

DESKTOP STUDY REPORT

Site Address:	East Court Farm, Church Lane, Gravesend, Kent DA12 2NL
Report Date:	April 2025
Project No.:	19482
Prepared for:	H Binning M.R.H.B. Services Ltd
Planning Application	Gravesham Borough Council



CONTENTS

1	Context and Objectives of this report	1
1.1	Introduction	1
1.2	Reference to the Current Planning Application Details	1
1.3	Decision Notice Relating to Contaminated Land	1
1.4	Report Objectives	1
1.5	Management Constraints	1
2	Characteristics of the site	1
2.1	The Site	1
2.2	Existing Site Use	2
2.3	Surrounding Land Uses	2
2.4	Site Reconnaissance	2
2.5	Site Reconnaissance – Photos	4
3	Details of Searches Undertaken	8
4	Information on Historical and Current Activities on the Site and Surrounding Area	8
4.1	Discussion of the Development History	8
5	Details of the Intended Future Use of the Site	12
6	References of Planning Applications	12
7	Discussion with Local Authority	12
8	Consultation with Environment Agency	12
9	Unexploded Bomb Assessment	12
10	Consultation with Appropriate Bodies/Local Sources	13
11	Previous Reporting	13
12	Environmental Settings	13
12.1	Superficial Deposits and Solid Geology	13
12.2	BGS Boreholes	13
12.3	Hydrogeology	13
12.4	Hydrology	14
12.5	Implication of groundwater	14
12.6	Flooding	15
12.7	Landfill Sites	15
12.8	Environmentally Sensitive Sites	15
13	Site Drainage and Other Potential Man-Made Pathways	16
14	Regulatory Data	16
15	Identification of Potential Contaminants of Concern and Source Areas	20
16	Outline Conceptual Model	21
16	Discussion on Sources of Contamination	25
17	Next Steps	26
17.1	Soil Assessment	26
17.2	Groundwater Assessment	27
17.3	Land Gas Assessment	28
17.4	Vapour Risk Assessment	29
17.5	Working Brief	29

APPENDIXES

Appendix 1	Additional Information
Appendix 2	Conceptual Model
Appendix 3	Site Plans
Appendix 4	Ordnance Survey Map Records
Appendix 5	‘Envirocheck’ Report

TABLES AND FIGURES

Table 1	Site Detail	2
Table 2	Walk Over Inspection Risk	7
Table 3	Historic Maps Assessment	9
Table 4	Overview of Historic Map Assessment Risk	11
Table 5	Summary of Geological Information	14
Table 6	Sensitivity of Environmental Receptors in the Vicinity of the Site	16
Table 7	Summary of Regulatory Data - Sources	17
Table 8	Summary of Regulatory Data - Receptors	17
Table 9	BGS Estimated Chemistry Data	18
Table 10	Geological Hazards	18
Table 11	Summary of Contemporary Trade Entries	19
Table 12	Table of Source Risk	20
Table 13	CIRIA Contaminated Land Risk Assessment Table	21
Table 14	Risk Assessment A	22
Table 15	Risk Assessment B	23
Table 19	Overview of Risk Assessments - Proposed Site Use	24
Table 20	Methodology for further assessment of potential contaminants	25
Table 21	Soils Assessment - Targeted Sampling	27
Table 22	Soils Assessment – Spatial Sampling	27
Table 23	Land Gas Assessment - Response Zone	28
Table 24	Vapour Risk Assessment - Response Zone	29
Table 25	Overview of Works	30

REFERENCES

- BRE Report BR211: Radon: Protective measures for new dwellings, 2015. BRE, Watford.
- BRE Digest 365 (2016): Soakaway design. BRE, Watford.
- BRE Special Digest 1: Concrete in Aggressive Ground, 2005.
- BRE, Watford. British Standards Institution (2004) Eurocode 7 – Geotechnical design - Part 1: General rules. BS EN 1997 1. Incorporating Corrigendum No.1. BSI, London
- British Standards Institution (2007) Eurocode 7 – Geotechnical design - Part 2: Geotechnical investigation and testing. BS EN 1997-2. BSI, London
- British Standards Institution (2015) BS 3882 Specification for topsoil and requirements for use. BSI, London
- British Standards Institution (2011) BS 10175 Code of practice for the investigation of potentially contaminated sites. BSI, London
- British Standards Institution (2013) BS 8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOC's), BSI, London
- British Standards Institution BS 5930:2015+A1:2020 Code of practice for ground investigations. BSI, London
- British Standards Institution (2015) BS 8485:2015 Incorporating corrigendum No.1 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BSI, London
- CIEH & CL:AIRE (2008) Guidance on comparing soil contamination data with a critical concentration. London: Chartered Institute of Environmental Health (CIEH) and CL:AIRE
- CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings.
- CIRIA, London CIRIA Report R143 (1995): The Standard Penetration Test (SPT): Methods and use. CIRIA, London.
- CL:AIRE (2020) Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration. CL:AIRE, Buckinghamshire
- Environment Agency (2020) Land contamination risk management (LCRM)
- Environment Agency, NHBC & CIEH (2008) Guidance for the safe development of housing on land affected by contamination. R & D Publication 66. London: Environment Agency
- Environment Agency (2006) Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination Environment Agency
- LQM/CIEH S4ULs. LQM, 2014
- Ministry of Housing, Communities & Local Government: National Planning Policy Framework. February 2019.
- NHBC Standards 2022. NHBC, Milton Keynes
- NHBC R&D Report 66 (2008)
- Tomlinson M.J (2001): Foundation Design and Construction: 7th Edition. Pearson Prentice Hall, Harlow. UFST.

DESKTOP STUDY GENERAL NOTES

This report has been prepared based on the findings of investigations into the site's conditions using current available data which has been recovered from Envirocheck to provide environmental data in relation to the site and surrounding area. Where possible, local sources have been researched to gain a better understanding of the site's conditions. As part of this review, research has been undertaken with the Local Authority and the Environment Agency to aid in the assessment of the site's condition.

We can confirm that this report has been prepared based on the information gained and that this information is not exhaustive, and that subsequent research may reveal additional facts that may influence the reporting. Where possible, this information has been researched.

All geological information has been researched using the British Geological Society website, (the geology viewer). The disclaimer associated with this portal confirms 'The British Geological Society accept no responsibility for omissions or misinterpretations of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation.'

The accuracy of map extracts cannot be guaranteed, and it should be recognized that different conditions on site may have existed after the various map surveys.

We can confirm that within the assessment of the site, various websites have been visited and as such, we cannot confirm the validity of these sites and as such, this information is accepted de facto and without prejudice. Anyone relying on these sources does so at their own risk, however, Herts & Essex Site Investigations does undertake all reasonable care to ensure this data is relevant and correct.

It should be confirmed that the extent of review of this report has undertaken a broad review of on-site features which would promote a contamination ground risk, however, this does not include ecological features and in particular Japanese Knotweed which should be reviewed under separate cover.

A review of the site will be made to confirm the extent of obvious Asbestos products or sheet materials either on the surface of the site soil or evident above ground, however, does not constitute a full Asbestos Survey by any means. This should be sought under separate cover.

The 'Copyright' within this report including plans and all other prepared documents prepared by Herts & Essex Site Investigations, (HESI), is owned by HESI and no such report, plan or document may be reproduced, published, or adapted without their written consent. Complete copies of this report may, however, be made and distributed by the client as an expedient in dealing with matters relating to this commission.

DOCUMENT INFORMATION AND CONTROL SHEET

Client

H Binning
M.R.H.B. Services Ltd
The Barn
East Court
Chalk
Kent
DA12 2NL

Environmental Consultants:

Herts & Essex Site Investigations.
Unit J8 Peek Business Centre
Woodside
Dunmow Road
Bishop's Stortford
Hertfordshire.
CM23 5RG

Tel: 01920 822233
Mobile: 07770274498
E-Mail: csgrey@hesi.co.uk
Web: <http://www.hesi.co.uk>

Project Manager:

Chris Gray, M.Sc.

