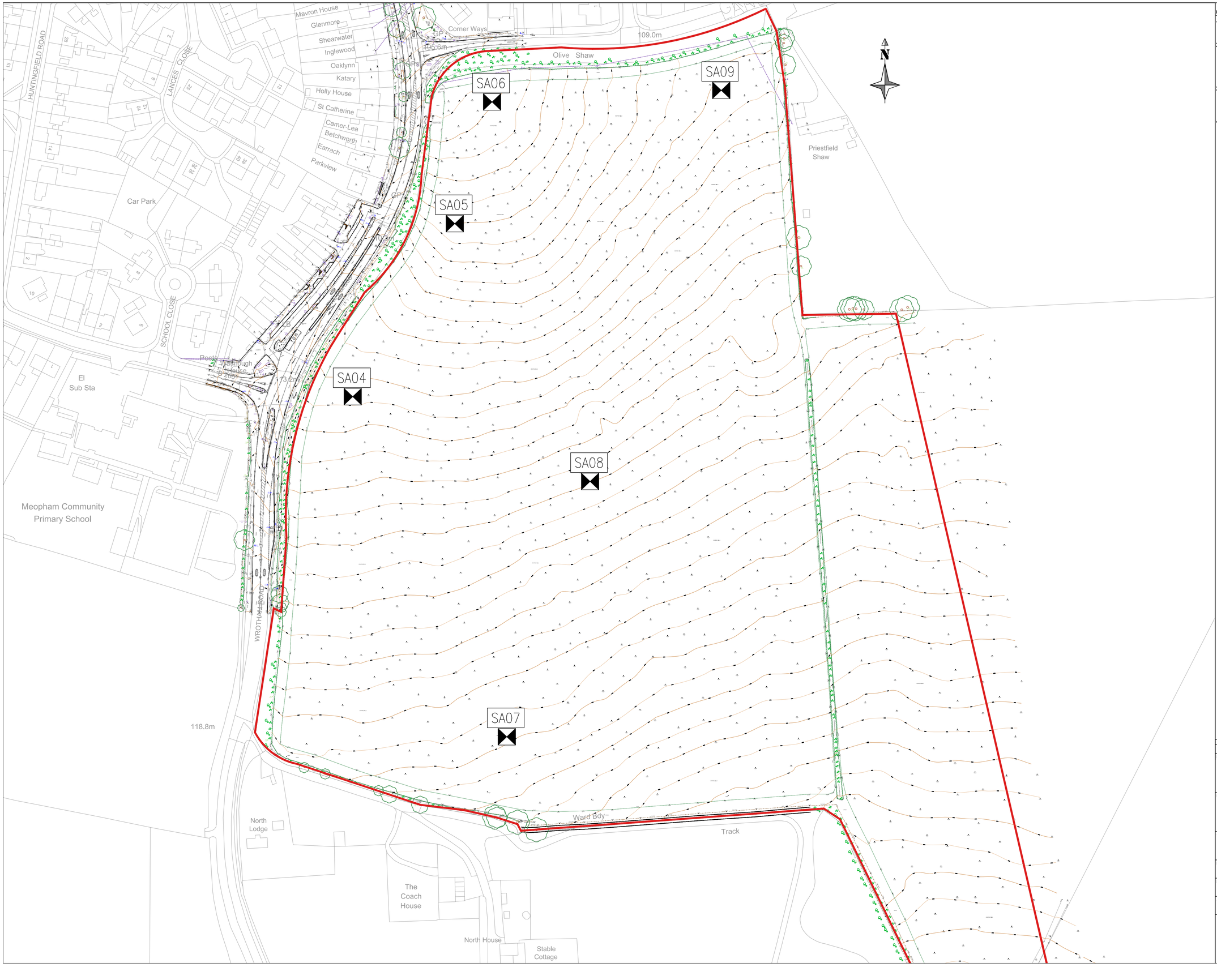
19	SA09 – Test 3	Result = 4.77 x 10^{-4} m/s			
20-25	Exploratory Hole Logs				

Values in bold represent lowest calculated infiltration rates.



GENERAL NOTES

1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS, ARCHITECTS AND SPECIALIST DESIGN DRAWINGS AND DETAILS.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS FOR STRATEGY PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.

KEY

SA01 SOIL INFILTRATION TEST PIT LOCATION

SITE BOUNDARY

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
-	FIRST ISSUE	JM	CW	DT	08/04/25

PROJECT:
LAND EAST OF
WROTHAM ROAD
MEOPHAM

DRAWING TITLE:
EXPLORATORY HOLE
LOCATION PLAN

CLIENT:
RICHBOROUGH ESTATES LTD

DRAWING NUMBER:
29473_04_140_01.1

REVISION:	SHEET SIZE:	SCALE:
-	A1	1 : 1000

STATUS:
FOR INFORMATION / APPROVAL

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Birmingham | Brighton | Leicester

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Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

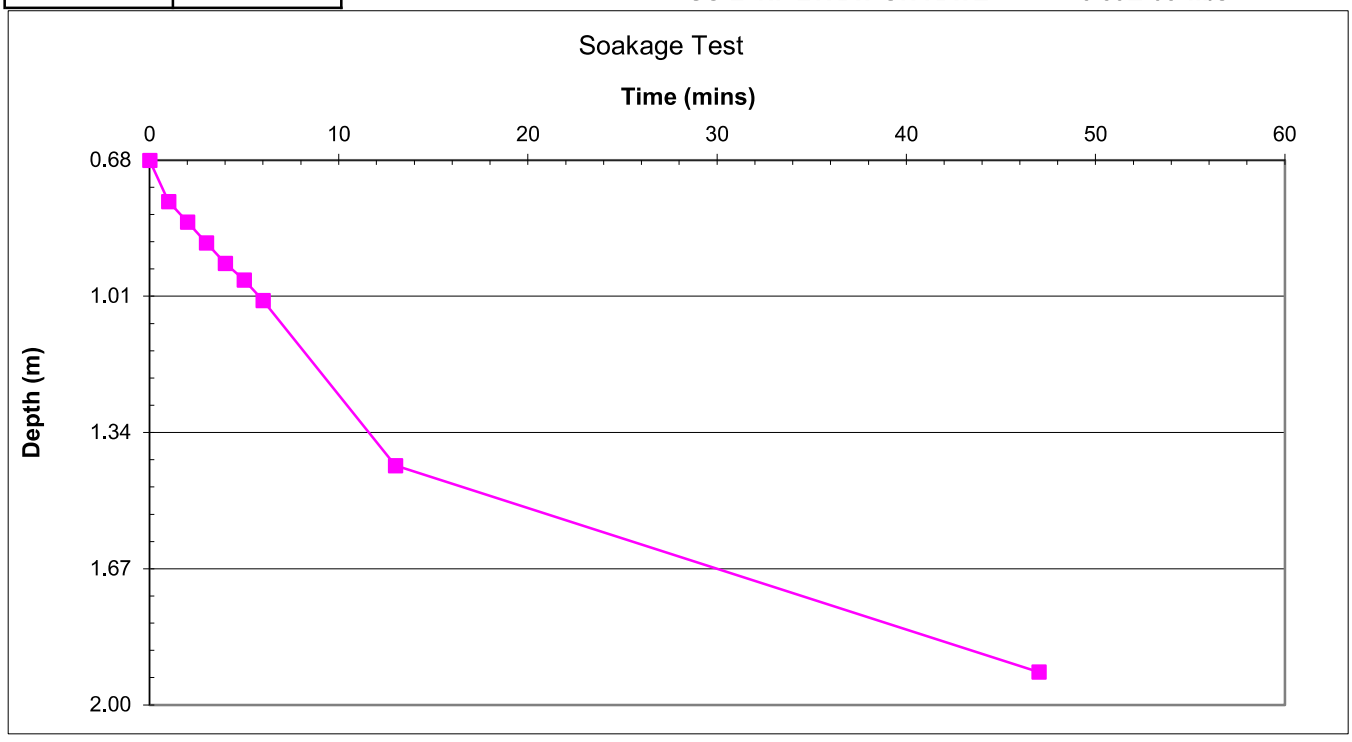
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA04**	**Test** 1
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.40m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.40-0.60m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise subangular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	0.60-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.68
1	0.78
2	0.83
3	0.88
4	0.93
5	0.97
6	1.02
13	1.42
47	1.92

Effective storage depth =	1.32	m
75% effective storage depth =	0.99	m
(ie depth below GL) =	1.01	m
25% effective storage depth =	0.33	m
(ie depth below GL) =	1.67	m
effective storage depth 75%-25% =	0.66	m
Time to fall to 75% effective depth =	5.4	mins
Time to fall to 25% effective depth =	30	mins
Void Ratio =	40%	
V (75%-25%) =	0.24	m^3
a (50%) =	4.13	m^2
t (75%-25%) =	24.60	mins
SOIL INFILTRATION RATE =	**3.89E-05**	**m/s**



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Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

