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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

DESK TOP STUDY REPORT

Site Address:	Land to the west of Clatterbury Lane, Clavering, Essex
Report Date:	October 2023
Project No.:	18256
Prepared for:	BAYA Group
Planning Application	Uttlesford District 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

C.S.Gray

- 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	October 2023	[redacted]	[redacted]

SUMMARY

Client	BAYA Group
Site Location	Land to the west of Clatterbury Lane, Clavering, Essex
Existing Development	Open Land
Proposed Development	Outline application with all matters reserved except access for up to 28 dwellings (Class C3) including public open space, sustainable drainage systems, landscaping and associated infrastructure and development.
Site Settings and Previous Uses	The site area is recorded as open land and remains such to date. Surrounding the site to the north and south west various buildings are recorded in place from about 1979 which currently form light industrial units. To the east of the site area a public house is in place, from about 1979 with a car park in place to the east of the site. The remain areas all form open land.

Geological and Hydrological Profile

Geology		Aquifer Classification
Made Ground	Shallow Made Ground Anticipated	Not Classified
Lowestoft Formation	Chalky till, together with outwash sands and gravels, silts and clays	Secondary Undifferentiated Aquifer
Chalk	Chalk	Principal Aquifer

Nearest Surface Water Feature	The nearest surface water feature is recorded as 19 meters to the east of the site which is recorded as a pond. To the north west of the site a drain is recorded in place, 20 meters from the site.
Groundwater Abstractions	The nearest abstraction well is located 1196 meters to the northeast of the site which is recorded for General Farming and Domestic. This may therefore form a potable water supply.
Source Protection Zone	The site lies within a Zone 3 Source Protection Zone.

Potential Sources of Contamination

Features On Site

- None

Features Off Site

- None (maintain a watching brief)

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 the site, surrounding the site features are in place with the nature and distance from the site has concluded the risk assessment as a low risk to the site area. 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	The geology within the site should be assessed and should significantly amount of granular soil or groundwater be in place further assessments may be required. If clayey soils are in place this will greatly reduce the potential of risk to the ground water. A watching brief noted in section 17.5 should be kept.
Surface Water Risk	
Vapour Risk	No sources of vapours risks are recorded within the site area. The nature of the off site sources of risk and the distance from the site has reduced the risk, A watching brief noted in section 17.5 should be kept
Land Gas Risk	The distance from the site to any potential infilled ground will reduce the risk. 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 – DESK TOP STUDY - PHASE 1 REPORT

1 Context and Objectives of this report

1.1 Introduction

This Desk Top Study has been prepared by Herts and Essex Site Investigations (HESI) in support of a planning application by BAYA Group on behalf of E&A Securities for the proposed development, comprising an 'Outline application with all matters reserved except access for up to 28 dwellings (Class C3) including public open space, sustainable drainage systems, landscaping and associated infrastructure and development.' on land to the west of Clatterbury Lane, Clavering, Essex.

This report will 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

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 Broad Characteristics of the site

2.1 The Site

The site is located within a rural area of Clavering to the southwest of the Saffron Walden in Essex, 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:	Land to the west of Clatterbury Lane, Clavering, Essex
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Open grass land
Previous use of site, (if known)	As above
Grid Reference	NGR 517390, 198110
Site Area	1.26 Hectares
Local Authority	Uttlesford District Council
Gradient of the site	The site forms a level area of land
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 19 meters to the east of the site area, where the a pond is recorded in place.

2.2 Existing Site Use

The site forms a grass field.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- To the north of the site area residential dwellings are in place, as well as a small light industrial area on the opposite side of road.
- To the east of the site there is a parking area (associated with the Cricketers Pub which is in place further to the east.
- To the southeast of the site area there are some small light industrial units.
- To the south of the site area a grass paddock is in place.
- To the west of the site area there is agricultural land.

2.4 Site Reconnaissance

The site walk over visit was undertaken in September 2023 on which the weather conditions were recorded slightly overcast.

