DESK TOP STUDY REPORT

Site Address:	Fox & Hounds, Bromley, Standon, Ware, SG11 1NX
Report Date:	January 2024
Project No.:	18742
Prepared for:	Mr Barnaby Fry
Planning Application	East Herts Council

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LIST OF ABBREVIATIONS

BGS	British Geological Society
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
EHO	Environmental Health Officer
GL	Ground Level
GW	Groundwater
HESI	Herts & Essex Site Investigations
LAPPC	Local Authority Pollution Prevention and Control
NOS	Not Otherwise Specified (waste material)
NHBC	National House-Building Council
OS	Ordnance Survey
PAH	Poly Aromatic Hydrocarbons
SPZ	Source Protection Zone
TPH	Total Petroleum Hydrocarbons
UFST	Underground Fuel Storage Tanks

DESK STUDY GENERAL NOTES

This report has been prepared based on the findings of investigations into the site 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 conditions. As part of this review, research has been undertaken with the Local Authority and the Environment Agency as to the site 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 between subsequent to 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 product or sheet materials either on the surface of the site soils or evident above ground, however, does not constitute a full Asbestos Survey by any means. This should be sought under separate cover.

DOCUMENT INFORMATION AND CONTROL SHEET

Client

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Qualifications

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- ONC - Civil Engineering.
- HNC – Civil Engineering.
- P.G. Certificate – Geotechnical Engineering, (Inc. Environmental Engineering)
- P.G. Diploma – Geotechnical Engineering, (Inc. Environmental Engineering)
- Master of Science, (Geotechnical Engineering), (Inc. Environmental Engineering)
- SNIFFER modelling course.
- CONSIM Groundwater Assessment Course.
- (30 Years in Geotechnical and Environmental Engineering)
- Asbestos Awareness Course.
- Non-Licensed Work with Asbestos Including NNLW.
- Site Supervisors Safety Training Scheme, (SSSTS).
- First Aid Course in Construction – 3 Day Course – 3 years.
- CSCS Labourer Card.

Document Status and Approval Schedule

Issue No	*Status*	*Date*	*Prepared by: Rebecca Chamberlain Signature / Date*	*Technical review by: Chris Gray Signature / Date*
1	Final	January 2024		

SUMMARY

Client	Mr Barnaby Fry
Site Location	Fox & Hounds, Bromley, Standon, Ware, SG11 1NX
Existing Development	The site forms a triangular shaped parcel of land which forms part of a rear garden to the existing residential house and associated landscaping. The site is in use as a tennis court and a small rectangular pool with small changing room.
Proposed Development	The proposed development forms the clearance of all site features and the construction of a new residential house with associated landscaping
Site Settings and Previous Uses	The site is recorded as open land from the earliest map record until present day which will likely form residential gardens. The site is shown as tennis courts and a swimming pool from 1999. The surrounding land uses include residential housing, 30m to the east of the site and farming community some 140 meters to the north east and south east. Residential housing is in place from 1879 and farming is present from 1879 to 1923 for Bromley Farm and from 1879 until recently for Bromleyhall Farm.

Geological and Hydrological Profile	**Geology**		**Aquifer Classification**
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	Lowestoft Formation	Chalky CLAY	Secondary Aquifer - Undifferentiated
	London Clay	Clay	Unproductive Stratum

Nearest Surface Water Feature	The nearest surface water feature is recorded as 35 meters to the south east of the site which is recorded as a likely pond.
Groundwater Abstractions	The nearest abstraction well is located 649 meters to the north of the site which is identified as Environment Agency, Thames Region Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order.
Source Protection Zone	The site lies within a source zone III protection zone and as such, the groundwater underlying the site may be sourced from time to time for abstraction purposes
Potential Sources of Contamination	***Features On Site*** • ***NONE*** ***Features Off Site*** • ***NONE***
Previous Investigations	No reports relating to contaminated land are known to us at the time of writing this report relating to the site.

Human Health Risk	Limited sources of contamination are recorded within and surrounding the site. A watching brief should be kept as follows and it may be prudent to complete an exploratory investigation to confirm no risks are in place. 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 in order to identify the risk associated with the material.
Ground Water Risk	Limited sources of risk are in place within the site a watching brief should be maintained throughout the development, should any significant pollution or suspect materials be encountered reassessment to the risk should be undertaken
Surface Water Risk	Considering the nature and located of the feature off site direct links between the site conditions are unlikely to be in place.
Vapour Risk	No sources of vaporous contamination are recorded in place.
Land Gas Risk	No sources of land gases are in place for the site area, should significant made ground or organic matter be encountered within the site area reassessment may be required, although for the information collect to date the risk of this is low.
Recommendations	• Intrusive shallow based excavation using hand sampler to assess the geological conditions and recover samples. • General exploratory investigation sampling to assess the site. • Visual observations of the subsoil encountered to make initial assessment of the potential risk from contamination. • Watching brief to record assess and report on unexpected contamination. Based on the above, a risk assessment should be completed if any investigation is completed. This will result in a revised conceptual model based on actual site conditions and confirm the risks in place.

PRELIMINARY RISK ASSESSMENT – DESKTOP STUDY - PHASE 1 REPORT

1 Context and Objectives of this report

1.1 Introduction

We have been asked by Mr Barnaby Fry to undertake an investigation of the above site in order 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 residential dwellings with gardens, as such the derivation of risk has been assigned as a 'Residential Land Use with Home-grown Produce'.