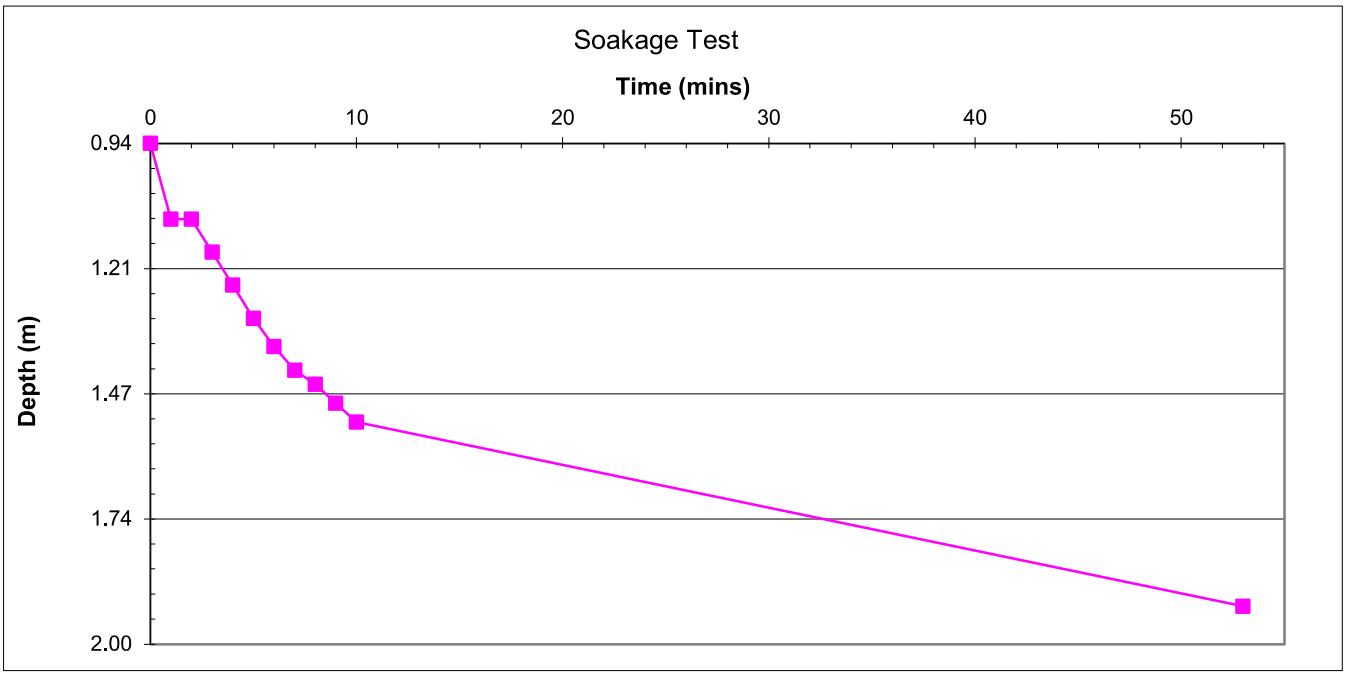
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA04**	**Test** 2
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.40m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.40-0.60m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise subangular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	0.60-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.94
1	1.10
2	1.10
3	1.17
4	1.24
5	1.31
6	1.37
7	1.42
8	1.45
9	1.49
10	1.53
53	1.92

Effective storage depth =	1.06	m
75% effective storage depth =	0.80	m
(ie depth below GL) =	1.21	m
25% effective storage depth =	0.27	m
(ie depth below GL) =	1.74	m
effective storage depth 75%-25% =	0.53	m
Time to fall to 75% effective depth =	3.5	mins
Time to fall to 25% effective depth =	32.6	mins
Void Ratio =	40%	
V (75%-25%) =	0.19	m^3
a (50%) =	3.50	m^2
t (75%-25%) =	29.10	mins
SOIL INFILTRATION RATE =	**3.12E-05**	**m/s**



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Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

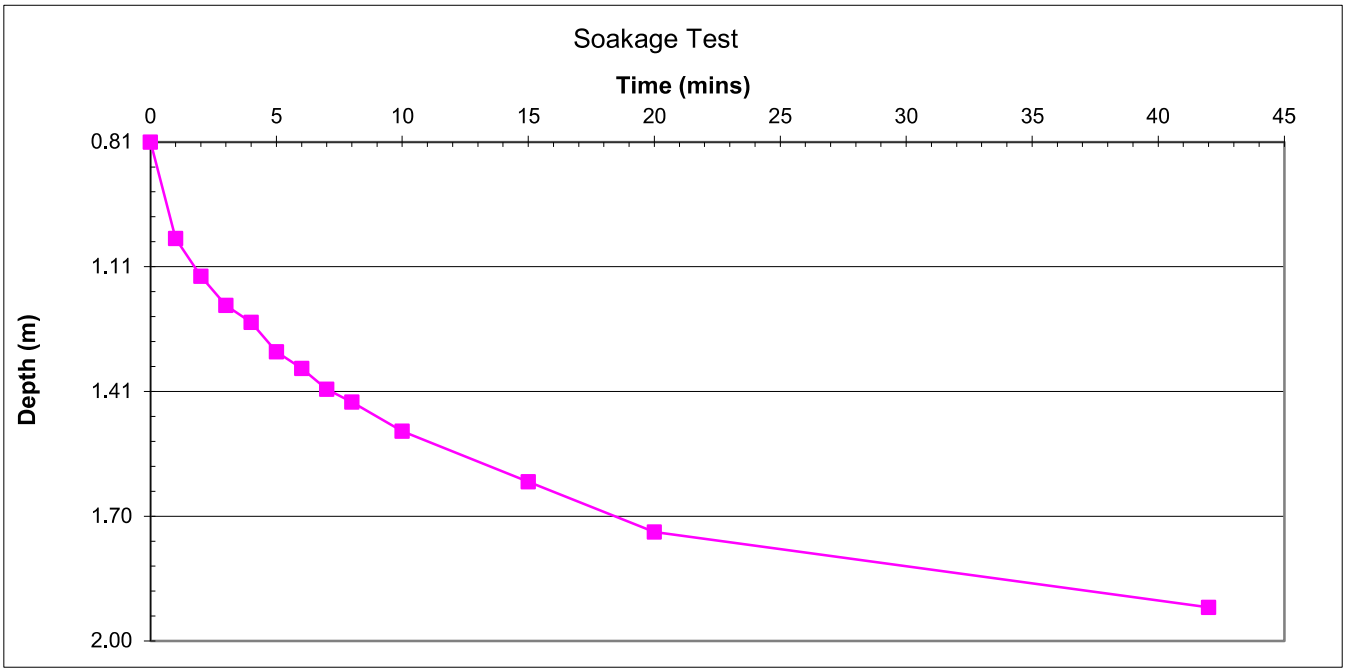
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA04**	**Test** 3
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.40m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.40-0.60m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise subangular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	0.60-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.81
1	1.04
2	1.13
3	1.20
4	1.24
5	1.31
6	1.35
7	1.40
8	1.43
10	1.50
15	1.62
20	1.74
42	1.92

Effective storage depth =	1.19	m
75% effective storage depth =	0.89	m
(ie depth below GL) =	1.11	m
25% effective storage depth =	0.30	m
(ie depth below GL) =	1.70	m
effective storage depth 75%-25% =	0.60	m
Time to fall to 75% effective depth =	1.7	mins
Time to fall to 25% effective depth =	18.5	mins
Void Ratio =	40%	
V (75%-25%) =	0.21	m^3
a (50%) =	3.82	m^2
t (75%-25%) =	16.80	mins
SOIL INFILTRATION RATE =	**5.57E-05**	**m/s**



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Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

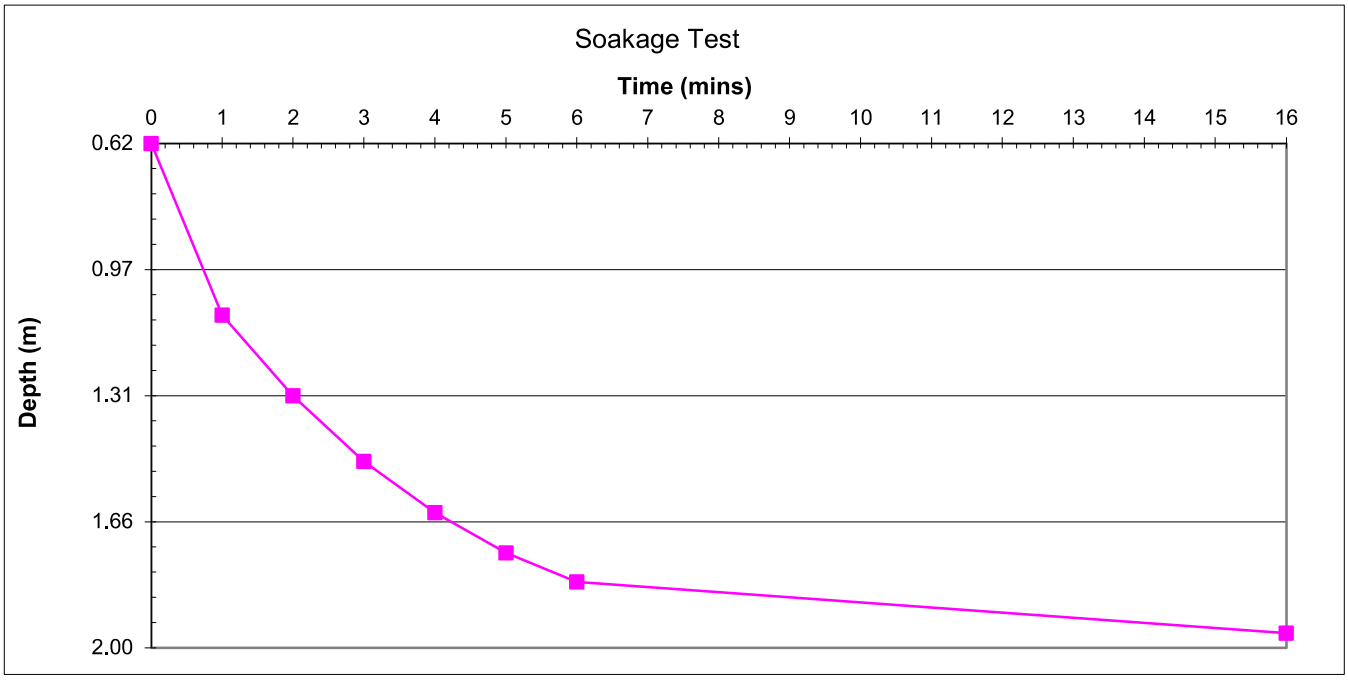
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA05**	**Test** 1
Length	**2.30** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.00m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.00-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.62
1	1.09
2	1.31
3	1.49
4	1.63
5	1.74
6	1.82
16	1.96