Principal Author:

Rebecca Chamberlain

Document Status and Approval Schedule

<i>Issue No</i>	<i>Status</i>	<i>Date</i>	<i>Prepared by: Rebecca Chamberlain Signature / Date</i>	<i>Technical review by: Chris Gray Signature / Date</i>
1	Final	7 th March 2025		

SUMMARY

Client	H Binning		
Site Location	East Court Farm, Church Lane, Gravesend, Kent DA12 2NL		
Existing Development	Scrubland		
Proposed Development	Conversion of agricultural barn to form 2 residential dwellings.		
Site Settings and Previous Uses	The site area is recorded as a section of open land, from 1908 a gravel pit is recorded to the north of the site area, which from 1908 was also recorded within the north of the site area and to east of the site. from about 1946 these were no longer in place or recorded as disused. To date these areas are currently woodland and scrub land. Surrounding the site there is open land and agricultural land with East Court Farm in place to the southwest of the site.		
Geological and Hydrological Profile	Geology		Aquifer Classification
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	River Terrace Deposits	Sand & Gravel.	Secondary A Aquifer
	Off site – W - Taplow Gravel	Sand & Gravel.	Secondary A Aquifer
	Seaford Chalk Formation	Chalk	Principal Aquifer
Nearest Surface Water Feature	The nearest surface water feature is recorded as 28 meters to the north of the site which is recorded as a pond		
Groundwater Abstractions	The nearest abstraction well is located 874 meters to the north of the site which is recorded for Remedial River/Wetland Support: Make-Up Or Top Up Water. No Potable Water Supplies are recorded within 1.5 km of the site		
Source Protection Zone	The site does not lie within a Source Protection Zone.		
Potential Sources of Contamination	Features On Site - Mounds / made ground - Storage Yard Area - East Court Farm - Gravel pit – Infilled - N Features Off Site - Gravel pit - Infilled - Potentially Infilled Land (Non-Water) - Historical Landfill Sites		
Human Health Risk	We would suggest that where there are potential sources of contamination the potential pathways in place within the site area are recorded as :- - Dermal Contact. - Inhalation of dust and fibres. - Inhalation of vapours from soils. - Inhalation of land Gases. - Inhalation of vapours through contaminated groundwaters - Ingestion of contaminated water through water main pipework. - Leaching, lateral migration of shallow groundwater to a target receptor. - Leaching, migration through fissures / cracks which may migrate to a groundwater receptor. - Plant Uptake. - Inhalation Asbestos dust and fibres (from Asbestos within the building). - Inhalation Asbestos dust and fibres (from asbestos within the soil).		
Receptors	Based on the proposed use of the site and the finding of this Desktop Study the following receptors will need to be considered :- - Human Health, (Site Development Personnel). - Human Health, (Residents or staff). - Adjoining Landowners, (unlikely). - Flora. - Groundwater. - Abstraction wells. - Surface water features.		
Proposed Investigation Work	Further works should be completed based on this assessment and follow protocols under BS 10175:2011+A2:2017, (Investigation of potentially contaminated sites). These recommended works are as follows :-		
Human Health Risk	- Intrusive investigation to assess and recover samples of the made ground and underlying natural geology to consider the geology and soil contamination. - Targeted samples to be recovered from with and/or around the sources noted above - Spatial sampling to be completed across the site area. - Chemical testing to be completed on an appropriate number of samples for the recommend pollutants.		
Land Gas Risks	- An assessment of risk Should be completed using RB17 A Pragmatic Approach to Ground Gas Risk Assessment (2012) - Install standpipes within the made ground and underlying superficial deposits to form the response zone for the site. - A Standpipe should be installed within the location of the infilled land. - A minimum of 1 No standpipe should be installed and preferably 3 No standpipes around the site. - Complete six monitoring rounds over falling or low atmospheric pressure or frozen ground conditions.		
Vapour Risk	- Soil testing to be undertaken to assess whether contamination that may promote a vapour risk is in place within the site area and the groundwater, where present. - Where vapour risks may be migrating onto the site from an off site source, utilize standpipes within the upper made ground and underlying upper gravels to form the response zone for the site. - A minimum of 1 No standpipe should be installed and preferably 3 No standpipes around the site. - Complete vapour monitoring to assess vapour risk.		

<i>Groundwater Risks</i>	• Assess soils profile to consider the requirement for installation of standpipes, (Clay or absence of groundwater would suggest limited groundwater risk) • Where significant risk is identified in place, undertake leachate testing on samples to assess mobility of soil contamination. • Utilize ground gas monitoring wells as dual gas and groundwater monitoring wells and recover samples of the groundwater for later chemical analysis. ◦ Purge groundwater monitoring wells and recover fresh samples of the groundwater for this testing. • Testing suite to be as per the recommendations within this report.
<i>Watching Brief</i>	• Maintain a watching brief throughout all site investigation works. ◦ Sample recovery should undertake due diligence to consider the presence of Asbestos as a critical risk. ◦ An engineering description of the samples recovered and depths to be noted for use within environmental reporting. ◦ An olfactoral assessment of the site soils exposed and recovered should be made and recorded for use within the environmental reporting.
<i>Reporting</i>	• Complete an environmental report in accordance with BS 10175:2011+A2:2017. • Report all findings of the site investigation.

PRELIMINARY RISK ASSESSMENT – DESKTOP STUDY - PHASE 1 REPORT

1 Context and Objectives of this report

1.1 Introduction

We have been asked by H Binning to undertake an investigation of the above site to assess the potential environmental impact of the existing and historical use of the site on the proposed development sufficient to document the level of risk and impact on future users and the environment.

The client is proposing to develop a glamping site, as such the derivation of risk has been assigned as a 'commercial land use'.

1.2 Reference to the Current Planning Application Details

This report is being written to be submitted as part of an application to Gravesham Borough Council.

1.3 Decision Notice Relating to Contaminated Land

There are currently no conditions in place for the site.

1.4 Report Objectives

The objective of this report is to assess and understand any potential sources, pathways and receptors associated with the site and preparation of a Conceptual Site Model (CSM) followed by a qualitative risk assessment, in line with UKs current regulatory guidance.

To complete the above the following will be undertaken.

- A visual walkover inspection of the site to review current and recent site activities, the condition of the site, potential ground related hazards and activities or areas that might have the potential to cause ground contamination as well as possible indicators of contamination.
- Review of historical land uses for the site and surroundings with a particular emphasis on identifying potential ground hazards and on-site and off-site contamination sources.
- A review of the geological, hydrological, and hydrogeological setting of the site, and public domain environmental information to build up an understanding of the site and its environmental setting/sensitivity/receptors.

1.5 Management Constraints

The site investigation has been prepared based on a budget and time scales which has been agreed with the client. The desk top study fees have been agreed at this time which will dictate a way forward.

2 Characteristics of the site

2.1 The Site

The site is located within a rural area of to the east of Gravesend in Kent, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 3, Sheet 1.

Table 1 **Site Detail**

Site Address:	East Court Farm, Church Lane, Gravesend, Kent DA12 2NL
Site assessed under	Site Owners Request - Aid as part of planning and warranties.
Current use of land:	Scrub / woodland.
Previous use of site, (if known)	As above.
Grid Reference	NGR 568540, 172990
Site Area	0.58 Hectares.
Local Authority	Gravesham Borough Council.
Gradient of the site	The site slopes down to the north.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 28 meters to the north of the site area.

2.2 Existing Site Use

The site area forms an area of scrub land and a section of an open land in use as a storage area for the Farm.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- To the north of the site area a Lower Higham Road is in place with open land beyond.
- To the east of the site area open land and woodland is in place.
- To the south of the site area a residential garden is in place.
- To the west of the site area East Court Manor is in place which forms a former farm which has been converted to residential land.