1.2 Reference to the Current Planning Application Details

An application is in place with East Herts Council as follows:-

No current application in place for this proposed development.

1.3 Decision Notice Relating to Contaminated Land

No decision notice is in place.

1.4 Report Objectives

The objectives of the project were as follows: -

- 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.
- 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 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; and
- Preparation of a Conceptual Site Model (CSM) with a view to identifying potentially significant source-pathway-receptor linkages followed by a qualitative risk assessment.

1.5 Timescales of the Assessment

The timescales for the site investigation process are based on immediate site investigation data and the assessment of the site conditions based on this report at present. The scope of this report which define the following: -

- Any immediate risks identified within the site that may promote a high risk to the immediate site conditions.
- Any current site use features that would promote a risk that required 'quick' action.
- Any construction or medium-term risks within the site which may be present during the construction process within the site.
- Any long-term risks within the site that may require long term assessments or interim monitoring.

- Any risks within the site that may change upon the change in use of the site to form the proposed development.

1.6 Level of Technical Confidence Expected

The scope of this report has been prepared in order to assess the historical impact of the site and any previous site uses on the existing and proposed development scheme. The level of risk will be prepared and assessed based on historical mapping and environmental information which has been gained to support the development of this report.

Whilst this is the case, gaps in map records and information will be in place that would reduce the readers confidence of the information sought. As such, this report has been prepared as a preliminary or Indicative Report with a Medium Confidence Level.

1.7 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 Standon, Hertfordshire, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1.

Table 1 Site Detail

Site Address:	Fox & Hounds, Bromley, Standon, Ware, SG11 1NX
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Residential House and gardens
Previous use of site, (if known)	As above
Grid Reference	NGR 541330, 221430
Site Area	0.27 Hectares
Local Authority	East Herts District Council
Gradient of the site	The site forms generally a level area of land with a slight gradient to the east.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 36 meters to the south east of the site which is recorded as a stream which is dry.

2.2 Existing Site Use

The site forms a triangular shaped parcel of land which forms part of a rear garden to the existing residential house and associated landscaping. The site is in use as a tennis court and a small rectangular pool with small changing room.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- From the south east of the site round to the north west of the site, open arable land has been recorded in place. To the immediate east of the site, a residential house is in place. Bromley Lane runs along the southern boundary of the site.

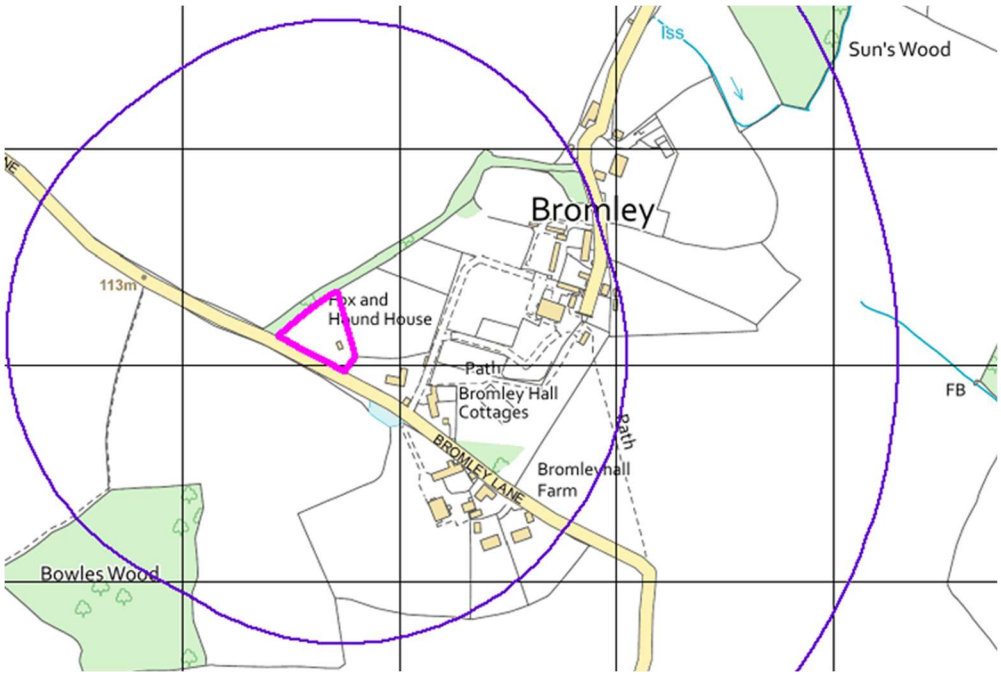
2.4 Site Reconnaissance

The site walk over visit was undertaken in January 2024 on which the weather conditions were recorded dry and slightly overcast.

Access

Access at present is slightly difficult as this can only be gained by pedestrian means from the main driveway of the main house. No vehicle access is currently available into the site area.

Site Area



The site is formed by a triangular shaped parcel of land which is part of an existing residential house. The access from the main garden is broken by a post and rail wooden fence which segregates the two land parcels as depicted by the plans attached.