Effective storage depth =	1.38	m
75% effective storage depth =	1.04	m
(ie depth below GL) =	0.97	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.66	m
effective storage depth 75%-25% =	0.69	m
Time to fall to 75% effective depth =	0.75	mins
Time to fall to 25% effective depth =	4.25	mins
Void Ratio =	40%	
V (75%-25%) =	0.29	m^3
a (50%) =	4.83	m^2
t (75%-25%) =	3.50	mins
SOIL INFILTRATION RATE =	**2.82E-04**	**m/s**



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		Date	15/04/25

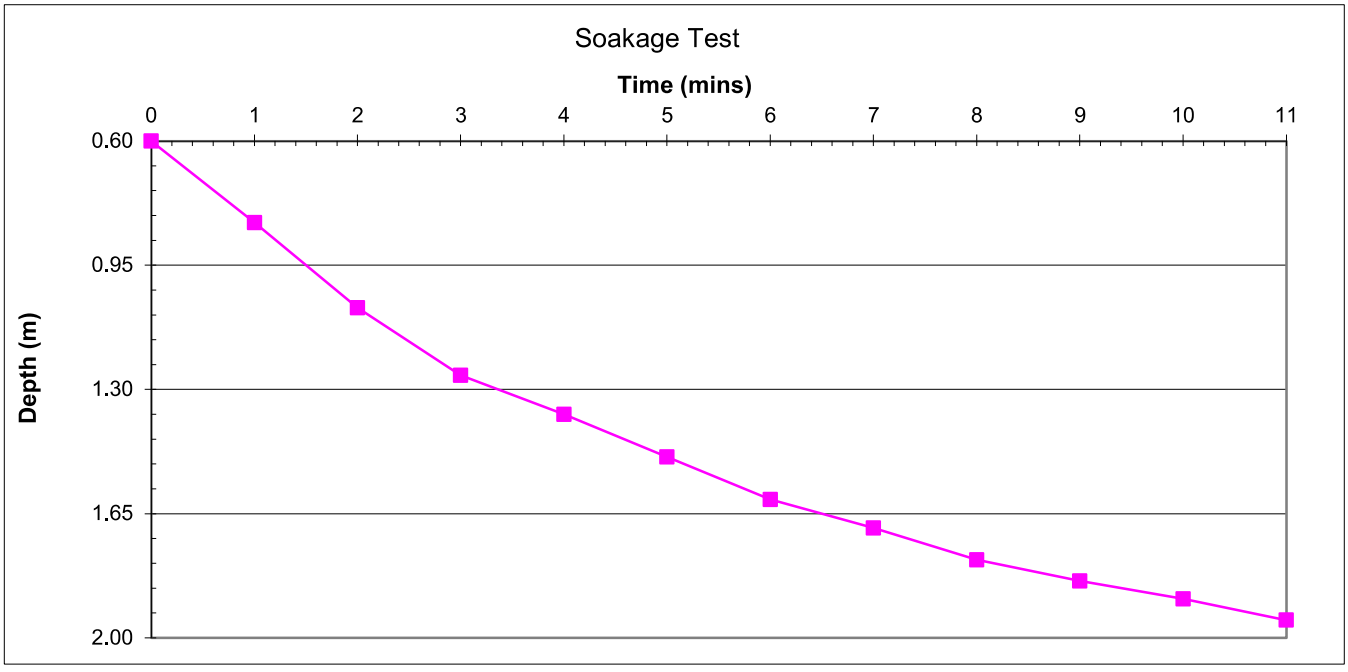
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA05**	**Test** 2
Length	**2.30** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.00m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.00-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.60
1	0.83
2	1.07
3	1.26
4	1.37
5	1.49
6	1.61
7	1.69
8	1.78
9	1.84
10	1.89
11	1.95

Effective storage depth =	1.40	m
75% effective storage depth =	1.05	m
(ie depth below GL) =	0.95	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.70	m
Time to fall to 75% effective depth =	1.52	mins
Time to fall to 25% effective depth =	6.54	mins
Void Ratio =	40%	
V (75%-25%) =	0.29	m^3
a (50%) =	4.89	m^2
t (75%-25%) =	5.02	mins
SOIL INFILTRATION RATE =	**1.97E-04**	**m/s**



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		Date	15/04/25

Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref. **SA05** **Test** 3

Length	**2.30**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	m

Ground conditions

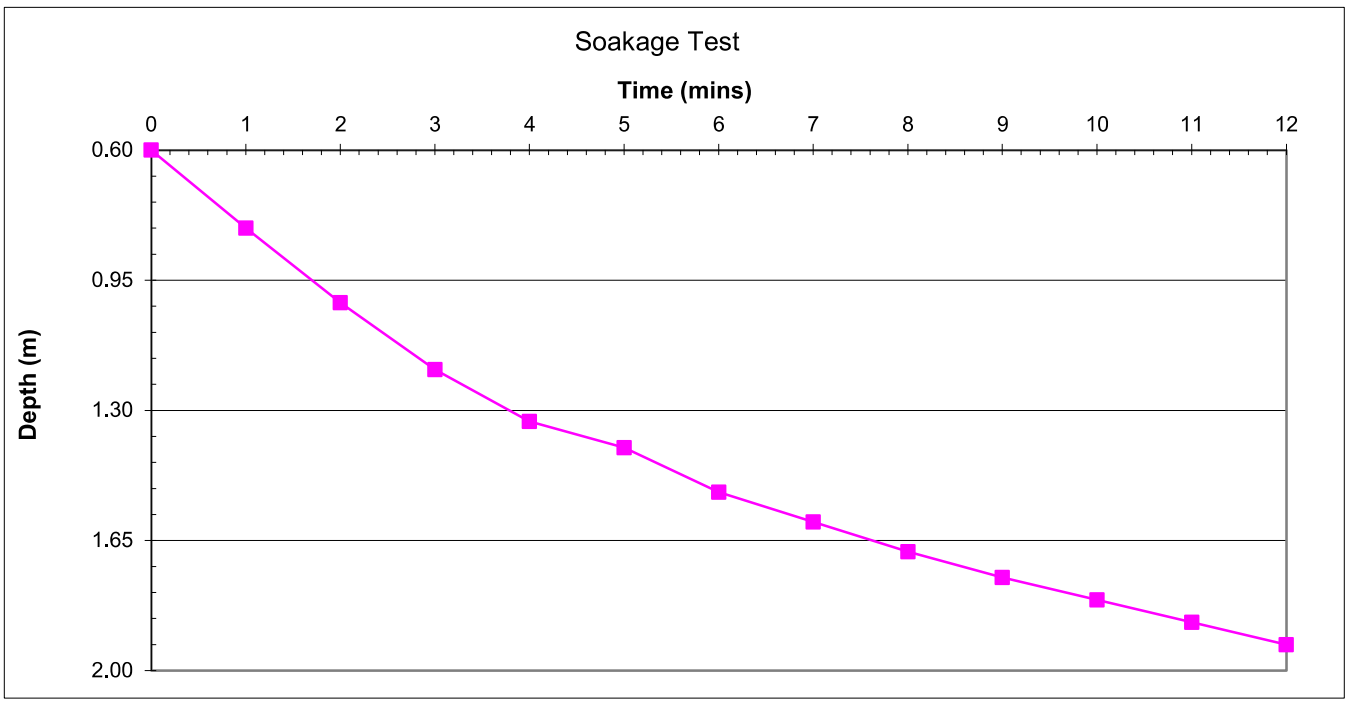
0.00-0.35m **Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**

0.35-1.00m **Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint.**
(HEAD DEPOSITS)

1.00-2.00m **Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc)**
(SEAFORD CHALK FORMATION)

Time (mins)	Depth to water (m bgl)
0	0.60
1	0.81
2	1.01
3	1.19
4	1.33
5	1.40
6	1.52
7	1.60
8	1.68
9	1.75
10	1.81
11	1.87
12	1.93