2.4 Site Reconnaissance

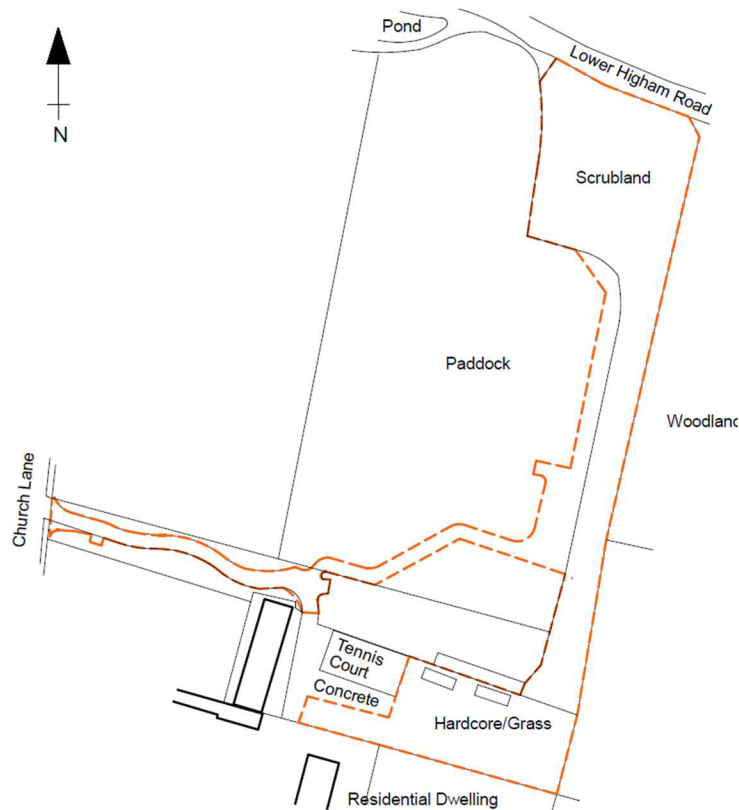
The site walk over visit was undertaken in March 2025 on which the weather conditions were recorded overcast.

Access

The site area is accessed from the East Court Manor Estate, where there is a driveway to leading to the west onto Church Lane. Currently the site is accessed from the driveway to the west of the site, it is proposed to develop a new driveway extend from the exiting.

Once within the site there is free access to walk over the site.

Site Area



The site forms an irregular shaped parcel of land. The southern section of the site forms a grassed yard area where some hardcore has also been placed. Towards the north of this area there are metal storage containers in place with building and household goods and equipment in place.

From the northeast of the above area the site extends to the north where a grass pathway is in place leading to the northern section of the site. This area is covered by shrubs, brambles and trees. The ground level undulated where small mounds of soil, brick hardcore and rubble are in place, due to the vegetation the levels and material were not clearly seen.

To the west of the site area there is a grassed paddock in place which a small section towards the site boundary will form a parking area for the development and a new access drive to the site will traverse this area.

Vegetation

Across the site area there are shrubs, vegetation and trees in place, all of which looked to be in a good state of growth.

Above or below ground fuel or oil storage tanks

By examination of the site no above ground tanks are in place, no features are present to suggest that any below ground fuel tanks would be in place within the site area.

Asbestos Containing Materials

No Asbestos containing materials were reviewed within the site area. Having seen the various mounds of material within the site the source of which was not known as such a full assessment for asbestos within any made ground will be required to fully consider risk from Asbestos.

Surrounding Area

Surrounding the site area woodland is in place to the east of the site, similar to the land within the north of the site.

To the west of the site area there is a grass paddock in place.

To the south of the site area there is a newly converted barn with garden area.

To the south west of the site area there are additional residential dwellings in place with a driveway and parking area towards the site area.

Site Levels and Ground Cover

The site area generally slopes down to the north, with the southern section of the site forming a level area.

Within the northern section of the site the surface undulates where historical mounds are in place.

The site area is laid to soft landscaping.

Current site activities

The current site use forms shrubland within the north and a grassed storage area within the south.

Effluent, Site Drainage and Services

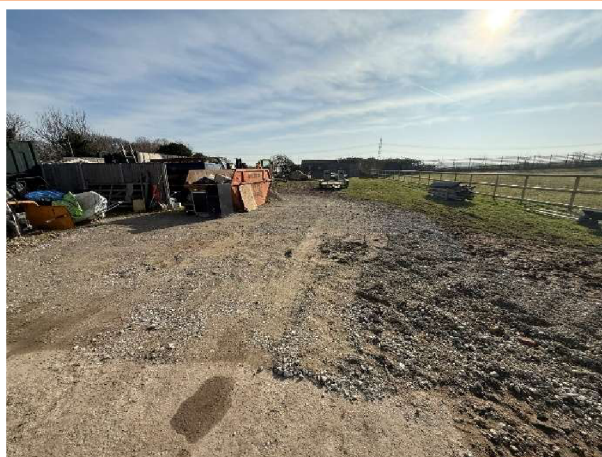
No drainage or services are known to traverse the site, although no service search is known to us, therefore the location condition nor status of these services is known.

2.5 Site Reconnaissance – Photos

Print 1



Print 2



Print 3



Print 4



Print 5



Print 6



Print 7



Print 8



Print 9



Print 10



Print 11



Print 12



Table 2 **Walk Over Inspection Risk**

<i>Feature</i>	<i>Location</i>	<i>Elevation</i>	<i>Is A Risk Assessment Required?</i>	<i>Justification</i>
c	On Site – N	At GL.	✓	Possible risk in place.
Storage Yard Area	On Site - S	At GL.	✓	Possible risk in place.

3 *Details of Searches Undertaken*

Within this report, various searches have been undertaken to assess the risk associated with the development of the site from the historical and current use of the site and surrounding area. These include: -

- Environmental Data Search 1:10,000.
- Environmental Data Search 1:2,500.
- Site Sensitivity Maps and Data Sheets.
- Historical Maps.
- Internet Search.
- Local Authority Search – Planning Files.
- Consultation with Site Owner / Architect.

4 *Information on Historical and Current Activities on the Site and Surrounding Area*

The history of the site's land-use and development from Victorian times onwards has been researched from Ordnance Survey, (O.S.) maps. Extracts of the O.S. Maps and plans are presented in Appendix 4. Reference to historical maps provides invaluable information regarding the land use/history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive map references.

4.1 *Discussion of the Development History*

A summary of the historical development of the site and surrounding area based on the information obtained from the above sources is provided in Table 3. It should be noted that these maps are only a small section of time and represent the timescales given in each of the map records. It is highly possible that development or features may have been developed within or surrounding the site which may influence the site, and this should be born in mind when assessing the history of the site.

Table 3 *Historic Maps Assessment*

Date	Scale	On Site Feature	Off Site Features
1864	1:2,500	Open Land	Open Land – N, E, W East Court Farm - S
1896	1:2,500		Gravel Pit – N 10m
1869	1:10,560		
1899	1:10,560		
1909	1:10,560		Gravel Pit – E 10m
1908	1:2,500	Gravel pit – N	
1932	1:10,560		
1936	1:2,500		Gravel Pit – E 10m – increased in size
1938	1:10,560	Small Holdings	Small Holdings - W
1946	1:10,560	Gravel pit – N – REMOVED	
1961	1:10,560		
1963	1:2,500		Gravel Pit – N 10m & E 10m – INFILLED / DISUSED

1966	1:10,000		
1973	1:2,500		
1975	1:10,000		
1981	1:2,500	Small Holdings – REMOVED	Small Holdings - W - REMOVED
1993	1:2,500		
1982	1:10,000		
1999	Historic Aerial Photo 1:10,000	Woodland – N Agricultural Land - S	Woodland – E Agricultural Land – S & SE
2006	1:10,000		
2024	1:10,000		

Table 4 **Overview of Historic Map Assessment Risk**

Identified Risk	Distance & Direction	Year	Is A Risk Assessment Required?	Justification
Open Land	On and Off Site – N, E, W	Pre 1864 - 1908	X	No Source
Gravel pit - Infilled	On Site– N Off site – N 10m - E 10m	Pre 1896 – 1946 1908 – 1946 1908 – 1946	✓	Possible risk from infilled land.
Small Holdings	On Site – N Off Site - W	1938 - 1981	X	Limited sources
Woodland	On Site – N Off site – E	1999 – present	X	No Source
Agricultural Land	On Site – S Off Site - S & SE	1999 – recently	X	No Source
East Court Farm	Off Site - S	Pre 1864 – Present	✓	Possible risks from this historical use of this area which if significant could migrate to the site area.