Upon gaining access into the site, a small brick built structure is identified in place which is the changing room for the small swimming poll located relatively centrally within the site area. The main pool is bounded by a small brick wall which extends around the pool and has access at the northern end. No features are present within this area which would promote a risk. No boiler room is in place.

A little further to the north of the site, a tennis court is in place which forms a traditional court area which is laid to a tarmac surface extending up to the main fencing surrounding the area. No features are present within this area. To the north west of the site, the ground elevation is slightly raised which may for the soils which were excavated to form the tennis courts or swimming pool, although, no investigation has been completed to support this.

To the northern boundary, heavy tree presence is in place along the boundary with a reduced area of ground which may have formally been a stream but was dry and has been for some time. No other features are present within the site area.

Vegetation

Minimal vegetation runs through the main site with the exception of grassed landscape and some small shrubs. Boundary areas are more heavily treed. All vegetation was identified as in a good state of health.

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. We recommend that an asbestos survey of the building be carried out, if not done so already, prior to any further demolition or works on site. A full assessment for asbestos within any made ground will be required in order to fully consider risk from Asbestos.

Surrounding Area

Surrounding the site area agricultural land is in place to most areas of the site with the exception of the east where the main residential house is in place.

Site Levels and Ground Cover

The ground has been identified as generally flat with a very slight incline leading down to the west of the site area. Slightly raised ground is in place to the north west corner of the site. This may be artificially raised up from the construction of the tennis courts or swimming pool.

Current site activities

The current site use forms a garden to a residential house.

Effluent, Site Drainage and Services

Minimal drainage is identified within the site area.

2.5 Site Reconnaissance – Photos

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Print 3

Print 4

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Table 2 Walk Over Inspection Risk

Feature	Location	Elevation	Is A Risk Assessment Required?
Raised Earth	NW Corner	At GL.	✓

3 Details of Searches Undertaken

Within this report, various searches have been undertaken in order 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
1879	1:2,500	Open Space	Residential House, 30m, E Bromley Farm, 140m, NE Bromleyhall Farm, 140m, SE
1883	1:10,560		
1897	1:2,500		
1899	1:10,560		
1923	1:2,500		Bromley Farm Likely removed 140m, NE
1924	1:10,560		
1947	1:10,560		
1960	1:10,000		
1977	1:2,500		
1982	1:10,000		
1993	1:2,500		

Table 4 *Historic Maps Assessment*

Date	Scale	On Site Feature	Off Site Features
1999	Historic Aerial Photo	Tennis Court and Swimming Pool in place.	
1999	1:10,000		
2006	1:10,000		
2023	1:10,000		Bromleyhall Farm Removed and redeveloped as housing, 140m, SE

Table 5 Overview of Historic Map Assessment Risk

Identified Risk	Distance & Direction	Year	*Is A Risk Assessment Required?*	Justification
Open Land	On Site	1879 – 1999	X	No Source
Tennis Court and Swimming Pool	On Site	1999 – Present.	X	No Source
Residential House	Off Site, 30m, E	1879 – Present	X	No Source
Bromley Farm & Bromleyhall Farm	Off Site, 140m, NE & 140m, SE	1879 – 1923 And Recently for Bromleyhall Farm.	✓	Possible risk of made ground, pollution and risk.

5 Details of the Intended Future Use of the Site

The proposed development forms the clearance of all site features and the construction of a new residential house with associated landscaping.

6 References of Planning Applications

No current planning application is in place for the site area.

7 Discussion with Local Authority

No discussion with the Local Authority has been completed.

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 take into account 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 Consultation with Appropriate Bodies/Local Sources

Limited consultation with the Local Authority has taken place a review of the online planning files has been made. No other local sources of information were available at the time if the walk over. This forms the level of assessments made.

10 Previous Reporting

No previous reports are known to us at the time of writing this report.

11 Environmental Settings

11.1 Superficial Deposits and Solid Geology

The ground conditions based on geological maps and BGS information shows the site to be located within a area identified as Lowestoft Formation is characterised by a Chalky till. This is seen to overlie London Clay.

11.2 BGS Boreholes

No BGS Boreholes are reported surrounding the site which would be of use in the identification of ground conditions.

Table 6 Geological Information

Geological Unit	*Brief Description*	*Anticipated thickness, (m)*	*Aquifer Type*
Superficial Deposits/Drift On Site			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
Lowestoft Formation	Chalky till, together with outwash sands and gravels, silts and clays	4-6 meters	Secondary Aquifer Undifferentiated
Solid Geology Deposits			
London Clay	Clay	15m +	Unproductive Stratum

11.3 Hydrology

The nearest surface water feature is recorded as 35 meters to the south east of the site which is recorded as a likely pond.

The nearest discharge consent is identified as 66 meters to the east of the site which is recorded as sewage discharge – final treated effluent – Not water company.

11.4 Hydrogeology

The published Environment Agency Groundwater Vulnerability Map of the area indicates the site to be located within an area classified as a Secondary Aquifer Undifferentiated. The underlying geology is recorded as an Unproductive Stratum which is formed by London Clay.

Secondary undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.

Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

The nearest abstraction well is located 649 meters to the north of the site which is identified as Environment Agency, Thames Region Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order.

The site lies within a source zone III protection zone and as such, the groundwater underlying the site may be sourced from time to time for abstraction purposes.