Effective storage depth =	1.40	m
75% effective storage depth =	1.05	m
(ie depth below GL) =	0.95	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.70	m
Time to fall to 75% effective depth =	1.6	mins
Time to fall to 25% effective depth =	7.6	mins
Void Ratio =	40%	
V (75%-25%) =	0.29	m^3
a (50%) =	4.89	m^2
t (75%-25%) =	6.00	mins
SOIL INFILTRATION RATE =	**1.65E-04**	**m/s**



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Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

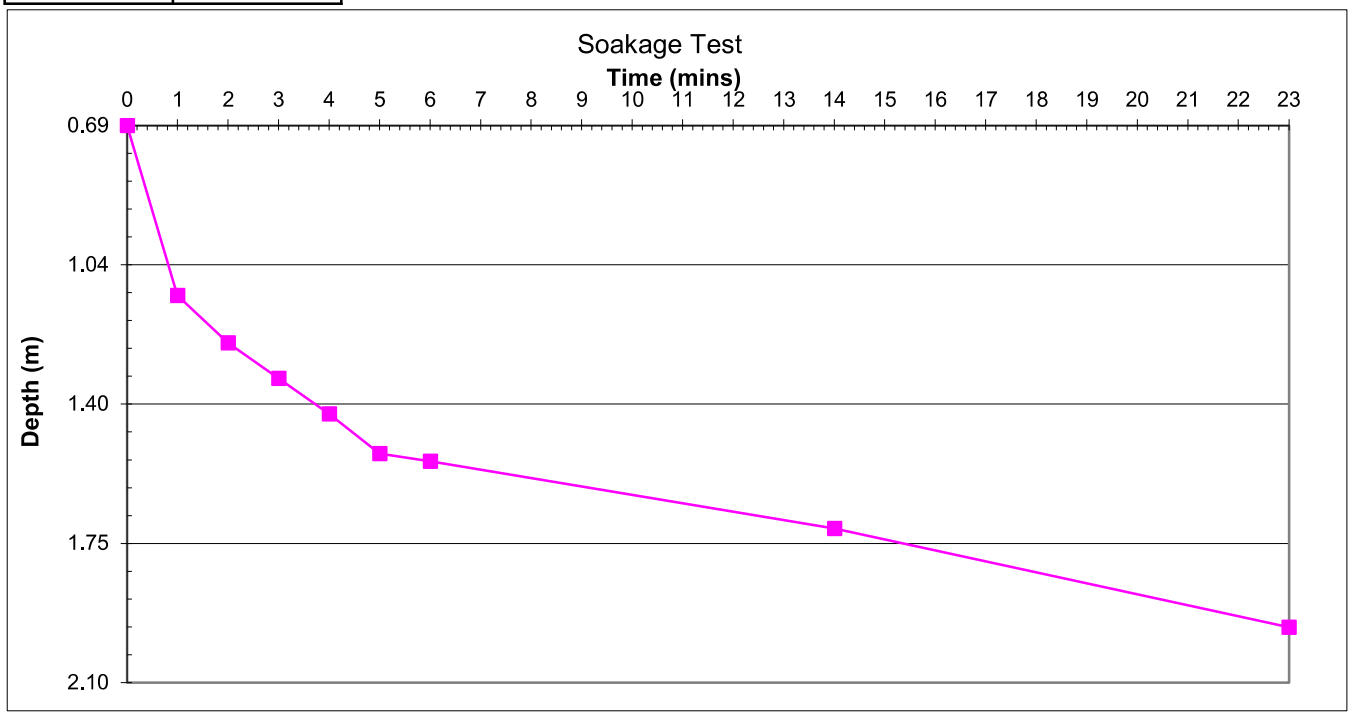
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA06**	**Test** 1
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.10** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.40m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.40-1.80m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.80-2.10m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.69
1	1.12
2	1.24
3	1.33
4	1.42
5	1.52
6	1.54
14	1.71
23	1.96

Effective storage depth =	1.41	m
75% effective storage depth =	1.06	m
(ie depth below GL) =	1.04	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.75	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	0.82	mins
Time to fall to 25% effective depth =	15.2	mins
Void Ratio =	40%	
V (75%-25%) =	0.25	m^3
a (50%) =	4.35	m^2
t (75%-25%) =	14.38	mins
SOIL INFILTRATION RATE =	**6.76E-05**	**m/s**



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Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

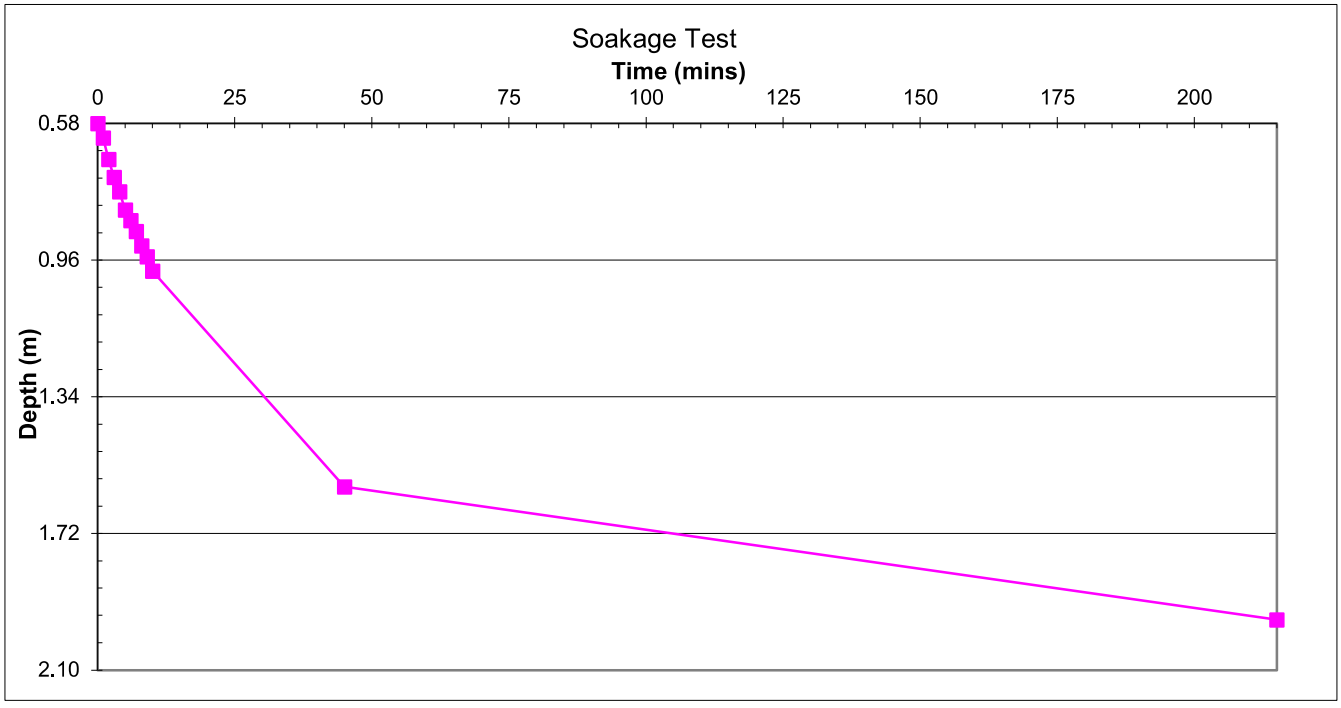
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA06**	**Test** 2
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.10** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.40m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.40-1.80m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.80-2.10m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.58
1	0.62
2	0.68
3	0.73
4	0.77
5	0.82
6	0.85
7	0.88
8	0.92
9	0.95
10	0.99
45	1.59
215	1.96

Effective storage depth =	1.52	m
75% effective storage depth =	1.14	m
(ie depth below GL) =	0.96	m
25% effective storage depth =	0.38	m
(ie depth below GL) =	1.72	m
effective storage depth 75%-25% =	0.76	m
Time to fall to 75% effective depth =	9.2	mins
Time to fall to 25% effective depth =	104	mins
Void Ratio =	40%	
V (75%-25%) =	0.27	m^3
a (50%) =	4.62	m^2
t (75%-25%) =	94.80	mins
SOIL INFILTRATION RATE =	**1.04E-05**	**m/s**



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Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref. **SA06** **Test** 3