5 *Details of the Intended Future Use of the Site*

It is proposed to use the land as a glamping site, with for plots within the north of the site, parking to the centre of the site and three plots within the south of the site area.

6 *References of Planning Applications*

From a review of the Gravesham Borough Council web site the no current applications is recorded for the site area.

Historical applications are in place with Council as follows although this relate to East Court Manor and just incorporate the site area as part of the site area.

Application No: 20230854

Proposal: Application for a variation of condition 2 to planning permission reference 20221313 for the creation of storage and games room within roof space, and the insertion of gable end windows, roof windows and rear door to the existing garage building; to allow an amendment to the proposals to allow dormer windows to be formed to the east elevation, and for a larger window to be inserted in the gable wall of the north elevation

Decision:

Application No: 20241040

Proposal: Application for non-material amendment to planning permission reference number 20210846 to adjust the position of the building to move it 325mm further away from the original building.

Decision:

7 *Discussion with Local Authority*

To date, no contact has been made back to us in relation to the site and this desk top study report. Should contact be made, this report will be re-issued.

8 *Consultation with Environment Agency*

Consultation has not been made with the Environment Agency at this time. The information gained from Envirocheck and the EA web site has provided sufficient information at this stage. The assessment of the site should consider the groundwater regime within the site area and the possible risk from both on-site and off-site contamination.

Should heavy or persistent contamination be identified within any Phase 2 or intrusive investigation, consultation will be required and will be undertaken.

9 *Unexploded Bomb Assessment*

A review of the data available on Zeticauxo web site, revealed the site was located within a high-risk area associated with unexploded ordnance (UXO), as indicated by having more than 49 bombs dropped per 1000 acres.

10 Consultation with Appropriate Bodies/Local Sources

A request for information relating to the site has been made to confirm the site condition, any potential sources of risk within the site. No additional information has been supplied which could be added to this report. The requested information is as follows :-

- Prior knowledge in relation to the history of the site uses.
- Service search to confirm the location of any and all Gas, Electric, Water Main, Fibre Optic, drainage works.
- Asbestos Containing Materials, (reporting or building management plan).
- Underground Fuel or Oil Tanks.
- Above Ground Fuel or Oil Tanks.
- Petrol Interceptors.
- Pollution Incidents.
- Storage of Chemicals, Pesticides, Herbicides.
- Electric Sub Station Uses.

11 Previous Reporting

No previous reports relating to contaminated land, or the ground conditions are known to us at the time of writing this report which relate to the site specifically.

12 Environmental Settings

12.1 Superficial Deposits and Solid Geology

The ground conditions based on geological maps and BGS information shows the site to be located within an area recorded as River Terrace Deposits (Sand and Gravel). This is seen to overlie Seaford Chalk Formation which will be in place to depth. To the west of the site area Taplow Gravel Member is recorded in place which may encroach on the site area.

12.2 BGS Boreholes

No BGS Boreholes have been identified close to the site.

12.3 Hydrogeology

The published Environment Agency Groundwater Vulnerability Map of the area indicates the site to be located within an area classified as a Secondary A Aquifer. The underlying geology is recorded as a principal aquifer within the chalk.

Principal aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.

Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

The nearest abstraction well is located 874 meters to the north of the site which is recorded for Remedial River/Wetland Support: Make-Up Or Top Up Water. No Potable Water Supplies are recorded within 1.5 km of the site.

The site does not lie within a Source Protection Zone.

Table 5 *Summary of Geological Information*

<i>Geological Unit</i>	<i>Brief Description</i>	<i>Anticipated thickness, (m)</i>	<i>Aquifer Type</i>
<i>Superficial Deposits/Drift On Site</i>			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
River Terrace Deposits	Sand & Gravel.	4-6 meters	Secondary A Aquifer
<i>Off site - W Taplow Gravel</i>	<i>Sand & Gravel.</i>	<i>4-6 meters</i>	<i>Secondary A Aquifer</i>
<i>Solid Geology Deposits</i>			
Seafood Chalk Formation	Chalk	15m +	Principal Aquifer

The above information has been taken from the BGS website based on the postcode location of the site.

12.4 Hydrology

The nearest surface water feature is recorded as 28 meters to the north of the site which is recorded as a pond.

The nearest discharge consent is recorded 215 meters to the east of the site, for Discharge Of Other Matter-Surface Water.

No pollution incident to controlled waters are recorded within 800 meters of the site area.

12.5 Implication of groundwater

Considering the underlying secondary A aquifer and lower principal aquifer, groundwater links are possible and therefore some degree of assessment will be required to classify the extent of risk to a groundwater system, as well as abstraction wells, surface water features and source protections zones surrounding the site area.

In accordance with Environment Agency guidance document: -

- The Environment Agency's approach to groundwater protection, Version 1.2, (February 2018)

The document confirms: -

- "Selecting compliance points for use in land contamination risk assessments the distance to a set compliance point should not exceed 50 metres for hazardous substances or a maximum of 250 metres for non-hazardous pollutants unless there are specific physical constraints on the ability to use the groundwater resource. Any increases above these specified distances may be justified but must be supported by a sustainability assessment that considers environmental, social and economic factors."

Considering the above, groundwater risk may be in place if significant contamination or a persistent source of contamination are encountered or recorded within the site area, within the information to date risk is considered possible.

12.6 Flooding

Based on the BGS Flood GFS Data the site is recorded within an area with potential for groundwater flooding to occur at surface. Off site to the north and east of the site there are area at a low risk (1000 year return) for flooding from surface water.

Based on a post code search of the Gov.com website the risks are noted as follows.

Surface water:

Yearly chance of flooding – Very Low

Yearly chance of flooding between 2040 and 2060 - Very Low

River and the sea:

Yearly chance of flooding - Very Low

Yearly chance of flooding between 2036 and 2069 - Very Low

Groundwater – unlikely

Reservoirs - unlikely

<https://www.gov.uk/check-long-term-flood-risk>

Based on the EA Flood map for planning search, as noted in the appendix of this report, the northern section of the site is recorded within a flood zone 3 has a high probability of flooding from rivers and the sea. A Flood Risk Assessment for the site will be require if not completed already.

Flood defences have been built to protect against flooding from rivers or the sea (shown as an orange line on the map). Flood defences reduce, but do not completely stop the chance of flooding because they can be overtopped or fail.

12.7 Landfill Sites

Ahistorical landfill site is recorded to the northwest of the site, 188 meters, the last input of Deposited Waste included Inert and Commercial Waste was recorded in 1991.

Within the site area potential infilled land is recorded within the north of the site, where the gravel pit was historically shown in place and extended to the east and was also in place to the north of the site.

12.8 Environmentally Sensitive Sites

Surrounding the site area, no environmentally sensitive receptors are recorded in place.

There are no Sites of Special Scientific Interest, (SSSI), surrounding the site within 2000 meters.