11.5 Implication of groundwater

Considering the underlying Secondary Aquifer Undifferentiated, 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 takes into account 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.

11.6 Flooding

The site does not lie within an area which is susceptible to flooding.

11.7 Landfill Sites

No landfill sites are recorded in place surrounding the site area.

Table 7 *Sensitivity of Environmental Receptors in the Vicinity of the Site*

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Secondary Aquifer Undifferentiated	Low	Low potential for significant volumes of groundwater to be in place.
	Unproductive Stratum	Low	Limited risk of migration to a lower groundwater system
Water Abstraction	Spray & Irrigation	Medium	The nearest abstraction well is located 649 meters to the north of the site which is identified as Environment Agency, Thames Region Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order
Source Protection Zone	Zone 3	Medium	The groundwater underlying the site may be sourced from time to time for abstraction purposes.
Surface Water	Pond	Low	The nearest surface water feature is recorded as 254 meters to the southwest of the site which is recorded as a likely pond
Flooding	NONE		

12 Site Drainage and Other Potential Man-Made Pathways

No obvious drainage runs have been identified within the site area.

13 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 8 ***Summery of Regulatory Data - Sources***

Data Sources	*On Site*	*Off Site*	*Distance from site.*	*Is A Risk Assessment Required?*
Discharge Consents	None	Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company	66m, E	X
		Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company	160m, SE	X
Radon Potential - Radon Protection Measures	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).			X

Table 9 ***Summary of Regulatory Data - Receptors***

Data Receptors	*On Site*	*Off Site*	*Distance from site.*	*Is this a potential receptor for risk ?*
Nearest Surface Water Feature	None	Pond	36m, SE	X
Water Abstractions	None	Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order	649m, N	X
		General Agriculture: Spray Irrigation - Storage	1007m, SW	X
OS Water Network Lines	None	Inland River, Thames	386m, NE	X
Source Protection Zone	SPZ III		On Site	✓

Table 10 BGS Estimated Chemistry Data

BGS Estimated Soil Chemistry Pollutant	BGS Estimated Soil Chemistry	BGS Urban Soil Chemistry Averages (mg / kg)		
		Minimum	Average	Maximum
Arsenic	<15	NO DATA		
Cadmium	<1.8			
Chromium	60-90			
Lead	<100			
Nickel	30-45			

Table 11 Geological Hazards

Geological Hazard	Distance & Direction	Feature	Risk Assessment Required
Non-Coal Mining Areas of Great Britain	On Site		Highly Unlikely
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		No Hazard
Ground Dissolution Features	On Site		No Hazard
Landslide	On Site		Very Low
Running Sand	On Site		Very Low
Shrinking or Swelling Clay	On Site		Low

Table 12 Summary of Contemporary Trade Entries

Trade Name	Trade Use	Distance & Direction from Site	Is A Risk Assessment Required?	Comment
NONE			X	
Further trades extend away from the site, (See Envirocheck Data)				

*NB The above information is taken from the Envirocheck trade directories

14 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 13 Table of Source Risk

Risk Assessment	Source Risk	Associated Contaminants	Source of Information	Location	Date	Considering Site Specific Pathways	
						Assessment Required.	Method of Assessment
A	***Raised Earth***	Metal, Semi Metals, PAHs, Asbestos	Walk Over Survey	NW Corner	Current	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
B	***Bromley Farm & Bromleyhall Farm***	Metal, Semi Metals, PAHs, Asbestos, Pesticides, Herbicides, CO2, CH4.	Walk Over Survey	Off Site, 140m, NE & 140m, SE	1879 – 1923 And Recently for Bromleyhall Farm	Possible GW Risk Possible Land Gas Risk Possible Vapour Risk	Install Standpipes Land Gas Monitoring GW & Vapour Assessments

15 Outline Conceptual Model

What must now be considered is what contamination should be identified as a potential hazard as a result of the use of the site-specific source pathway and receptor. In order 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. This is based on the information below: -

Table 14 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 15 *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*
Raised Earth ***NW Corner of the site.***	TPH's Naphthalene	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact	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 land Gases	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
		Adjoining Landowners	Direct contact. Inhalation dust and fibers. Dermal contact	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	Low Likelihood	Moderate / Low	Limited risk in place
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Low Likelihood	Moderate / Low	Limited risk in place
		Flora	Plant Uptake Direct Contact	Medium	Low Likelihood	Moderate / Low	Limited risk in place
	Asbestos	Site Users Construction Workers.	Inhalation dust and fibers (from Asbestos within the building)	Severe	Low Likelihood	Severe	Limited risk in place
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Low Likelihood	Severe	Limited risk in place
	Metals Metalloids PAH's	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact;	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Ingestion of home-grown produce	Medium	Low Likelihood	Moderate / Low	Limited risk in place
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Low Likelihood	Moderate / Low	Limited risk in place
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Low Likelihood	Moderate / Low	Limited risk in place
	TPH's Naphthalene	Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Low Likelihood	Moderate / Low	Limited risk in place
			Direct contact with contaminated groundwater	Medium	Low Likelihood	Moderate / Low	Limited risk in place