Length	**2.00**	m
Width	**0.45**	m
Depth	**2.10**	m
Ground water level	**N/A**	m

Ground conditions

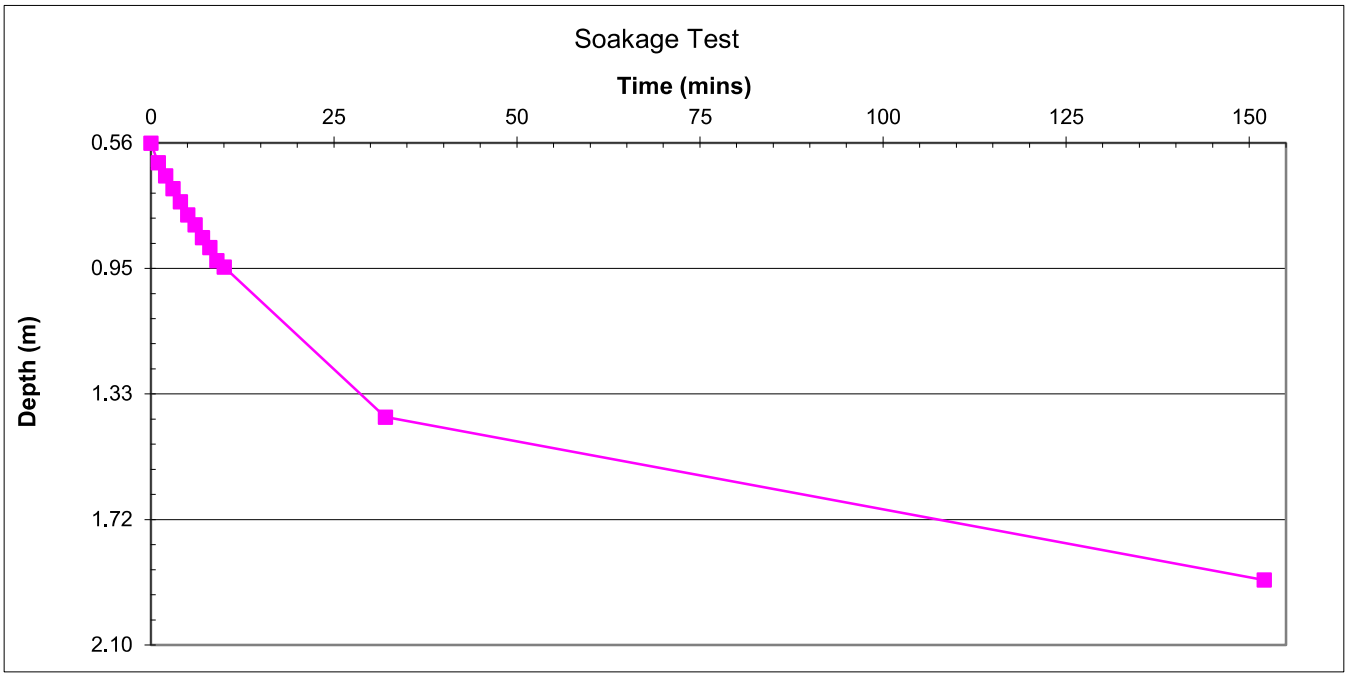
0.00-0.40m **Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**

0.40-1.80m **Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint.**
(HEAD DEPOSITS)

1.80-2.10m **Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc)**
(SEAFORD CHALK FORMATION)

Time (mins)	Depth to water (m bgl)
0	0.56
1	0.62
2	0.66
3	0.70
4	0.74
5	0.78
6	0.81
7	0.85
8	0.88
9	0.92
10	0.94
32	1.40
152	1.90

Effective storage depth =	1.54	m
75% effective storage depth =	1.16	m
(ie depth below GL) =	0.95	m
25% effective storage depth =	0.39	m
(ie depth below GL) =	1.72	m
effective storage depth 75%-25% =	0.77	m
Time to fall to 75% effective depth =	10.46	mins
Time to fall to 25% effective depth =	107	mins
Void Ratio =	40%	
V (75%-25%) =	0.28	m^3
a (50%) =	4.67	m^2
t (75%-25%) =	96.54	mins
SOIL INFILTRATION RATE =	**1.02E-05**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	13
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

Soil Infiltration Test - Gravel Filled Method

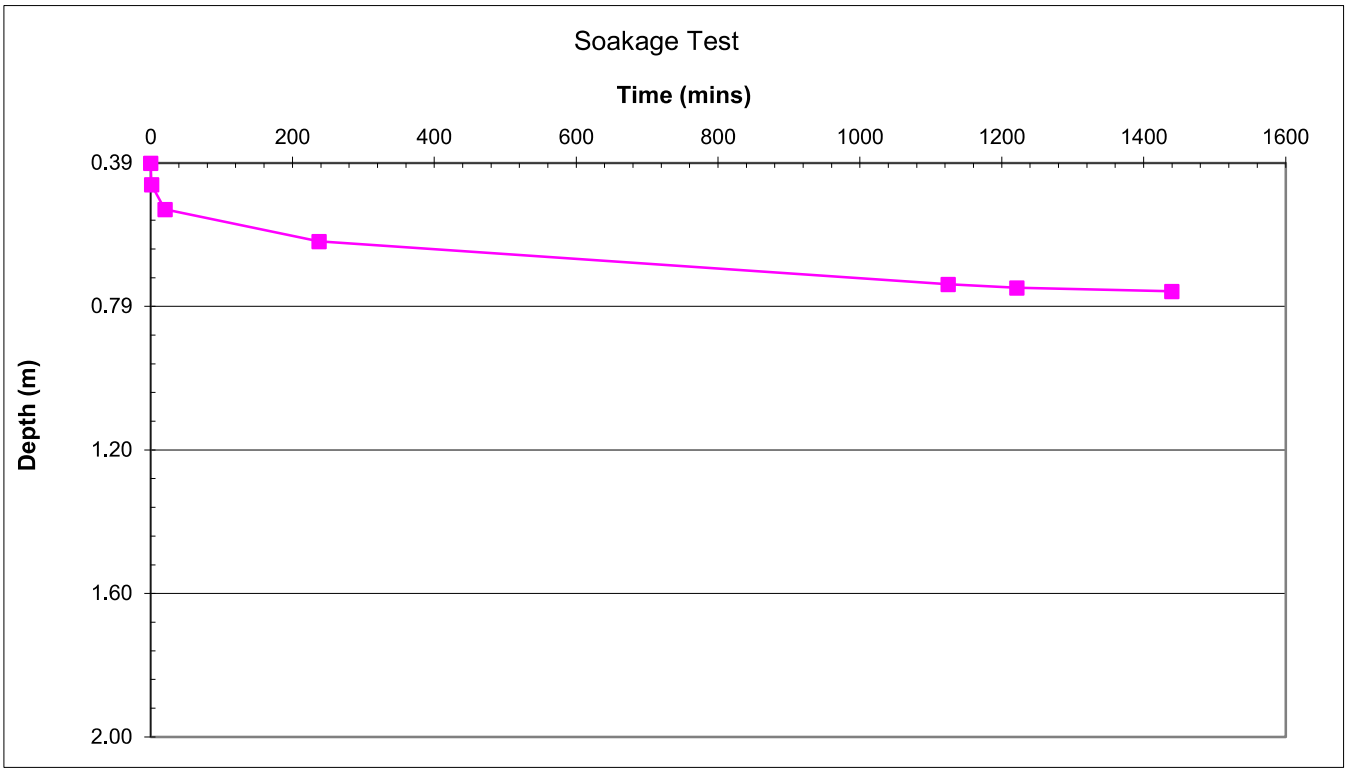
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Soakaway pit ref.	**SA07**	**Test** 1
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-2.00m	**Orangish brown, clayey, silty, gravelly SAND. Gravels comprise subrounded, fine to coarse flint. (THANET FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.39
1	0.45
20	0.52
237	0.61
1124	0.73
1221	0.74
1439	0.75

Effective storage depth =	1.61	m
75% effective storage depth =	1.21	m
(ie depth below GL) =	0.79	m
25% effective storage depth =	0.40	m
(ie depth below GL) =	1.60	m
effective storage depth 75%-25% =	0.81	m
Time to fall to 75% effective depth =	N/A	mins
Time to fall to 25% effective depth =	N/A	mins
Void Ratio =	40%	
V (75%-25%) =	0.29	m^3
a (50%) =	4.84	m^2
t (75%-25%) =	N/A	mins

Insufficient soakage to derive an infiltration rate.



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	14
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

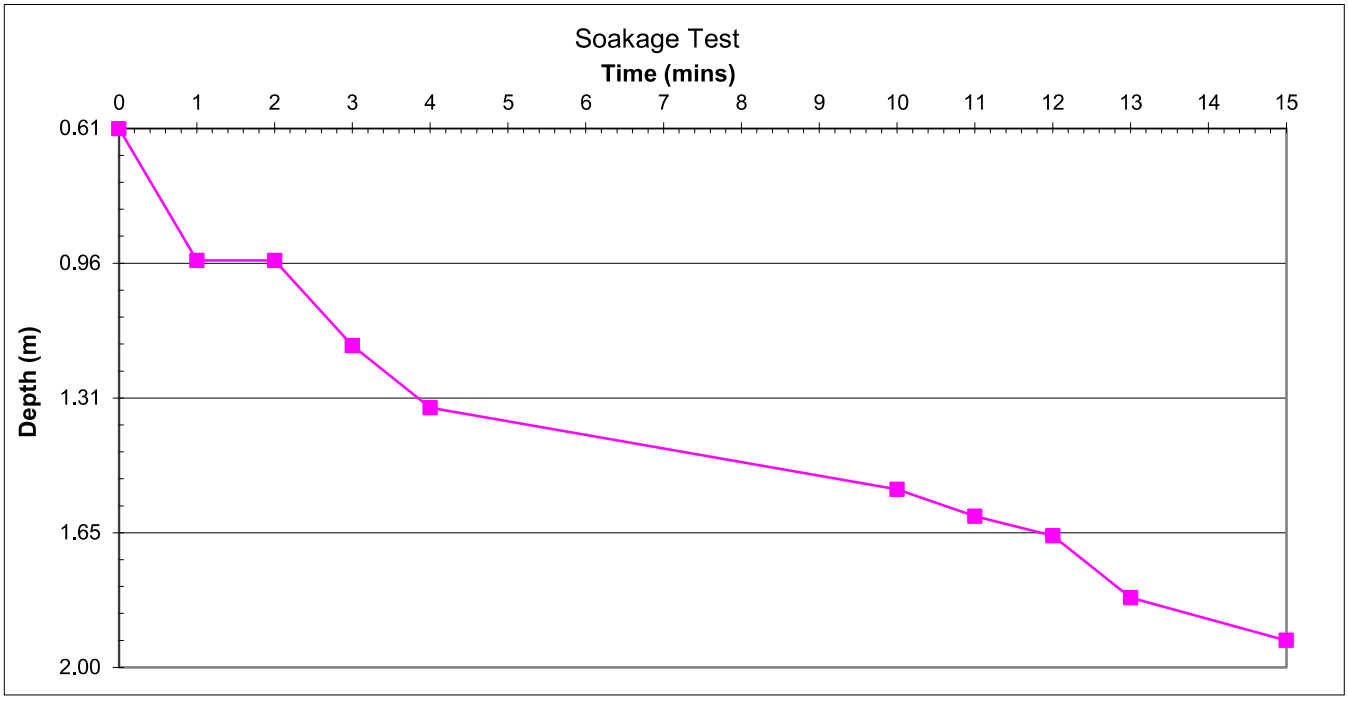
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA08**	**Test** 1
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.10m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.10-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.61
1	0.95
2	0.95
3	1.17
4	1.33
10	1.54
11	1.61
12	1.66
13	1.82
15	1.93