Access

The site area is accessed from the road to the north of the site, where a five-bar gate is present to the northwestern corner of the site, once within the site free access is in place, for pedestrians and 4 x 4 vehicles.

Site Area

The site area forms a grass field which was used a paddock, the grass has been left to grow with some area of nettles and brambles. To the northern boundary of the site there is some debris form this former use, pallets, storage shed, bath for water, buckets and bins. No features are in place that would promote a contamination risk.

Vegetation

Grasses and plants are in place across the site. The boundary of the site is formed by a well-established hedge with trees also in place.

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. A full assessment for asbestos within any made ground should be completed, if encountered, in order to fully consider risk from Asbestos.

Surrounding Area

Surrounding the site area agricultural land is in place to the west.

To the north of the site, to the west there are residential dwellings in place, to the east there is a small light industrial area. Within this area there are units in place with a concrete yard and parking area.

To the east of the site area there is a tarmac parking area in place for the Cricketers Public House.

To the south east of the site area there is a building in place with commercial trades in place.

To the south of the site area there is a paddock in place with a manege.

Site Levels and Ground Cover

The site forms a level area of land.

The site is laid to grasses and weeds.

Current site activities

The current site use forms a grass field.

Effluent, Site Drainage and Services

Limited service or drainage was seen in place, across the access point and along the northern boundary there is an over cable in place. 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

Feature	Location	Elevation	Risk Assessment Needed?	Location to Target
Grass Land	Sitewide	At GL.	X	
Parking area	Off site – E 2m	At GL.	✓	Possible migration onto the site
Light industrial units	Off site – NE 10m & SE 10m	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
1877	1:2,500	Open Land	Open land – N, E, S, W Pond – NE 15m, S 50m
1897	1:2,500		
1881	1:10,560		
1898	1:10,560		
1921	1:2,500		
1923	1:10,560		
1950	1:10,560		
1960	1:10,000		
1979	1:2,500		Pond - S 50m – REMOVED. Building – N, SE Public House - E
1982	1:10,000		
1993	1:2,500		
1999	Historic Aerial Photo 1:10,000		

Table 4 *Historic Map Assessment - Continued……*

Date	Scale	On Site Feature	Off Site Features
2006	1:10,000		
2023	1:10,000		

Table 5 Overview of Historic Map Assessment Risk

Identified Risk	Distance & Direction	Year	Is risk in place?	Considering All Pathways		Justification
				Assessment Required.	Method of Assessment	
Open Land	On and Off Site – S, W - N & E	Pre 1877 – Present Pre 1877 - 1979	X			No Source
Buildings	Off Site – N & SE	1979 – Present	X			Limited sources
Ponds	Off Site – NE 15m, S 50m	Pre 1877 – present Pre 1877 - 1979	X			No Source
Pond INFILLED	S 50m	1979 – Present	✓	Possible Land Gas Risk	Install Standpipes Vapour Assessments	The nature of the feature, distance to the site and time that has passed will reduce the risks
Public house	Off Site – E 15m	1979 – Present	X			Limited sources

5 Details of the Intended Future Use of the Site

Outline application with all matters reserved except access for up to 28 dwellings (Class C3) including public open space, sustainable drainage systems, landscaping and associated infrastructure and development.

6 References of Planning Applications

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

Historical applications are in place with Council for residential development although these have been refused.

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 am area of Lowestoft Formation. This is seen to overlie Lewes Nodular Chalk Formation and Seaford Chalk Formation which will be in place to depth.

The Lowestoft Formation is characterised by a Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content.

11.2 BGS Boreholes

No BGS Boreholes are reported surrounding the site.

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			
Chalk	Chalk	15m +	Principal Aquifer

11.3 Hydrology

The nearest surface water feature is recorded as 19 meters to the east of the site which is recorded as a pond. To the north west of the site a drain is recorded in place, 20 meters from the site.

The nearest discharge consent is recorded 57 meters to the north west of the site, for Sewage Discharges - Pumping Station - Final/Treated Effluent - Not Water Company.

The nearest pollution incidents to controlled waters is recorded as 117 meters to the southeast of the site which are recorded as Minor Incidents from Oils – Unknown in 1995.