Table 6 *Sensitivity of Environmental Receptors in the Vicinity of the Site*

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Secondary A Aquifer	Moderate	Possible risk to underlying Gravel Deposits.
	Principal Aquifer	High	Possible risk to underlying chalk aquifer.
Water Abstraction	Remedial Wetland Make-Up Water Or River/Support: Top Up	Medium	The nearest abstraction well is located 874 meters to the north of the site.
Source Protection Zone	NONE		
Surface Water	Pond	Low	The nearest surface water feature is recorded as 28 meters to the north of the site.
Flooding	Zone 3	Medium	Possible risk within the north of the site area.
Ecological	NONE		

13 Site Drainage and Other Potential Man-Made Pathways

Drainage is recorded in place, although, the site has not been reviewed for drainage routes. A full drainage assessment may aid in the assessment of the site in relation to pathway creation for pollution to migrate.

14 Regulatory Data

Information relating to the potential hazards associated with environmental regulatory controls are summarised in Table 7 and 8. This information is recorded in full within the Envirocheck Data provided within Appendix 5. The salient points recorded within this data are re-created below.

Table 7 *Summary of Regulatory Data - Sources*

<i>Data Sources</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site</i>	<i>Is A Risk Assessment Required?</i>	<i>Justification</i>
Discharge Consents	None	Discharge Of Other Matter-Surface Water	E 215m	X	Distance from the site reduce the risk.
Historical Landfill Sites	None	Deposited Waste included Inert and Commercial Waste	NW 188m	✓	Possible risks
Potentially Infilled Land (Non-Water)	Unknown Filled Ground (Pit, quarry etc) from 1982		East	✓	Possible risks
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions		On Site	X	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).

Table 8 *Summary of Regulatory Data - Receptors*

<i>Data Receptors</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site</i>	<i>Is this a potential receptor for risk ?</i>	<i>Justification</i>
Nearest Surface Water Feature	None	Pond	N 28m	✓	Possible risks
Water Abstractions	None	Potable Water abstraction	N 874m	X	Distance from the site reduce the risk.
OS Water Network Lines	None	Inland river	N 171m	X	Distance from the site reduce the risk.
Source Protection Zone	Zone 3			✓	Possible risks

Table 9 *BGS Estimated Chemistry Data*

<i>BGS Estimated Soil Chemistry Pollutant</i>	<i>BGS Estimated Soil Chemistry (mg / kg)</i>
Arsenic	<15
Cadmium	<1.8
Chromium	60-90
Lead	<100
Nickel	30-45

Considering the background concentrations present, potential for human health risk is not anticipated within this area.

Table 10 *Geological Hazards*

<i>Geological Hazard</i>	<i>Distance & Direction</i>	<i>Feature</i>	<i>Risk Assessment Required</i>
Non-Coal Mining Areas of Great Britain	On Site		Negligible
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		Very Low
Ground Dissolution Features	On Site	56 meters to the southwest of the site a moderate risk is recorded in place.	Low - Solution feature report is recommended.
Landslide	On Site		Very Low
Running Sand	On Site		Very Low
Shrinking or Swelling Clay	On Site		Negligible

Table 11 **Summary of Contemporary Trade Entries**

Trade Name	Trade Use	Distance & Direction from Site	Is A Risk Assessment Required?	Comment
X No trades are recorded within 150 meters of the site area. Further trades extend away from the site, (See Envirocheck Data)				

*NB The above information has been provided by Envirocheck and is taken from the Thomson Directories

15 Identification of Potential Contaminants of Concern and Source Areas

Potential sources of contamination are brought forward for further risk assessment which are detailed in Table 14: -

Table 12 Table of Source Risk

Risk Assessment	Source Risk	Associated Contaminants	Source of Information	Location	Date	Considering Site Specific Pathways	
						Assessment Required.	Method of Assessment
	On Site Features						
A	Mounds / made ground	Metal, semi metals, PAHs, Asbestos	Walk Over Survey	On Site – North		Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
	Storage Yard Area	Metal, semi metals, PAHs, Asbestos, TPHs,	Walk Over Survey	On Site – South			
	East Court Farm	Metal, semi metals, PAHs, Asbestos, TPHs,	Historical Maps	Off Site - S	Pre 1864 – Present		
B	Gravel pit - Infilled	Metal, semi metals, PAHs, Asbestos, TPHs, Land Gases	Historical Maps	On Site– N Off site – N 10m - E 10m	1908 – 1946 Pre 1864 – 1963	Possible Soil Risk Possible GW Risk Possible Land Gas Possible Vapour Risk	Recover Soil Samples Install Standpipes Land Gas Assessment GW & Vapour Assessments
	Potentially Infilled Land (Non-Water)	Metal, semi metals, PAHs, Asbestos, TPHs, Land Gases	Envirocheck Data	On site & East			
	Historical Landfill Sites	Land Gases	Envirocheck Data	NW 188m			

16 Outline Conceptual Model

What must now be considered is what contamination should be identified as a potential hazard because of the use of the site-specific source pathway and receptor. To undertake this task, the risk assessment process is based on guidance provided in CIRIA C552 (2001) Contaminated Land Risk Assessment – A Guide to Good Practice.

The information below incorporates a hazard assessment of the features surrounding the site that could potentially impact on the proposed development and has also been reproduced as a pictorial conceptual site model in Appendix 2. This is based on the information below: -

Table 13 *CIRIA Contaminated Land Risk Assessment Table*

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

Extracted from CIRIA Publication C552 Contaminated Land Risk Assessment

Table 14 **Risk Assessment A**

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Mounds / made ground Storage Yard Area East Court Farm	TPHs	Site Users. Construction Workers.	Dermal contact. Inhalation dust and fibres.	Medium	Likely	Moderate	Possible risk in place.
			Ingestion of dust and fibres via home-grown produce and plant uptake.	Medium	Unlikely	Low	Camping site no private gardens proposed.
			Ingestion of contaminated water through water main pipework.	Medium	Low Likelihood	Moderate / Low	Possible risk in place.
			Inhalation of vapours.	Medium	Low Likelihood	Moderate / Low	Possible risk in place.
			Inhalation of land Gases.	Medium	Likely	Moderate	Possible risk in place.
			Inhalation of vapours through contaminated ground waters.	Medium	Low Likelihood	Moderate / Low	Possible risk in place.
		Adjoining Landowners.	Dermal contact. Inhalation of dust and fibres. Ingestion of dust and fibres	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Ingestion of home-grown produce.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Ingestion of contaminated water through water main pipework.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Inhalation of vapours.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Inhalation of vapours through contaminated ground waters.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
		Controlled Surface Water.	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible risk in place.
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place.
	Asbestos	Site Users Construction Workers.	Inhalation dust and fibres (from Asbestos within the building)	Severe	Unlikely	Moderate	No buildings in place.
			Inhalation dust and fibres (from asbestos within the soil)	Severe	Likely	High	Possible risk in place.
	Metals Metalloids PAHs	Site Users. Construction Workers.	Direct contact. Inhalation dust and fibres. Dermal contact.	Medium	Likely	Moderate	Possible risk in place.
			Ingestion of home-grown produce.	Medium	Unlikely	Low	Camping site no private gardens proposed.
		Flora	Plant Uptake. Direct Contact.	Medium	Likely	Moderate	Possible risk in place.
		Controlled Surface Water.	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible risk in place.
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place.
	TPHs	Buildings. Construction Materials. Services	Direct contact with contaminated soils.	Medium	Likely	Moderate	Possible risk in place.
			Direct contact with contaminated groundwater.	Medium	Likely	Moderate	Possible risk in place.