Table 16 *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*
Bromley Farm & Bromleyhall Farm. Off Site, 140m, NE & 140m, SE	TPH's, Naphthalene, Pesticides, Herbicides. Land gases CO2 CH4	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact	Medium	Unlikely	Low	No Action
			Ingestion of home-grown produce	Medium	Unlikely	Low	No Action
			Ingestion of contaminated water through water main pipework	Medium	Unlikely	Low	No Action
			Inhalation of vapours	Medium	Unlikely	Low	No Action
			Inhalation of land Gases	Medium	Unlikely	Low	No Action
			Inhalation of vapours through contaminated ground waters	Medium	Unlikely	Low	No Action
		Adjoining Landowners	Direct contact. Inhalation dust and fibers. Dermal contact	No liability from third parties			
			Ingestion of home-grown produce				
			Ingestion of contaminated water through water main pipework				
			Inhalation of vapours				
			Inhalation of vapours through contaminated ground waters				
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.				
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
		Flora	Plant Uptake Direct Contact	Medium	Unlikely	Low	No Action
Asbestos		Site Users Construction Workers.	Inhalation dust and fibers (from Asbestos within the building)	Severe	Unlikely	Moderate / Low	No Action - Distance removes risk
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Unlikely	Moderate / Low	No Action - Distance removes risk
Metals Metalloids PAH's		Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact;	Medium	Unlikely	Low	No Action
			Ingestion of home-grown produce	Medium	Unlikely	Low	No Action
		Controlled Surface Water;	Leaching, lateral migration of shallow groundwater to a target receptor.	No liability from third parties			
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.				
TPH's Naphthalene VOC's PCB's		Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Unlikely	Low	No Action
			Direct contact with contaminated groundwater	Medium	Low Likelihood	Moderate / Low	Limited risk in place

Table 17 Overview of Risk Assessments - Proposed Site Use

Receptors	Pathways	A	B
		Raised Earth	Bromley Farm & Bromleyhall Farm.
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	X	X
	Ingestion of home-grown vegetation	X	X
	Ingestion of contaminated water through water main pipework	X	X
	Inhalation of vapours from soils	X	X
	Inhalation of vapor from contaminated ground waters	X	X
	Inhalation of land gas vapours	X	X
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	X	X
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	X	X
Adjoining Land Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	X	No Liability from third parties
	Ingestion of home-grown vegetation	X	
	Ingestion of contaminated water through water main pipework	X	
	Inhalation of vapours from soils	X	
	Inhalation of vapours from contaminated ground waters	X	
Flora	Plant Uptake / Direct Contact	X	X
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	X	No Liability from third parties
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	X	
Buildings	Direct contact with contaminated soils.	X	X
	Direct contact with contaminated groundwater	X	X

*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 Identification of Potential Contaminants of Concern and Source Areas

Based on the information gained no specific sources of contamination are in place. which are likely to impact on the development site. Within the site area there may be made ground in place although this is unlikely to contain contamination the following assessments are recommended

17 Next Steps

Considering the information gathered to date, it may be prudent to complete a general assessment of any fill material encountered within the site area to confirm no risk are in place. This may be particularly relevant to the earth mound to the north west corner to confirm soils in this location were excavated from the swimming pool area and therefore relatively natural.

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)
- Contaminated Land Report, (CLR11) 11, 'Model Procedures for the Management of Contaminated Land', (2004).
- DEFRA: Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, (April 2012)
- Environment Agency, (EA), GP3 'Groundwater Protection: Policy and Practice'.

Based on the site area and size of the site and BS10175: 2011+A2:2017, (approximately 2700 m²), we would recommend that 3-4 samples will be required across the site to provide a 'good' spatial density.

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

- Confirm the geology in the north west corner.
- Determine if there are any obstructions such as old service and foundations, buried tanks, etc.
- Obtain samples of the made ground, natural soils for contamination testing for a general suite of potential contaminants.
- 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 samples will be sent directly to the chemist in cool boxes to retain the integrity of the soil sample.

Table 18 Soils Assessment - Targeted Sampling

Feature	Contaminant	Method of Investigation
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 PAH's, (EPA Priority 16), Phenols.	Window Sampler Boreholes Hand Auger Boreholes Trial Pits

Upon completion of on-site sampling and the associated chemical analysis, the soil data will be compared against the Generic Assessment Criteria 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 – Suitable 4 Use Levels in the absence of Atkins adopted values.

17.2 Groundwater Assessment

The unproductive strata within and surrounding the site area will greatly reduce the potential of risk to the ground water, therefore the watching brief noted in section 17.5 should be kept.

17.3 Land Gas Assessment

No sources of land gases are in place for the site area, should significant made ground or organic matter be encountered within the site area reassessment may be required, although for the information collect to date the risk of this is low.

17.4 Vapour Risk Assessment

No sources of vapours risks are recorded within the site area.

17.5 Working Brief

During the course of the development it will be the responsibility of the on-site manger to ensure watching briefs are kept. A watching brief consists of a record of:

- Any observations of contamination made during the course of development by any member of site staff, contractor or visitor.

- A photographic record of the key stages of development and key occurrences including any contamination found during the course of the development, the formation levels of excavations, any reduced level dig/mass excavation, formation of landscaped or garden areas, etc.

- Contact the Environmental Engineer and strategic points within the development of the site where contamination validation elements will be required.