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 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 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.

The nearest abstraction well is located 1196 meters to the northeast of the site which is recorded for General Farming and Domestic. This may therefore form a potable water supply.

The site lies within a Zone 3 Source Protection Zone.

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 low.

11.6 Flooding

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

11.7 Landfill Sites

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

11.8 Environmentally Sensitive Sites

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

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

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Secondary Aquifer Unproductive	Medium	Possible risk should gravel deposits be in place within the site, the Lowestoft formation in this area is normally clayey.
	Principal Aquifer	Medium	Should clayey soil be in place within the superficial deposits the risk to the lower groundwater is reduced.
Water Abstraction	General Farming and Domestic	Medium	The nearest abstraction well is located 1196 meters to the northeast of the site.
Source Protection Zone	Zone 3	Medium	Likely to be associated with the aquifer at depth within the chalk
Surface Water	Ditch	Low	The nearest surface water feature is recorded as 19 meters to the east of the site which is recorded as a pond. To the north west of the site a drain is recorded in place, 20 meters from the site.
Flooding	NONE		
Ecological	NONE		

12 Site Drainage and Other Potential Man-Made Pathways

Limited 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.

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 potential risk in place?*
Discharge Consents	None	Sewage Discharges - Final/Treated Effluent - Not Water Company	NW 57m	X
LAPPC	None	Respraying of road vehicles	W 166m	X
Pollution Incident to Controlled Waters	None	Minor Incident - Oil – Unknown in 1995	SE 117m	X
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions			X

Table 9 *Summary of Regulatory Data - Receptors*

Data Receptors	On Site	Off Site	Distance from site.	Is potential risk in place?
Nearest Surface Water Feature	None	Pond	E 19m	✓
Water Abstractions	None	General Farming and Domestic	NE 1196m	✓
OS Water Network Lines	None	Inland river	E 19m	X
Source Protection Zone	Zone 3		On Site	X

Table 10 *BGS Estimated Chemistry Data*

BGS Estimated Soil Chemistry Pollutant	BGS Estimated Soil Chemistry
Arsenic	15-25
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 11 Geological Hazards

Geological Hazard	Distance & Direction	Feature	Risk Assessment Required
Non-Coal Mining Areas of Great Britain	On Site		Rare
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		Negligible
Ground Dissolution Features	On Site		Negligible
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 potential risk in place?	Comment
Quendon Furniture	Furniture Manufacturers - Home & Office	SE 23m	X	Distance from the site will reduce the risk
Rouse Joinery Ltd	Joinery Manufacturers	NE 49m	X	Distance from the site will reduce the risk
Clavering Prestige	Car Dealers - Used	NE 49m	X	Distance from the site will reduce the risk
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	Source of Information	Location	Date	Considering Site Specific Pathways	
					Assessment Required.	Method of Assessment
	On Site Features					
	None					
	Off site Features	Envirocheck Data				
A	Parking Area	Walk Over Survey	Off site – E 2m		Possible GW Risk Possible Land Gas Possible Vapour Risk	Install Standpipes Land Gas Assessment GW & Vapour Assessments
	Light Industrial Units	Walk Over Survey	Off site – N 10m & SE 10m			
	Pond infilled	Historical Maps	Off site – S 50m	1979		

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 areas. In order to undertake this task, the ***Contaminated Land Reports, (CLR10)***, has been used which details some trades and potential sources of contamination. In addition to this, the Department of Environment Industry Profiles have been incorporated which detail trade, and also, specific site usage of the trade and contaminant sources.