Effective storage depth =	1.39	m
75% effective storage depth =	1.04	m
(ie depth below GL) =	0.96	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.70	m
Time to fall to 75% effective depth =	2.04	mins
Time to fall to 25% effective depth =	11.8	mins
Void Ratio =	40%	
V (75%-25%) =	0.25	m^3
a (50%) =	4.31	m^2
t (75%-25%) =	9.76	mins
SOIL INFILTRATION RATE =	**9.92E-05**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	15
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref. **SA08** **Test** 2

Length **2.00** m

Width **0.45** m

Depth **2.00** m

Ground water level **N/A** m

Ground conditions

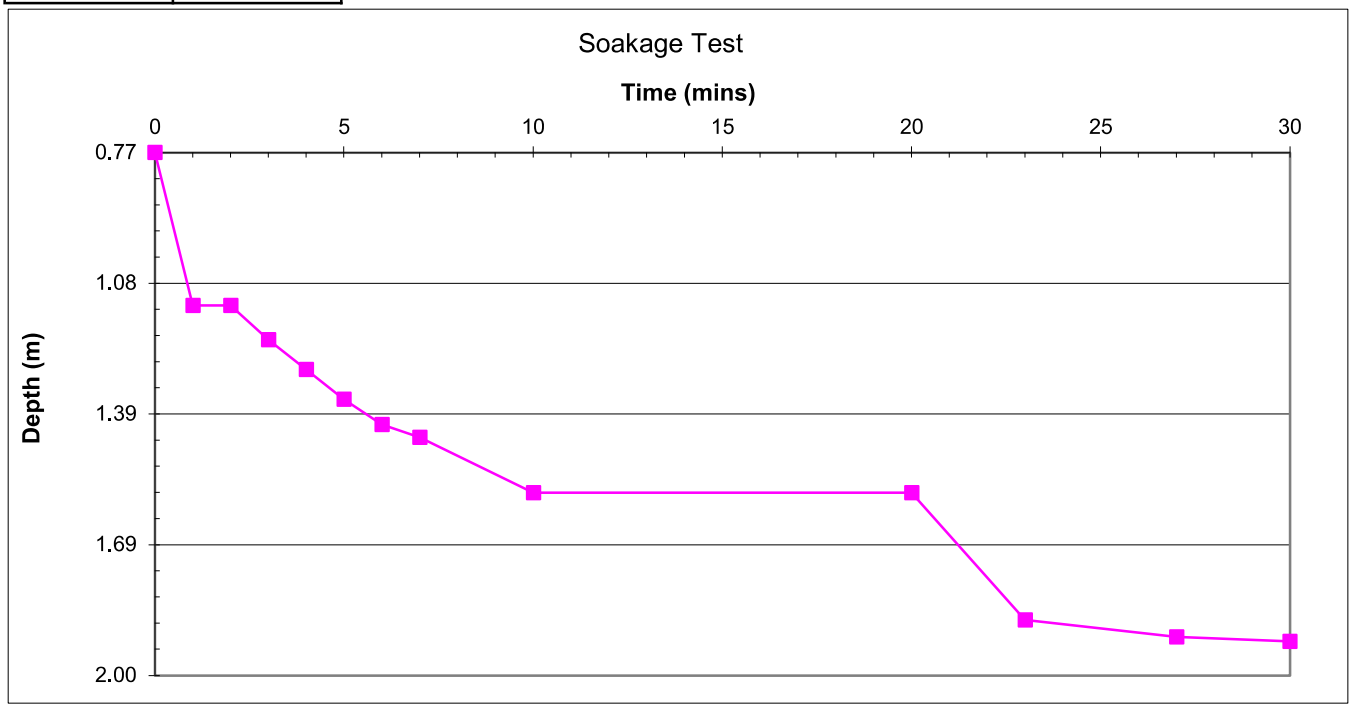
0.00-0.35m **Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**

0.35-1.10m **Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint.**
(HEAD DEPOSITS)

1.10-2.00m **Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc)**
(SEAFORD CHALK FORMATION)

Time (mins)	Depth to water (m bgl)
0	0.77
1	1.13
2	1.13
3	1.21
4	1.28
5	1.35
6	1.41
7	1.44
10	1.57
20	1.57
23	1.87
27	1.91
30	1.92

Effective storage depth =	1.23	m
75% effective storage depth =	0.92	m
(ie depth below GL) =	1.08	m
25% effective storage depth =	0.31	m
(ie depth below GL) =	1.69	m
effective storage depth 75%-25% =	0.62	m
Time to fall to 75% effective depth =	0.8	mins
Time to fall to 25% effective depth =	21.25	mins
Void Ratio =	40%	
V (75%-25%) =	0.22	m^3
a (50%) =	3.91	m^2
t (75%-25%) =	20.45	mins
SOIL INFILTRATION RATE =	**4.61E-05**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	16
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

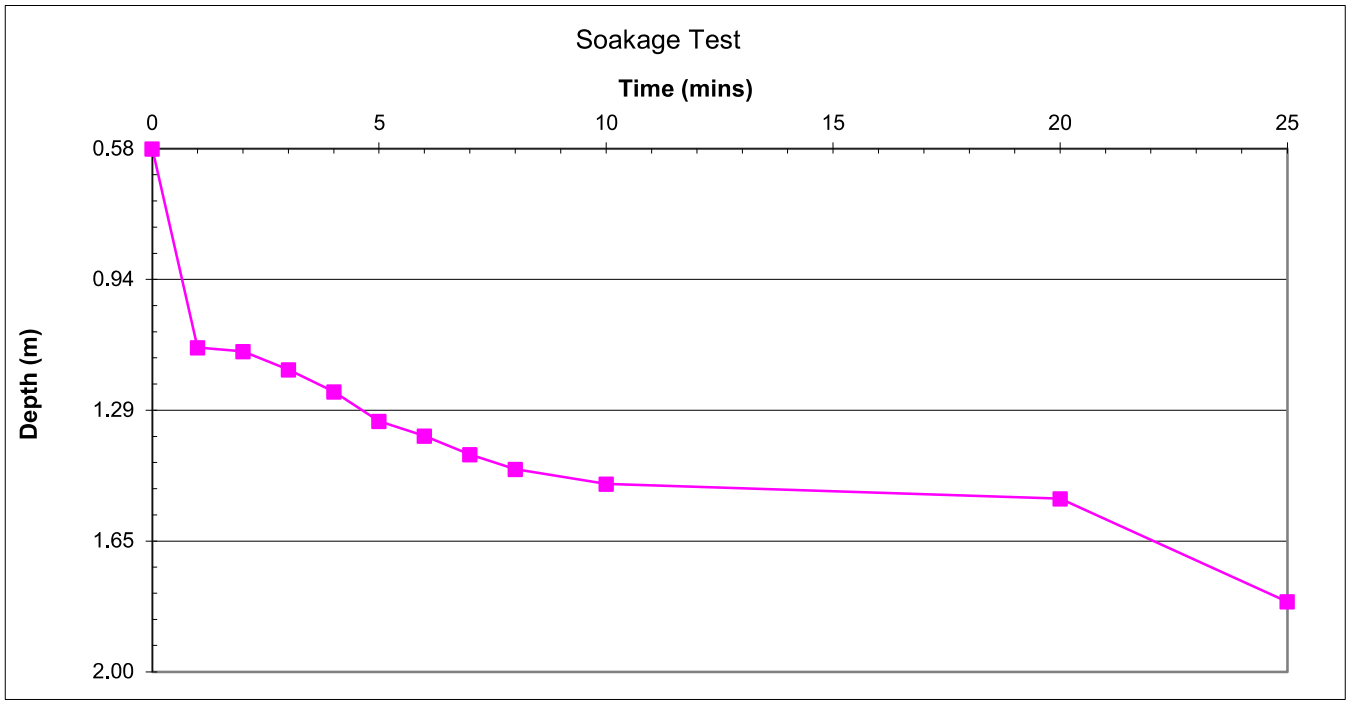
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA08**	**Test** 3
Length	**2.00** m	
Width	**0.45** m	
Depth	**2.00** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.10m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.10-2.00m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.58
1	1.12
2	1.13
3	1.18
4	1.24
5	1.32
6	1.36
7	1.41
8	1.45
10	1.49
20	1.53
25	1.81

