

DESK TOP STUDY REPORT

Site Address:	The Bothy, Hexton Manor, Hexton, Herts SG5 3JH
Report Date:	December 2023
Project No.:	18672
Prepared for:	Architech Ltd
Planning Application	North Herts 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.

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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

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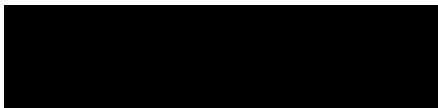
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C.S.Gray

- ONC - Civil Engineering.
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- CONSIM Groundwater Assessment Course.
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- First Aid Course in Construction – 3 Day Course – 3 years.
- CSCS Labourer Card.

Document Status and Approval Schedule

Issue No	Status	Date	Prepared by:	Technical review
			Rebecca Chamberlain Signature / Date	by: Chris Gray Signature / Date
1	Final	December 2023		

SUMMARY

Client	Architech Ltd		
Site Location	The Bothy, Hexton Manor, Hexton, Herts SG5 3JH - 18672		
Existing Development	Vacant Bothy / Outbuilding		
Proposed Development	Residential dwelling		
Site Settings and Previous Uses	The site area forms a very small area of the Hexton Manor Estate, which is recorded as a section of woodland extending to the east and south. From about 1924, the woodland was cleared and a building constructed to the centre of the site which remains in place to date. From 1924 to 1925 the building is labelled as an engine house, likely for the storage of vehicles for the Manor Estate. The building is better known as a Bothy and is currently a vacant outbuilding, with a parking area within the north of the site. Surrounding the site to the south the woodland remains in place, forming part of the Hexton Manor Estate, which is in place around the site in all directions.		
Geological and Hydrological Profile	Geology		Aquifer Classification
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	West Marly Formation	Melbury Chalk Chalk	Principal Aquifer
Nearest Surface Water Feature	The nearest surface water feature is recorded as 45 meters to the northwest of the site, which is recorded as a ditch. This leads to the east and into a Lake to the north east of the site about 100 meters from the site centre.		
Groundwater Abstractions	The nearest abstraction well is located 68 meters to the southeast of the site which is recorded as a General Agriculture: Spray Irrigation – Direct. No Potable Water Supplies are recorded surrounding the site.		
Source Protection Zone	The site does not lie within a Source Protection Zone.		
Potential Sources of Contamination	Features On Site - Parking area and Driveway - Building (Former Engine House) 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	We would suggest that there are potential sources of contamination relating to the historical land use of the site that, may be in place within the upper subsoil which will require assessment. Potential pathways in place within the site area recorded as : - - Dermal Contact. - Inhalation of dust and fibres. - Ingestion of home-grown produce. - Ingestion of dust and fibres - Ingestion of contaminated water through water main pipework. - Inhalation of vapours from soils. - Inhalation of vapours from Groundwater. - Inhalation Asbestos dust and fibres (from Asbestos within the building) - Inhalation Asbestos dust and fibres (from asbestos within the soil).
Ground Water Risk	Considering the underlying Principal Aquifer within the site area there is a potential for groundwater to be in place and to be impacted on by the site area, although risks of contamination within the site area recorded as low, the follow pathways may be in place: - Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well; Leaching, lateral migration of shallow surface water system adjacent to the site.
Surface Water Risk	Considering the ditch located to the north west and the lake to the north east of the site, direct links between the site conditions and the stream are in place and as such, the follow pathways may be in place: - Leaching, lateral migration of shallow surface water system adjacent to the site
Vapour Risk	Sources of contamination that may promote a vapour risk are recorded in place as such risk maybe in place. Potential pathways in place within the site area recorded as: - Inhalation of vapours from soils - Visual and chemical tests to be completed initially;
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 collected to date the risk of this is low.
Recommendations	- Intrusive shallow based excavation using window sampler to assess the geological conditions and recover samples. - Initially assess soils for presence / absence of fuels and if encountered: - - Install standpipe for the monitoring of both groundwater and vapour risks, if required. - Targeted and spatial sampling to assess on site source risk. - Consideration through the site assessment as to the presence of Asbestos product within the site and subsoil within the site. - Assess the risk to and from the groundwater - Leachate testing and groundwater sampling if required. - 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 when the findings of the investigation have been 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 Architech Ltd 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 convert the existing dwelling to form a residential dwelling 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 North Herts District Council as follows:-

Application No: 23/02724/FP

Proposal: Conversion of existing outbuilding to one 2-bed dwelling to include single storey side extension following demolition of existing extensions with parking and landscaping. Alterations to fenestration

Status: Registered

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 Hexton a small village to the west of Hitchin, 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:	The Bothy, Hexton Manor, Hexton, Herts SG5 3JH
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Outbuilding within a residential estate
Previous use of site, (if known)	As above
Grid Reference	NGR 510730, 230450
Site Area	0.1 Hectares
Local Authority	North Herts Council
Gradient of the site	The site and the surrounding area slopes down to the north.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 45 meters to the northwest of the site which is recorded as a swimming pool. Further to the north of the site about 100 meters there is a ditch in place which leads to the east where a lake is in place.

2.2 Existing Site Use

The site is currently a vacant building within the grounds of a manor house formally identified as a 'Bothy' - A bothy is a basic shelter, usually left unlocked and available for anyone to use free of charge.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

The site is located to within the Hexton Manor Estate.

- To the north of the site area open grass land is in place, part of the Hexton Manor Estate.
- To the east of the site a driveway and landscaping.
- To the south of the site area woodland is in place.
- To the west of the site area a walled garden area is in place laid to grass with a gravel area (used to host weddings and events with a marquee).