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*
Parking area – E 2m Light Industrial Units N & SE 10m Infilled Pond – S 50 m Off Site	TPH's Naphthalene. VOC's	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact	Medium	Unlikely	Low	The nature of these features and distance from the site will reduce the likelihood of risks being in place within the site.
			Ingestion of home-grown produce	Medium	Unlikely	Low	
			Ingestion of contaminated water through water main pipework	Medium	Unlikely	Low	
			Inhalation of vapours	Medium	Unlikely	Low	
			Inhalation of land Gases	Medium	Low Likelihood	Moderate / Low	
			Inhalation of vapours through contaminated ground waters	Medium	Low Likelihood	Moderate / Low	
		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		Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Unlikely	Low	No Action
			Direct contact with contaminated groundwater	Medium	Unlikely	Low	No Action

Table 16 Overview of Risk Assessments - Proposed Site Use

Receptors	*Pathways*	*A* *Parking area – E 2m* *Light Industrial Units N & SE 10m* *Infilled Pond – S 50 m* *Off Site*
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	X
	Ingestion of home-grown vegetation	X
	Ingestion of contaminated water through water main pipework	X
	Inhalation of vapours from soils	X
	Inhalation of vapor from contaminated ground waters	X
	Inhalation of land gas vapours	X
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	X
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	X
Adjoining Land Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	No Liability from third parties
	Ingestion of home-grown vegetation	
	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	X
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	No Liability from third parties
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	
Buildings	Direct contact with contaminated soils.	X
	Direct contact with contaminated groundwater	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 Discussion on Sources of Contamination

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.

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 18000 m²), we would recommend that the site be subjected to a sampling density of 50 meter grid pattern to for an exploratory investigation. As such, we can confirm that a likely 6-7 samples will be required across the site to provide a 'good' spatial density.

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.
- 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 17 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 geology within the site should be assessed and should significantly amount of granular soil or groundwater be in place further assessments may be required. If clayey soils are in place this will greatly reduce the potential of risk to the ground water. A watching brief noted in section 17.5 should be kept.

17.3 Land Gas Assessment

The distance from the site to any potential infilled ground will reduce the risk. 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. The nature of the off site sources of risk and the distance from the site has reduced the risk, A watching brief noted in section 17.5 should be kept

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 18 Watching Brief – Targeted areas for observation

Area of site	*Works to be observed*	*Person to observe works*
Reduced digs for site clearance or site set up.	Watching brief through any excavation works	Site agent / Contractors
Drainage and or Foundation Excavations		

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 19 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 20 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 21 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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Land to the west of Clatterbury Lane, Clavering, Essex

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 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

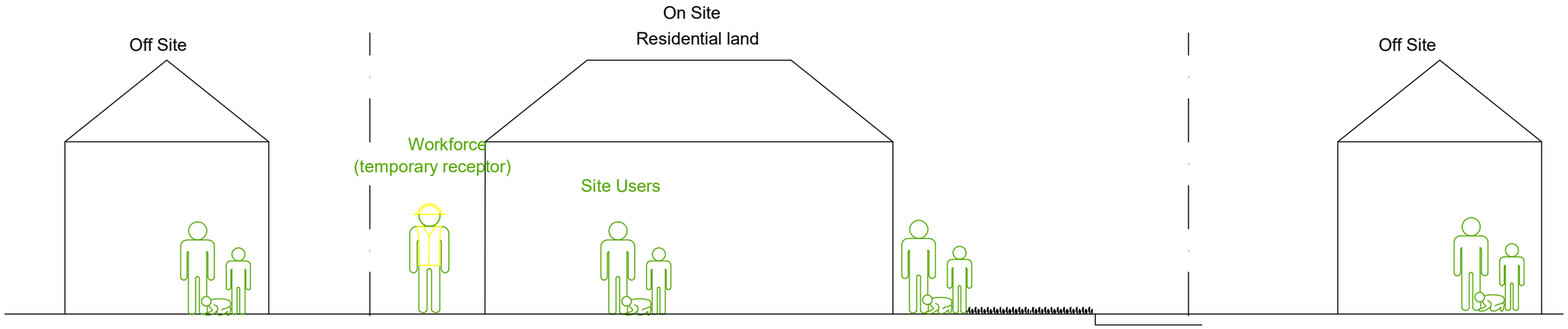
10. Leaching, lateral migration of shallow groundwater to a target receptor