Effective storage depth =	1.42	m
75% effective storage depth =	1.07	m
(ie depth below GL) =	0.94	m
25% effective storage depth =	0.36	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	0.65	mins
Time to fall to 25% effective depth =	22.4	mins
Void Ratio =	40%	
V (75%-25%) =	0.26	m^3
a (50%) =	4.38	m^2
t (75%-25%) =	21.75	mins
SOIL INFILTRATION RATE =	**4.47E-05**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	17
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

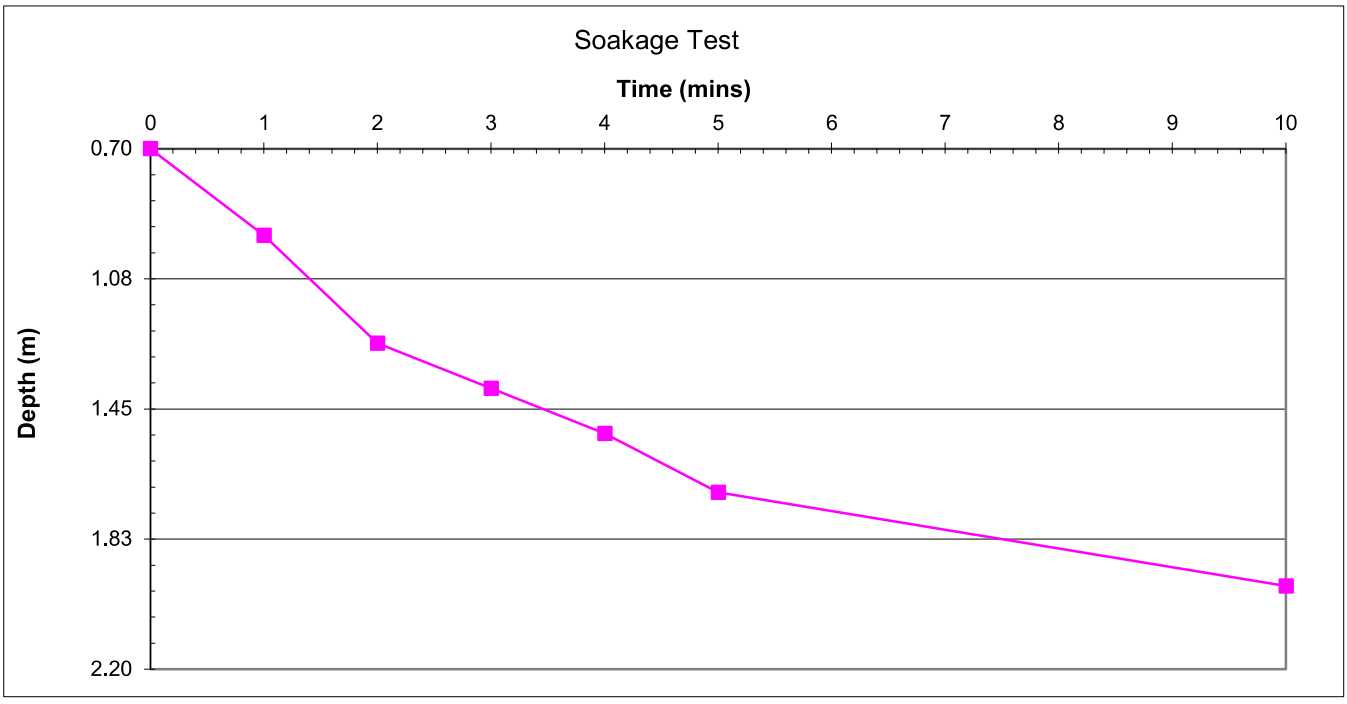
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA09**	**Test** 1
Length	**2.20** m	
Width	**0.45** m	
Depth	**2.20** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.40m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.40-2.20m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	0.7
1	0.95
2	1.26
3	1.39
4	1.52
5	1.69
10	1.96

Effective storage depth =	1.50	m
75% effective storage depth =	1.13	m
(ie depth below GL) =	1.08	m
25% effective storage depth =	0.38	m
(ie depth below GL) =	1.83	m
effective storage depth 75%-25% =	0.75	m
Time to fall to 75% effective depth =	1.4	mins
Time to fall to 25% effective depth =	7.5	mins
Void Ratio =	40%	
V (75%-25%) =	0.30	m^3
a (50%) =	4.97	m^2
t (75%-25%) =	6.10	mins
SOIL INFILTRATION RATE =	**1.63E-04**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	18
Client	**Richborough**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

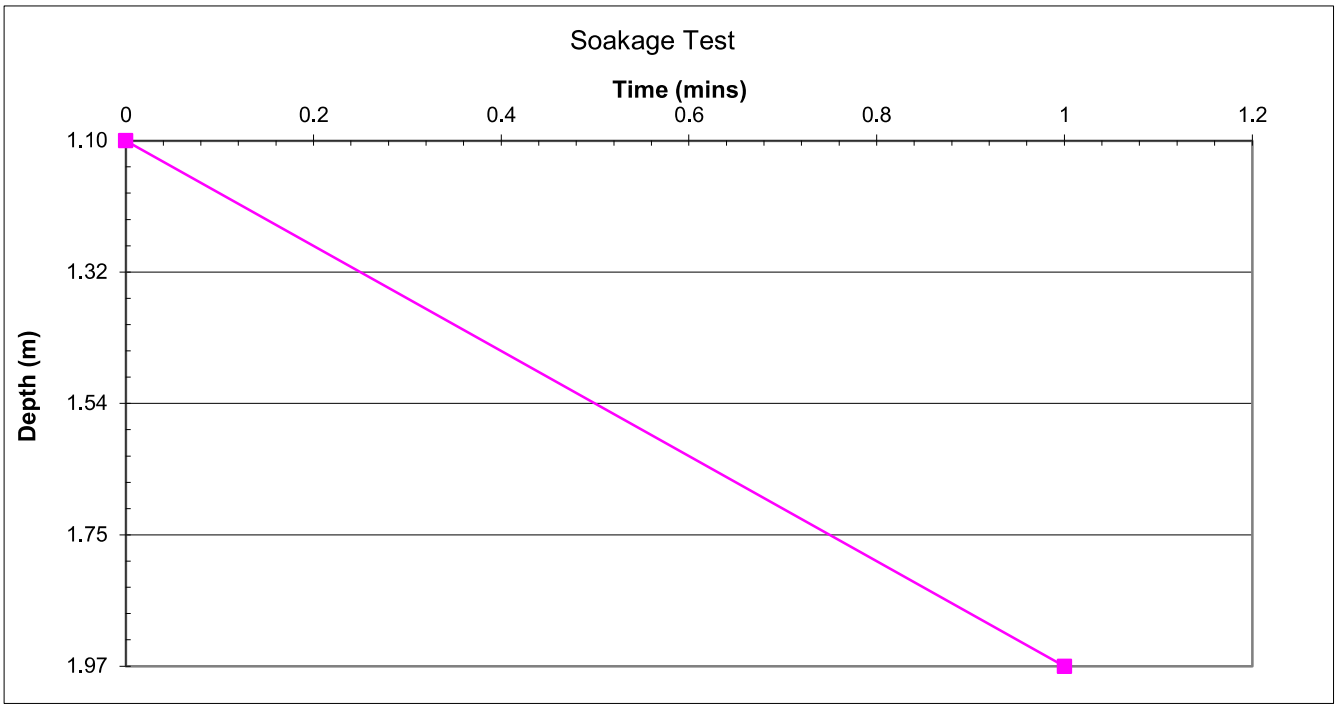
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA09**	**Test** 2
Length	**2.00** m	
Width	**0.45** m	
Depth	**1.97** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.40m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.40-2.20m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	1.1
1	1.97

Effective storage depth =	0.87	m
75% effective storage depth =	0.65	m
(ie depth below GL) =	1.32	m
25% effective storage depth =	0.22	m
(ie depth below GL) =	1.75	m
effective storage depth 75%-25% =	0.44	m
Time to fall to 75% effective depth =	0.25	mins
Time to fall to 25% effective depth =	0.75	mins
Void Ratio =	40%	
V (75%-25%) =	0.16	m^3
a (50%) =	3.03	m^2
t (75%-25%) =	0.50	mins
SOIL INFILTRATION RATE =	**1.72E-03**	**m/s**



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Scheme	**Land East of Wrotham Road, Meopham**	**Page No.**	19
Client	**Richborough Estates Ltd**	**Calcs by**	RF
Job ref.	**29473**	**Checked By**	DT
		Date	15/04/25