In areas of the site where there is a greater chance of finding contaminated soil and/or water an area specific watching brief will need to be kept. Such a brief will need to be completed by an appropriately qualified site manager and/or an environmental consultant. The following table specifies works in specific parts of the site that require an area specific watching brief, identifying who must complete the watching brief.

Table 19 Watching Brief – Targeted areas for observation

Area of site	*Works to be observed*	*Person to observe works*
Sitewide	General watching brief through any excavations or reduced digs.	Site agent / Contractors

Upon completion of associated works, a written and signed statement will be obtained by the following parties:

- Ground works contractor(s) upon completion of foundations and ground works.
- On site manager upon completion of groundworks and landscaping work.

The written statement must clearly state whether or not evidence of contamination was identified during the course of the development and the action that was taken. An example statement is provided below.

"I am [insert name] from [insert company]. We undertook [insert works undertaken] between the [start date] and [finish date]. During the course of work at [insert site name and address] we observed [delete were not applicable: no potential contamination / evidence of contamination / significant evidence of contamination].

Where contamination is identified

The contamination identified:

[include a description of the observations of the contamination]

[identify the location of the observations of contamination and mark the locations on a plan]

[Who was notified of the observations]

[What action was taken to mitigate/clear up contamination]"

The on-site manager statement must include confirmation of whether all site staff and contractors received an appropriate brief regarding the potential presence of contamination.

17.6 Site Staff Training / Briefing

All site staff, site contractors and, where significant contamination is expected site visitors, will be briefed on the potential presence of land, water or air bourn contamination before commencing work on the site. Apart from any standard Health & Safety practices this will include the following information:

- Health & Safety considerations.
- Asbestos Awareness course.
- The type of land, water or air bourn contamination expected at the development site based on previous use and available site investigation information.

- Any particular areas of the site which are likely to be affected.
- Staff responsibilities under the discovery strategy.

The on-site manager will need to provide written confirmation that site staff were briefed about contaminated land in line with these recommendations.

17.7 Discovery Strategy

The discovery strategy sets out the actions that must be taken if contamination is encountered during the course of a development.

A significant observation includes any observation of contamination. Examples of the types of observations that would be considered significant are set out in the following table.

Table 20 Discovery Strategy – Examples of Observations

Evidence	Description
Visual	• Fuel or oil like substances mixed in with or smeared on the soil or floating on perched, groundwater or surface waters. • Waste materials (refuse, barrels, industrial wastes, ash, tar, etc.) buried at specific location or across the site. • Marked variation in colour. For example red, orange, yellow, green, light or dark blue, etc. may indicate contamination from a variety of contaminants. • Soils including large amounts of ash and clinker where such contamination of soils wasn't expected.
Odours	• Fuel, oil and chemical type odours • Unusual odours such as sweet odours or fishy odours
Wellbeing	• Light headedness and/or nausea when in excavations, at the working face of an excavation, when visual or olfactory evidence of contamination exists, etc. • Burning of nasal passages, throat, lungs or skin. • Blistering or reddening of skin due to contact with soil

Note: The examples provided in this table are not exhaustive.

The following table sets out the actions that must be taken if significant or suspected land, water or air contamination is observed by site staff, contractors or visitors.

Table 21 Discovery Strategy – Action to be taken if risks are encountered

Person observing contamination	*To be reported to:*	*Action to be taken*
Site visitor	Must report observations to the site manager	None
Contractor	Must report observations to the site manager	Stop work and where possible make area safe and secure area before reporting to site manager
On site manager	Must report observations to their direct manager, the appointed Environmental Consultant, the Planning Authority and Contaminated Land Officer at the Local Authority	Stop work and where possible make area safe and secure area before reporting to others
Environmental Consultant	Must report observations to the site manager, the Planning Authority and Contaminated Land Officer at the Local Authority	Advise that work stops and where possible that the area is made safe before reporting to others

The following table identifies other organisations that may need to be contacted in an emergency or where pollution of controlled waters or nuisance is occurring.

Table 22 Discovery Strategy – Organisations to be contacted if risks are encountered

Occurrence	*Description*	*Contact*
Risk to the public	If at any point residents, the public or others may be at risk as a result of contamination found during the course of investigation, remediation or development works	· Contact the emergency services if there is a risk to life · Contaminated Land Officer/Planning Authority · Health & Safety Executive
Nuisance to residents/the public	If a nuisance has been or is likely to be caused to nearby residents, the public and others – for example odours, dust, noise, vibration, etc.	· Pollution Control Team at the Local Authority (and other council's where necessary)
Pollution of controlled waters	If any surface, culverted or groundwater has been polluted – for example slurry, contaminated soil/water or a chemical spillage entering a river or canal.	· Environment Agency · Planning Authority and Contaminated Land Officer at the Local Authority
Pollution of adjoining land	If land outside the boundary of the development site is polluted from site activities – for example slurry, contaminated soil/water or a chemical spillage	· The owner of the land · Planning Authority and Contaminated Land Officer at the Local Authority

APPENDIX ONE

CONCEPTUAL MODEL

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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

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Site Conceptual Model - Proposed SIte Plan

Potential Pathways

Human Heath

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 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