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



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APPENDIX TWO

SITE PLANS

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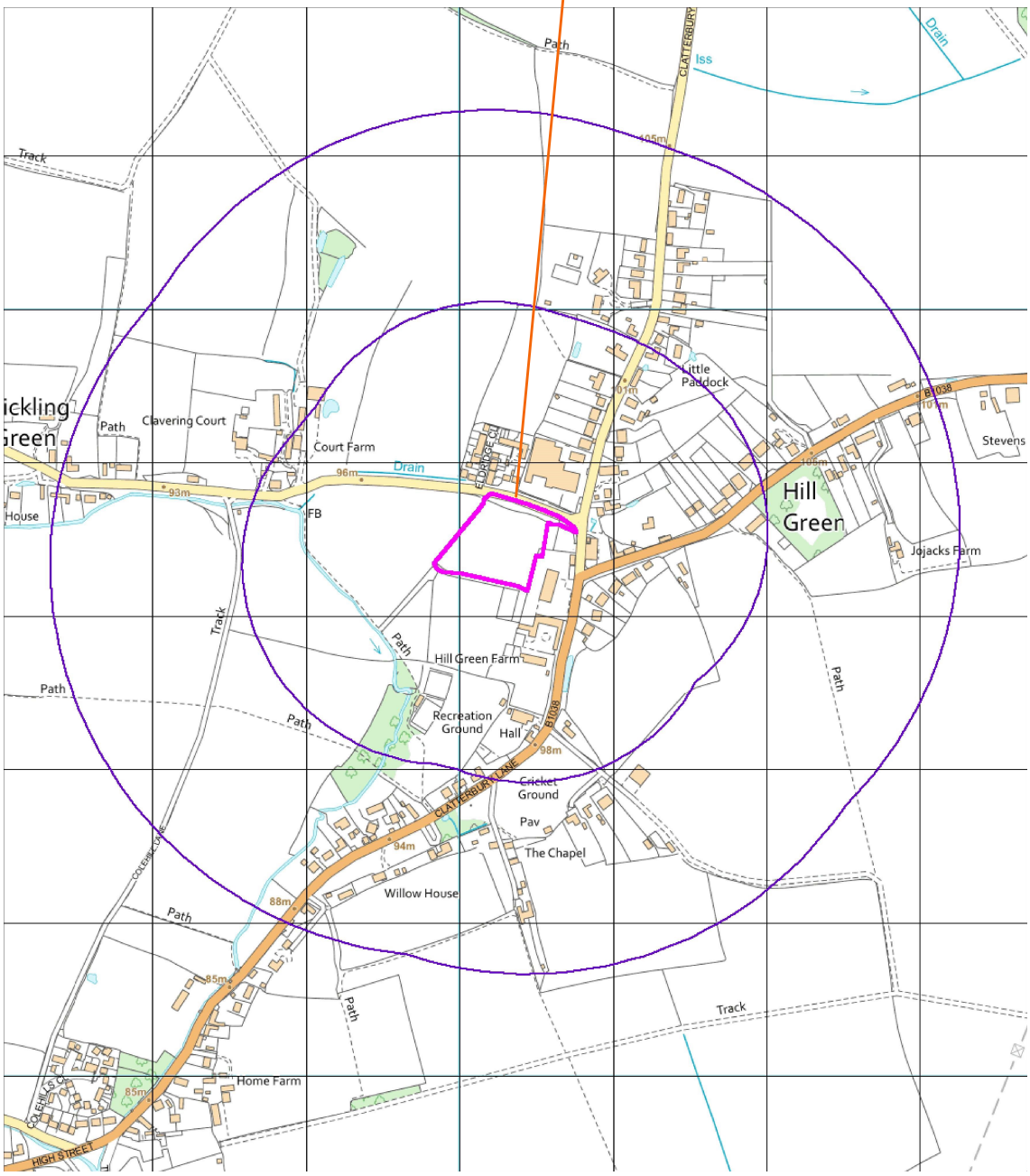
Location Plan