Table 15 Risk Assessment B

Source (Potential Contaminating Use)	Potential Contaminants	Receptors	Pathways	Associated Hazard, [Severity]	Proposed Site Use Risk Assessment		
					Likelihood of occurrence	Potential Risk	Notes
Gravel pit - Infilled Potentially Infilled Land (Non-Water) Historical Landfill Sites On and Off site	TPHs Land Gases CO ₂ CH ₄	Site Users. Construction Workers.	Dermal contact. Inhalation dust and fibres.	Medium	Likely	Moderate	Possible risk in place.
			Ingestion of dust and fibres via home-grown produce and plant uptake.	Medium	Unlikely	Low	Camping site no private gardens proposed.
			Ingestion of contaminated water through water main pipework.	Medium	Likely	Moderate	Possible risk in place.
			Inhalation of vapours.	Medium	Likely	Moderate	Possible risk in place.
			Inhalation of land Gases.	Medium	Likely	Moderate	Possible risk in place.
			Inhalation of vapours through contaminated ground waters.	Medium	Likely	Moderate	Possible risk in place.
		Adjoining Landowners.	Dermal contact. Inhalation of dust and fibres. Ingestion of dust and fibres	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Ingestion of home-grown produce.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Ingestion of contaminated water through water main pipework.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Inhalation of vapours.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
		Controlled Surface Water.	Inhalation of vapours through contaminated ground waters.	Medium	Low Likelihood	Moderate / Low	Limited risk in place.
			Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible risk in place.
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place.
		Asbestos	Inhalation dust and fibres (from Asbestos within the building)	Severe	Unlikely	Moderate	No buildings in place.
			Inhalation dust and fibres (from asbestos within the soil)	Severe	Likely	High	Possible risk in place.
		Metals Metalloids PAHs	Direct contact. Inhalation dust and fibres. Dermal contact.	Medium	Likely	Moderate	Possible risk in place.
			Ingestion of home-grown produce.	Medium	Unlikely	Low	Camping site no private gardens proposed.
		Flora.	Plant Uptake. Direct Contact.	Medium	Likely	Moderate	Possible risk in place.
		Controlled Surface Water.	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible risk in place.
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place.
	TPHs	Buildings. Construction Materials. Services.	Direct contact with contaminated soils.	Medium	Likely	Moderate	Possible risk in place.
			Direct contact with contaminated groundwater.	Medium	Likely	Moderate	Possible risk in place.

Table 16 Overview of Risk Assessments - Proposed Site Use

Receptors	Pathways	A	B
		Mounds / made ground	Gravel pit - Infilled
		Storage Yard Area	Potentially Infilled Land (Non-Water)
		East Court Farm	Historical Landfill Sites
			On and Off site
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact.	✓	✓
	Ingestion of home-grown produce.	X	X
	Ingestion of contaminated water through water main pipework.	✓	✓
	Inhalation of vapours from soils.	✓	✓
	Inhalation of vapor from contaminated ground waters.	✓	✓
	Inhalation of land gas vapours.	✓	✓
	Inhalation Asbestos dust and fibres (from Asbestos within the building)	X*	X*
	Inhalation Asbestos dust and fibres (from asbestos within the soil)	✓	✓
Adjoining Landowners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact.	✓	✓
	Ingestion of home-grown vegetation.	X	X
	Ingestion of contaminated water through water main pipework.	✓	✓
	Inhalation of vapours from soils.	✓	✓
	Inhalation of vapours from contaminated ground waters.	✓	✓
Flora	Plant Uptake / Direct Contact.	✓	✓
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	✓	✓
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ.	✓	✓
Construction Materials	Direct contact with contaminated soils.	✓	✓
	Direct contact with contaminated groundwater.	✓	✓

*NB: Due to Severe Consequence from Asbestos and Explosive Gases, some risk is assessed and potentially in place and therefore highlighted above.

GW Only: Some risks have been assessed as a direct result of potential mobilisation of groundwater contamination that may influence the site. A pictorial conceptual model has been reproduced within this report to confirm the above findings

16 Discussion on Sources of Contamination

Considering the risk assessment and conceptual site model produced, the following contaminants of concern have been identified based on land uses and features.

Table 17 Methodology for further assessment of potential contaminants

Risk Assessment	Land Use	Pollutant
	Mounds / made ground	Soil, Groundwater & Vapour Risk
Risk Assessment A	Storage Yard Area	Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAHs, (EPA Priority 16), Phenols, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band).
	East Court Farm	Soil Sampling Groundwater & Vapour Assessment
Risk Assessment B	Gravel pit - Infilled	Soil, Groundwater & Vapour Risk
	Potentially Infilled Land (Non-Water)	Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAHs, (EPA Priority 16), Phenols, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band). Land Gases CO ₂ , CH ₄ .
	Historical Landfill Sites	Soil Sampling Groundwater & Vapour Assessment
	On and Off site	
Spatial Sampling, (General Assessment)		Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAHs, (EPA Priority 16), Phenols. BS3882:2015
		Asbestos
		25-meter Centres In accordance with BS10175: 2011+A2:2017.
		5-10-meter Centres In accordance with BS10175: 2011+A2:2017.

17 Next Steps

Considering the information gathered to date, we would suggest that an appropriate way forward would be to assess the condition of the subsoil within the site resulting from the historical and former uses of the site as detailed within previous sections of this report. We would suggest that the most viable way of assessing risk will be to consider the following assessment techniques.

The assessment of the site proposed in this report and the following recommendations which are detailed below have been prepared in accordance with key guidance documents as follows: -

- National Planning Policy Framework.
- British Standards 10175:2011+A2:2017.
- Land contamination risk management (LCRM).
- DEFRA: Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, (April 2012).
- Environment Agency, (2010) GPLC1 Guidance Principles for Land Contamination.

The investigation is proposing to undertake the following at the site: -

- Determine the ground and groundwater conditions.
- Determine if there are any obstructions such as old service and foundations, buried tanks, etc.
- Install gas, vapour and groundwater monitoring well installations and monitor the levels of groundwater, gas and vapours.
- Obtain samples of the made ground, natural soils and groundwater for contamination testing at targeted site-specific designed locations. Test soil and groundwater samples for a range of contaminants, as identified in Table 18.
- Obtain samples of soil to test for vapours contaminants, as identified in Table 18.
- Visually appraise soils to consider olfactorily or visual presence of contamination factors, risk, vapours or fragments.
- All laboratory testing should be completed to MCERT/UKAS accredited standard.
- All detection limits provided by chemical laboratories must fall below the set screening values.

17.1 Soil Assessment

Soil sampling will be completed recovering samples in appropriate containers for analysis by the analytical chemist. All sampling will be sent directly to the chemist in cool boxes to retain the integrity of the soil sample.

At least one sample will be recovered and chemically tested from the natural underlying subsoil to consider any pollution within the lower soils. Most of the sampling and chemical analysis will be recovered from the upper made ground / FILL material where risk is likely higher. Should any areas of the soil profile recovered cause concern in terms of visual or olfactoral risk, this will be recorded, and testing completed.

Based on the site area and size of the site, (approximately 5800 m²), we would recommend that the site should be subjected to a sampling density of between 15-20 meter grid pattern or moderate risk pollutants which is broadly in line with that proposed by 10175:2011+A2:2017 and offers a greater density sampling pattern of 10-15 meter grid pattern for high risk pollutant such as Asbestos. As such, we can confirm that a likely 13-17 samples locations will be required across the site to provide a 'good' spatial density and an additional 36- 43 sample locations being tested for Asbestos.

Table 18 **Soils Assessment - Targeted Sampling**

<i>Feature</i>	<i>Contaminant</i>	<i>Method of Investigation</i>
Mounds	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes
Storage area	Metals, Semi Metals, PAHs, TPHs, Asbestos	Trial Pits

Table 19 **Soils Assessment – Spatial Sampling**

<i>Feature</i>	<i>Contaminant</i>	<i>Method of Investigation</i>
Made ground	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes
Former gravel pit	Metals, Semi Metals, PAHs, TPHs, Asbestos	Trial Pits

Upon completion of on-site sampling and the associated chemical analysis, the soil data will be compared against the Generic Assessment Criteria for commercial land use derived by AtRisk Soils which has been purchased as a reviewing standard. This has been prepared by Atkins as Soil Screening Values, (SSV's). Additionally, values will be adopted for screening values using LQM / CIEH – Sutable 4 Use Levels in the absence of Atkins adopted values.