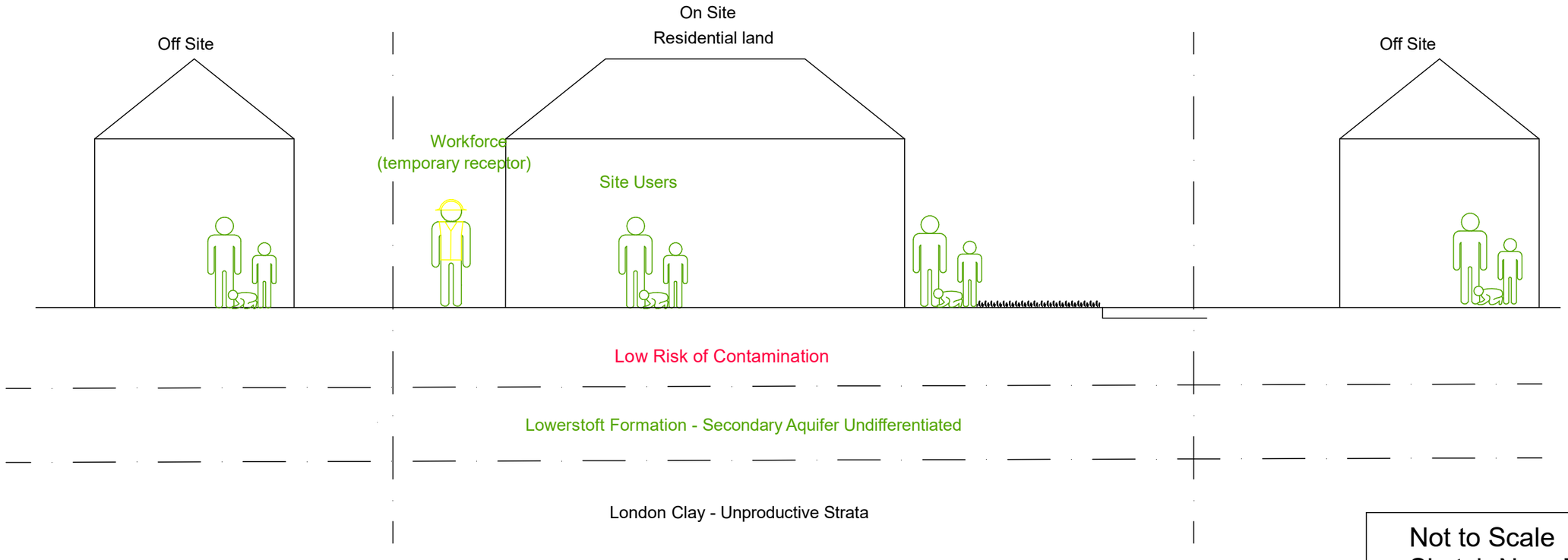
10. Leaching, lateral migration of shallow groundwater to a target receptor

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



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APPENDIX TWO

SITE PLANS

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Location Plan

The Site

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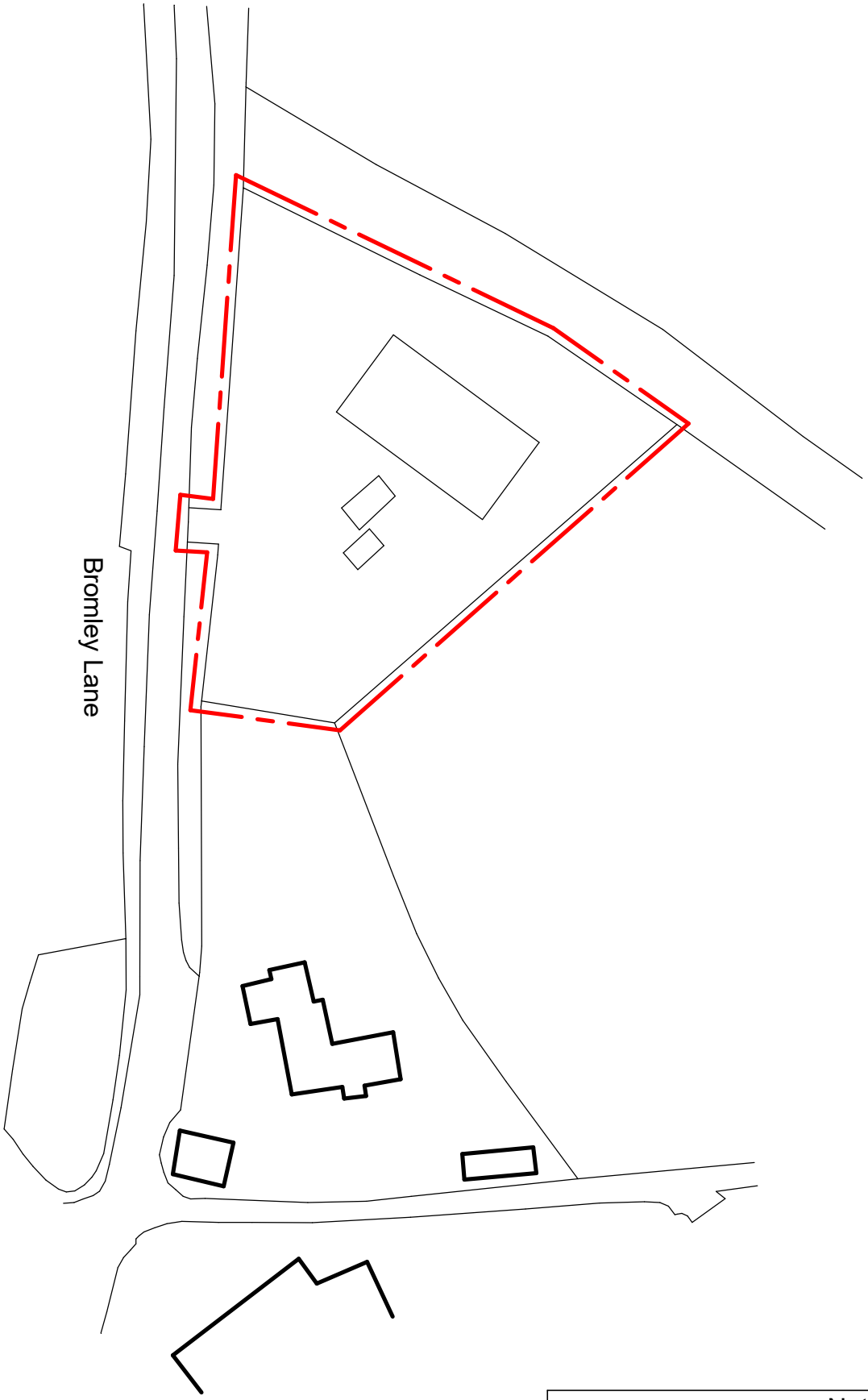
Existing Site Plan