N

Site Plan



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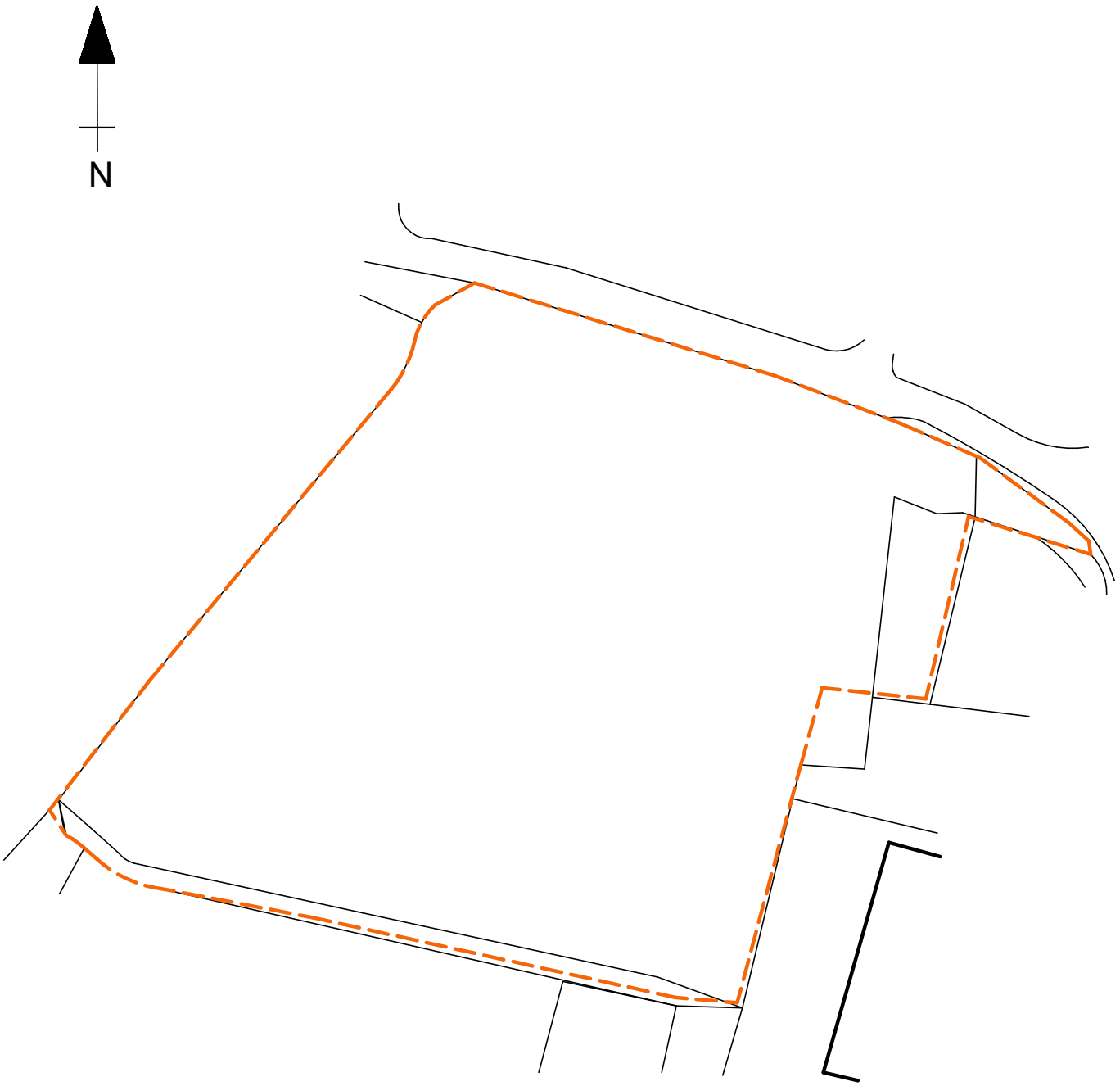
Existing Site Plan



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Land to the west of Clatterbury Lane, Clavering, Essex

Proposed Site Plan

Not to Scale
Sketch No. : DTS / 18595 / 02 / 03