17.2 Groundwater Assessment

To gain an understanding of the groundwater system and the level of risk in place, we can confirm that the following works should be completed: -

The Geology within the site should be confirmed.

- The depth of the Geology within the site should be assessed and if ground water is encountered or has the potential to be in place, some assessment of the risk to groundwater and surface water features should be carried out as well as potential human health risk from vapours.
 - Considering the size and nature of the site, the groundwater elevation may be perched at locations and as such, strikes may be local to lenses or pockets of more permeable ground to provide surface water runoff.

Standpipes should be installed across the site, to orientate the groundwater table to identify groundwater flow direction. Three standpipes should be installed for groundwater assessment such that orientation of the groundwater table can be undertaken.

- We would recommend that the installation of the boreholes at the site should be completed in order to determine the groundwater elevation, if present. The boreholes should be left for a minimum period of one week to allow the groundwater to reach equilibrium at which time, purging of the standpipe well should be completed to consist of a minimum of 3 well volumes removed from the standpipes prior to samples being recovered. Should groundwater be identified, sampling of the groundwater can be completed and retained in appropriate containers dependent upon the analysis proposed. The sample should then be sent to the analytical chemist for assessment in appropriate transport conditions.
- It is possible that groundwater assessments may require extending the standpipes through any superficial deposits suggested by the Envirocheck report.
- Considering the size and nature of the site should ground water risk be recorded within the site area each borehole should be sampled and tested for the range of pollutants as identified within this report. The potential risks should be initially assessed against the UK Drinking Water standard as a Tier 1 assessment Criteria with possible further assessments required where heavy contamination or risk deemed in place. Groundwater samples should be compared against the EQS standards, (Environmental Quality Standards).
- The assessment of groundwater will also be used to consider the risks to surface water features and whether the site may impact of this feature.
- Risk assessments A to B, should be tested for so the extent of pollutants can be identified within the groundwater sample.

17.3 Land Gas Assessment

Considering the potential for Land Gas risks due to the potential made ground and infilled gravel pits potentially in place within and off site area Land Gas risk assessments must be completed. These will include the potential for contamination migration from on and off-site sources which may be present in concentrations where risk is recorded.

Land gas monitoring should be specifically targeting the following land uses.

Table 20 Land Gas Assessment - Response Zone

Feature	Targeted Response Zone	Location to Target	Gas risk
Mounds / made ground	Made Ground	North of the site	Land Gases - CO ₂ , CH ₄ .
Gravel pit - Infilled	Made Ground	Site Wide	
Potentially Infilled Land (Non-Water)	Made Ground	Site Wide	
Historical Landfill Sites	Made Ground	Site Wide	

Infilled land is recorded in place off site, although, we would suggest that an assessment of risk could be completed using RB17 A Pragmatic Approach to Ground Gas Risk Assessment (2012). The surrounding land is

primarily residential and as such, a pragmatic approach is deemed most suitable for the site and if risk confirmed, additional more intrusive assessments completed.

Considering the above, we would suggest that soil testing is undertaken to assess the infilled ground its depth and type, and a standpipe should be installed within the site with response zones placed within the upper made ground solely, and the following assessments completed as follows:-

- Install standpipes to allow vapour and Land Gas risk to be considered from the upper made ground.
- Assess vapour risk over a minimum of six monitoring rounds to comply with CIRIA C665 to consider risks to buildings, LCRM and R & D Publication 66.
- Monitoring should be completed over falling or low atmospheric pressures or in periods where ground conditions are frozen to provide the worst-case scenario for the site, although, the site is laid to hard cover which will restrict natural ventilation of any gases.
- Reporting of land gas and vapour risk/ can be completed assessing soils in situ using a Photo Ionisation Detector for Volatile Organic Compounds, (which include BTEX). Flow rates should also be noted for reporting purposes.

17.4 Vapour Risk Assessment

Considering the potential for vapour risk to be in place from various source as noted below, the following risk are in place.

Table 21 Vapour Risk Assessment - Response Zone

Feature	Targeted Response Zone	Location to Target	Vapour risk
Mounds / made ground	Made Ground / Sand & Gravel	On Site North	TPHs
Storage Yard Area	Made Ground / Sand & Gravel	Migration onto the site	TPHs
East Court Farm	Made Ground / Sand & Gravel	Migration onto the site	TPHs

Considering the above, we would suggest that soil testing is undertaken to assess whether contamination that may promote a vapour risk is in place within the site area and the groundwater.

17.5 Working Brief

It should be noted that this investigation is undertaken to identify the extent of contamination because of historic and ongoing use. Should any areas of the site be encountered within the development that appear potentially contaminated through visual or olfactory assessment outside that discussed within this report, consultation with ourselves should be undertaken to identify the risk associated with the material.

Table 22 **Overview of Works**

Receptor	Scope of Investigation Works Required			Proposed Method of Assessment	Proposed Site Works to Complete
	Assessment of: Soils	Vapour and Gas	Ground Surface Water and		
Human Health	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground. Assessment of the underlying natural soils to consider contamination. Groundwater Risk Assessment. Land Gas Assessment Vapour Risk Assessment. Analysis of soil samples for GQRA Assessment. Reporting.
Surface Water	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground. Assessment of the underlying natural soils to consider contamination. Groundwater Risk Assessment. Vapour Risk Assessment. Analysis of soil samples for GQRA Assessment. Reporting.
Ground Water	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground. Assessment of the underlying natural soils to consider contamination. Groundwater Risk Assessment. Vapour Risk Assessment. Analysis of soil samples for GQRA Assessment. Reporting.
Services & Building	✓	✓ #	X	Window Sampling - Soil sampling	Recover samples of the made ground. Vapour Risk Assessment. Groundwater Assessment. Analysis of soil samples for GQRA Assessment. Reporting.
Geotechnical Assessment	✓	N/A	X	Window Sampling	Recover samples of the natural soils for laboratory testing. Assessment of shallow soils for conventional foundation. Consider deeper or piled foundations. Reporting.

NB * Initial assessments of the site should be undertaken using Leachate Testing and water sampling if required.

Complete soils testing to assess if vaporous contamination is in place within the site area.