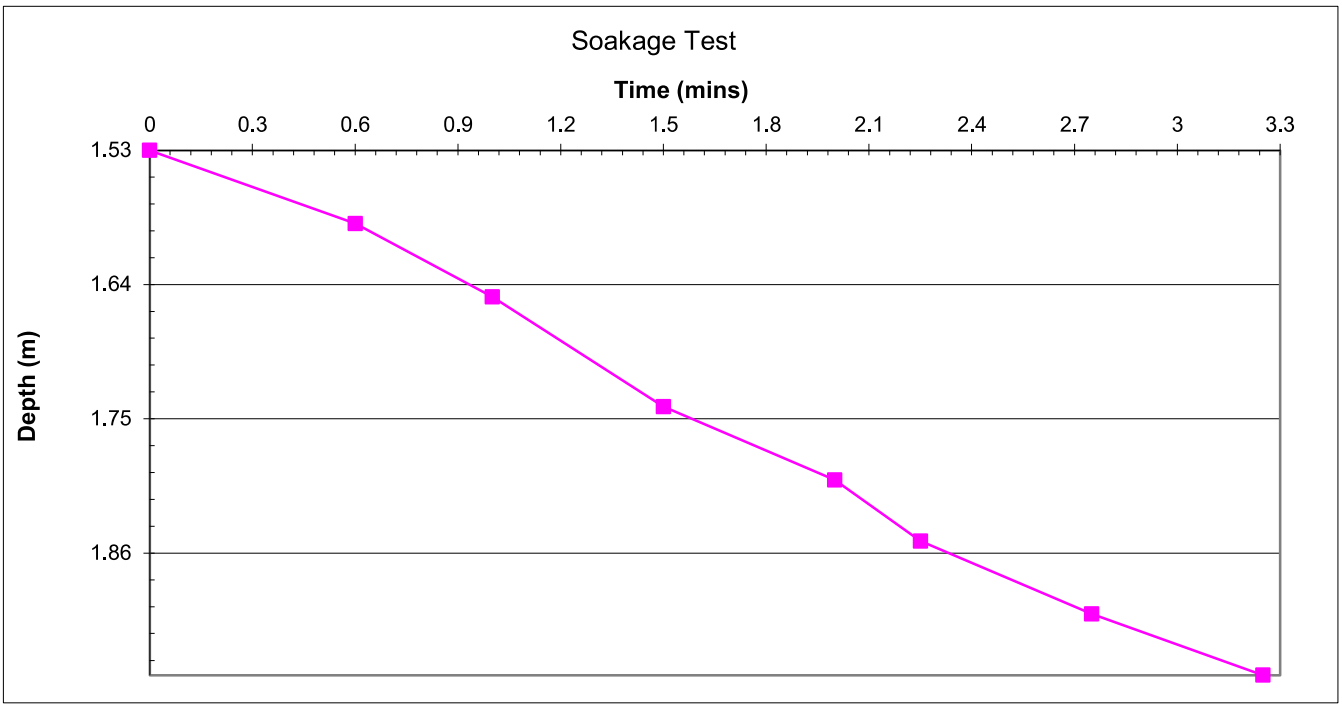
Soil Infiltration Test - Gravel Filled Method

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

Soakaway pit ref.	**SA09**	**Test** 3
Length	**2.00** m	
Width	**0.45** m	
Depth	**1.97** m	
Ground water level	**N/A** m	
Ground conditions	**0.00-0.35m**	**Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.**
	0.35-1.40m	**Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. (HEAD DEPOSITS)**
	1.40-2.20m	**Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) (SEAFORD CHALK FORMATION)**

Time (mins)	Depth to water (m bgl)
0	1.53
0.6	1.59
1	1.65
1.5	1.74
2	1.80
2.25	1.85
2.75	1.91
3.25	1.96

Effective storage depth =	0.44	m
75% effective storage depth =	0.33	m
(ie depth below GL) =	1.64	m
25% effective storage depth =	0.11	m
(ie depth below GL) =	1.86	m
effective storage depth 75%-25% =	0.22	m
Time to fall to 75% effective depth =	0.94	mins
Time to fall to 25% effective depth =	2.34	mins
Void Ratio =	40%	
V (75%-25%) =	0.08	m^3
a (50%) =	1.98	m^2
t (75%-25%) =	1.40	mins
SOIL INFILTRATION RATE =	**4.77E-04**	**m/s**



MEC Consulting Group Ltd The Old Chapel, Station Road Hugglescote, Leicestershire LE67 2GB		Exploratory Hole ID:	**SA04** Sheet 1 of 1	
Project: Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used: JCB 3CX
Location: Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564442.90 166669.30		Elevation (m AOD): 114.50
Client: Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
		0.40	114.10				
Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise subangular to subrounded, fine to coarse flint. HEAD DEPOSITS		0.60	113.90				
Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) SEAFORD CHALK FORMATION							
End of Trial Pit		2.00	112.50				

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability: Stable

Dimensions:

Length: 2.00m
Width: 0.45m
Depth: 2.00m

Key:

B - Bulk Sample
D - Disturbed Sample
ES - Environmental Sample
W - Water Sample
PID - PID Reading
HSV - Hand Shear Vane Reading

MEC Consulting Group Ltd The Old Chapel, Station Road Hugglescote, Leicestershire LE67 2GB	Exploratory Hole ID:	**SA05** Sheet 1 of 1

Project: Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used: JCB 3CX
Location: Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564501.76 166769.06		Elevation (m AOD): 110.00
Client: Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. HEAD DEPOSITS		0.35	109.65				
Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) SEAFORD CHALK FORMATION		1.00	109.00				
End of Trial Pit		2.00	108.00				

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability: Stable

Dimensions:

Length: 2.30m
Width: 0.45m
Depth: 2.00m

Key:

B - Bulk Sample
D - Disturbed Sample
ES - Environmental Sample
W - Water Sample
PID - PID Reading
HSV - Hand Shear Vane Reading

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Exploratory Hole ID: SA06

Sheet 1 of 1

Project:	Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used: JCB 3CX
Location:	Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564523.25 166839.21		Elevation (m AOD): 108.00
Client:	Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
		0.40	107.60				
Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. HEAD DEPOSITS							
		1.80	106.20				
Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) SEAFORD CHALK FORMATION							
		2.10	105.90				
End of Trial Pit							

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability: Stable

Dimensions:

Length: 2.00m
Width: 0.45m
Depth: 2.10m

Key:

B - Bulk Sample
D - Disturbed Sample
ES - Environmental Sample
W - Water Sample
PID - PID Reading
HSV - Hand Shear Vane Reading

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Exploratory Hole ID:	SA07
	Sheet 1 of 1

Project:	Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used:
Location:	Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564531.75 166473.16		Elevation (m AOD): 121.00
Client:	Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
		0.35	120.65				
Orangish brown, clayey, silty, gravelly SAND. Gravels comprise subrounded, fine to coarse flint. THANET FORMATION							
End of Trial Pit		2.00	119.00				

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability:

Dimensions:

Length: m
Width: m
Depth: m

Key:

B - Bulk Sample
D - Disturbed Sample
ES - Environmental Sample
W - Water Sample
PID - PID Reading
HSV - Hand Shear Vane Reading

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SA08

Sheet 1 of 1

Exploratory Hole ID:

Project:	Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used: JCB 3CX
Location:	Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564579.76 166620.38		Elevation (m AOD): 117.00
Client:	Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. HEAD DEPOSITS		0.35	116.65				
Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) SEAFORD CHALK FORMATION		1.10	115.90				
End of Trial Pit		2.00	115.00				

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability: Stable

Dimensions:

Length: 2.00m
Width: 0.45m
Depth: 2.00m

Key:

B - Bulk Sample
D - Disturbed Sample
ES - Environmental Sample
W - Water Sample
PID - PID Reading
HSV - Hand Shear Vane Reading

MEC Consulting Group

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The Old Chapel, Station Road
Hugglescote, Leicestershire
LE67 2GB

Exploratory Hole ID:	SA09
	Sheet 1 of 1

Project:	Land East of Wrotham Road	Project No. 29473	Start Date: 07/04/2025	End Date: 07/04/2025	Plant Used: JCB 3CX
Location:	Meopham	Logged By: CC	Easting and Northing Co-ordinates: 564655.38 166845.90		Elevation (m AOD): 112.00
Client:	Richborough	Approved By: DT			

Strata Description	Legend	Depth (m)	Level (m AOD)	Samples Type	Samples Depth	Tests	Groundwater (m)
Dark brown, sandy, silty clay TOPSOIL with gravel sized fragments of flint.							
Brown, sandy, slightly gravelly, silty CLAY. Gravels comprise angular to subrounded, fine to coarse flint. HEAD DEPOSITS		0.35	111.65				
Structureless CHALK composed of slightly sandy, silty, subangular to subrounded, medium to coarse GRAVEL. Gravel is white. Matrix is cream. (Grade Dc) SEAFORD CHALK FORMATION		1.40	110.60				
End of Trial Pit		2.20	109.80				

Remarks:

Exploratory hole location scanned with Cable Avoidance Tool and Signal Generator.
Descriptions based on visual inspection by a Geo-environmental engineer.
Groundwater was not encountered.
Visual or olfactory evidence of contamination was not observed.
Co-ordinates and elevations estimated from the topographical survey.

Stability: Stable

Dimensions:

Length: 2.00m
Width: 0.45m
Depth: 2.20m

Key:

B - Bulk Sample
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- CIVIL ENGINEERING
- TRANSPORT
- FLOOD RISK & DRAINAGE
- STRUCTURES
- GEO-ENVIRONMENTAL
- ACOUSTIC AIR
- UTILITIES
- GEOMATICS
- LIGHTING
- EXPERT WITNESS

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