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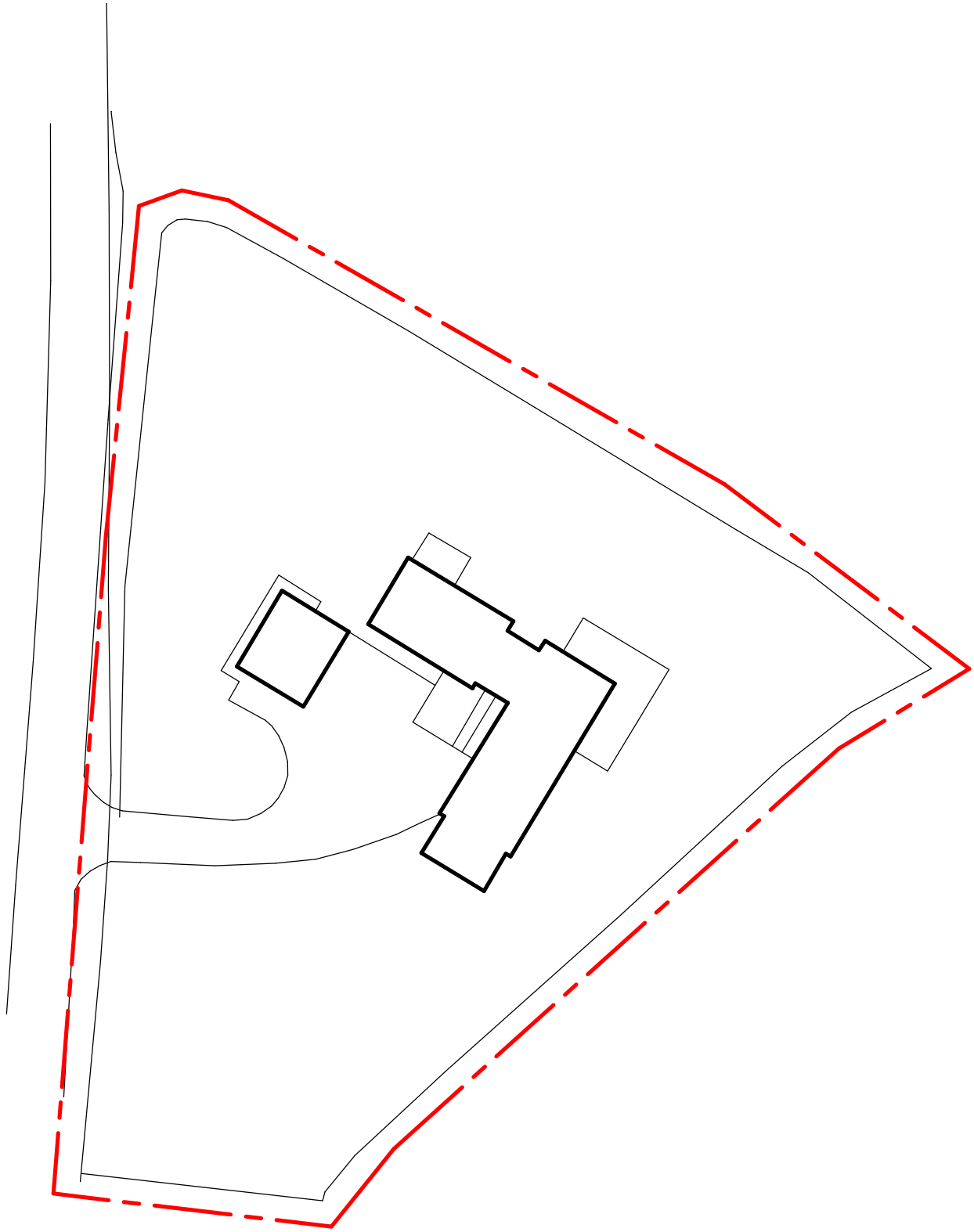
Proposed Site Plan



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