APPENDIX ONE

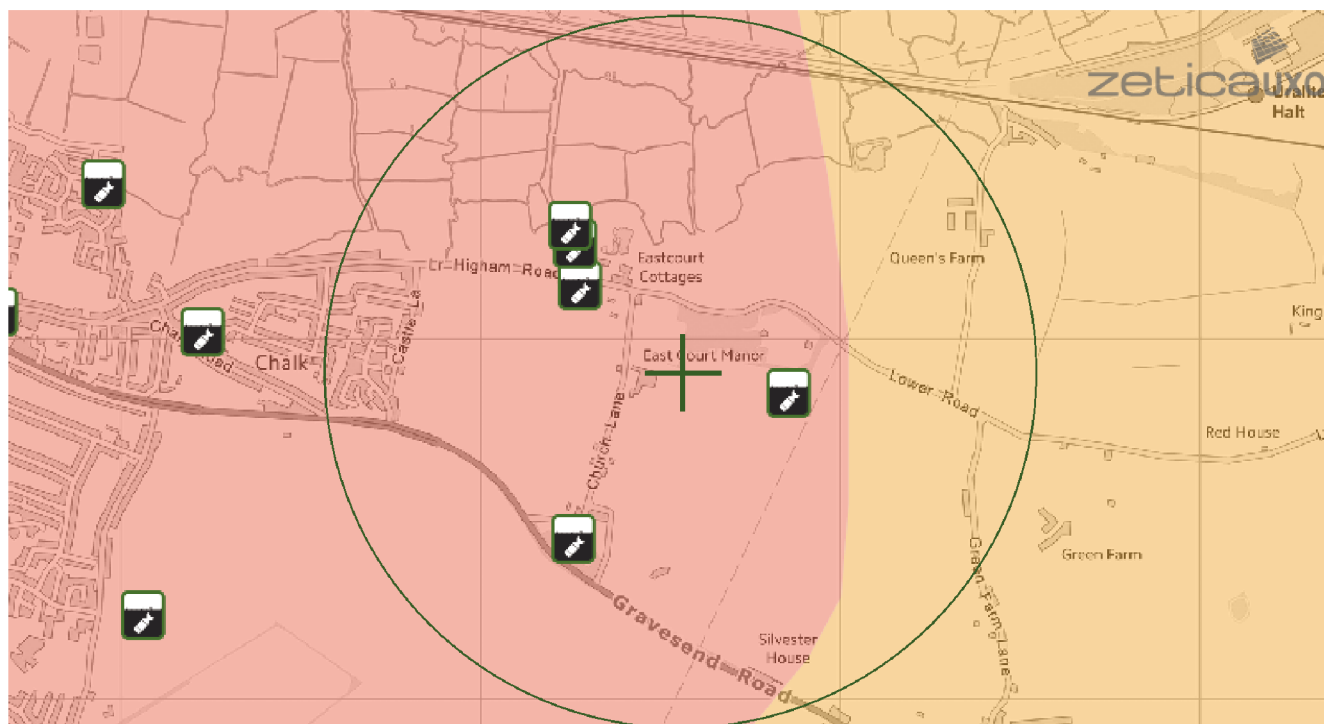
ADDITIONAL INFORMATION

UNEXPLODED BOMB RISK MAP



SITE LOCATION

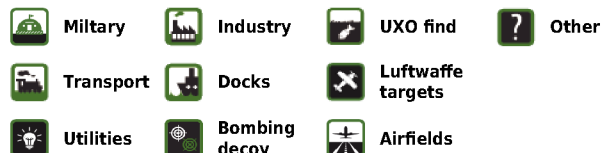
Map Centre: 568527,172915



This map principally indicates a hazard from Unexploded Bombs (UXB) due to WWII bombardment. Other sources of Unexploded Ordnance (UXO) may be present. It should be noted that this map does not represent UXO risk and should not be reported as such when reproduced.

LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.



How to use your Unexploded Bomb (UXB) risk map?

This map indicates the potential for UXBs to be present because of World War Two (WWII) bombing. It can be incorporated into a technical report, such as a Phase 1 Desk Study, or similar document as an indication of the potential for UXO encounter on a Site. Other sources of UXO may also be indicated, although note that these are not comprehensive and more detailed research is required to confirm their presence.

What if my Site is in a moderate or high density area?

We typically recommend that a detailed UXO desk study and risk assessment is undertaken for sites in an area with a moderate or high bombing density. Additionally, if your site is in close proximity to a strategic target, military establishment, airfield or bombing decoy, then [additional detailed research](#) is recommended.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirm that there is a low potential for UXO to be present on your site, then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

If you are unsure whether other sources of UXO may be present, you can request one of our [pre-desk study assessments \(PDSA\)](#) by emailing a site boundary and location to pdsa@zetica.com.

You should never plan site work or undertake a risk assessment using these maps alone. More detail is required, to include an assessment of the likelihood of a source of UXO hazard from other military activity not reflected on these maps.

If I have any questions, who do I contact?

tel: +44 (0) 1993 886682 email: uxo@zetica.com web: www.zeticauxo.com

The information in this UXB risk map is derived from a range of sources and should be used with the [accompanying notes on our website](#).

Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgement. The copyright remains with Zetica Ltd.

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
568563/173000

Created
7 April 2025 18:48

Your selected location is in flood zone 3, an area with a high probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Unspecified

Location (easting/northing)

568563/173000

Scale

1:2,500

Created

7 Apr 2025 18:48

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



0 20 40 60m

APPENDIX TWO

CONCEPTUAL MODEL

East Court Farm, Church Lane, Gravesend, Kent DA12 2NL

Site Conceptual Model - Proposed Site Plan

Potential Pathways

Human Health

- ① Direct contact with contaminants in soil/dust or water
- ② Inhalation of contaminants through soil/dust/particles
- ③ Dermal Contact
- ④ Ingestion of home grown produce
- ⑤ Ingestion of contaminated water through water main pipework
- ⑥ Inhalation of Land Gases / Vapours From Soils
- ⑦ Inhalation of Vapours from Groundwater
- ⑧ Migration to off site Adjoining Land Owners

Flora

- ⑨ Plant uptake & direct contact with soil

Controlled Surface Water, Ground Water & Abstraction Well

- ⑩ Leaching, lateral migration of shallow groundwater to a target receptor

Off Site Sources

- A Migration of contamination to the site area
- B Migration of land gases/ vapours to the site area
- C Migration of contaminated groundwater to the site area

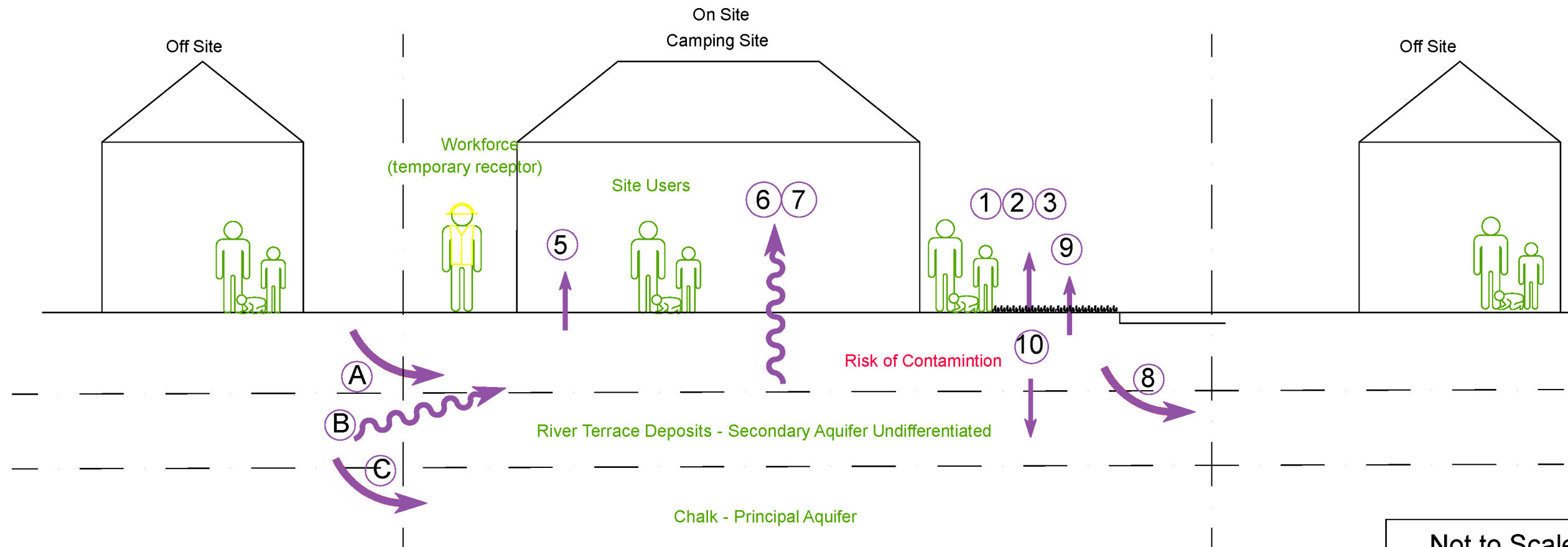
Key

Purple =Possible pathways

Green =Possible receptors

Red =Possible sources

Grey = Not in place within this site



Not to Scale
Sketch No. : DTS / 19482 / 02 / 01

APPENDIX THREE

SITE PLANS

East Court Farm, Church Lane, Gravesend, Kent DA12 2NL

EXISTING SITE PLAN