2.4 Site Reconnaissance

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

Access

Hexton Manor is accessed from Mill Lane to the west of the site where a gated access leads to the east and splits to the north and south. The Bothy area is accessed from the tarmac estate driveway which runs along the northern boundary of the site, with an entrance and exit points to the northeast and northwest of the site.

Once within the site, there is a gravel parking area to the north, and free pedestrian access to the rest of the site area.

Site Area

Within the north of the site area there is a gravel area in place with some plant beds to the boundary of the site area, a well established well maintained hedge is in place to the northern boundary of the site and extending along some of the eastern and western boundary.

The southern boundary of the site is not defined by a section of a grassed and treed area.

To the centre of the site area there is a single-story brick building with a tile roof. The building was not in use at the time of the walk over and was occasionally used as meeting house for the estate.

To the east and west of the building concrete areas are in place leading up the building

Vegetation

Limited vegetation is in place within the site area, within the north there is a small section of grass land in place. Within the east and west there are plant beds in place with limited vegetation at the time of the walk over.

Surrounding the site there are mature trees in place, mainly to the north.

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 a large manor house and grounds are in place, with driveways, gardens and out buildings, the main house to north east of the site area.

Site Levels and Ground Cover

The site and the surrounding area generally slope down to the north.

The north of the site is laid to gravel, with concrete areas to the east and west of the building. A small area of grass land is in place to the south of the site.

Current site activities

The current site use forms a vacant building.

Effluent, Site Drainage and Services

Drainage and services are in place for the new dwelling, with overhead cables in place through the site, from east to west with a wooden pylon to the centre of the site. 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



Table 2 **Walk Over Inspection Risk**

Feature	Location	Elevation	Is A Risk Assessment Required?
Parking area and Driveway	Sitewide	At GL.	✓
Hexton Manor Estate	Off site	At GL	X

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
1882	1:2,500	Treed area	Hexton House – NE Estate Grounds – N, E, S, W
1884	1:10,560		
1887	1:10,560		
1898	1:2,500		
1899	1:10,560		
1901	1:2,500 1:10,560		
1924	1:2,500	Building – Within this map reference there an Engine House recorded which may relate the site although this is not shown on any further maps.	
1825	1:10,560		
1948	1:10,560		
1960	1:10,560		
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 1:10,000		
2006	1:10,000		
2023	1:10,000		

Table 5 *Overview of Historic Map Assessment Risk*

Identified Risk	Distance & Direction	Year	Is A Risk Assessment Required?	Justification
Woodland	On Site Off Site – E, S	Pre 1882 – 1924 Pre 1882 - Present	X	No Source
Building (Engine House)	On Site	1924 – Present	✓	In 1924 the building is possibly ladled as an Engine house, although after this date no use is given. The storage of vehicles at the site may promote some risk to be in place, although the time that has passed will reduce likelihood of these risk being in place.
Hexton House	Off Site – NE	Pre 1882 – Present	X	No Source
Manor Estate Grounds	Off Site – N, E, S, W	Pre 1882 – Present	X	Limited sources are in place around the site area.

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

Is it proposed to convert the existing dwelling and add an extension to the east of the building. Within the east of the site area a resin driveway is proposed, with the area to the northwest of the site the area will be laid to lawn and from a private garden area.

6 *References of Planning Applications*

From a review of the North Herts District Council web site the following applications is recorded for the site area.

Application No: 23/02724/FP

Proposal: Conversion of existing outbuilding to one 2-bed dwelling to include single storey side extension following demolition of existing extensions with parking and landscaping. Alterations to fenestration

Status: Registered

A historical application is in place with Council as follows: -

Application No: 82/00495/1

Proposal: Change of use from agricultural to wine storage and distribution unit

Decision: Refused

No other information has been gained from the online planning files.

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 an area of West Melbury Marly Chalk Formation. No superficial deposits are recorded within the site.

11.2 BGS Boreholes

No BGS Boreholes are reported surrounding the site.

Table 6 **Geological Information**

<i>Geological Unit</i>	<i>Brief Description</i>	<i>Anticipated thickness, (m)</i>	<i>Aquifer Type</i>
Superficial Deposits/Drift On Site			
Filled/Re-worked ground	Made Ground, (Potentially Contaminated Stratum).	0.5-1.00 meters+	Not Classified
Solid Geology Deposits			
West Melbury Marly Chalk Formation	Chalk	15m +	Principal Aquifer

11.3 Hydrology

The nearest surface water feature is recorded as 45 meters to the northwest of the site, which is recorded as a ditch, which leads to the east and into a Lake to the northeast of the site about 100 meters from the site.

The nearest discharge consent is recorded 302 meters to the north of the site, for Trade Discharge - Agricultural and Surface.

No pollution incident to controlled waters are recorded surrounding the site area.

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 Principal Aquifer.

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

The nearest abstraction well is located 68 meters to the southeast of the site which is recorded as a General Agriculture: Spray Irrigation – Direct. No Potable Water Supplies are recorded surrounding the site.

The site does not lie within a Source Protection Zone.

11.5 Implication of groundwater

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

In accordance with Environment Agency guidance document: -

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

The document confirms: -

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

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.

The nearest feature is recorded as a Local Authority Recorded Landfill Site 387 meters to the south of the site.

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	Principal Aquifer	High	Possible risk to underlying aquifer within the chalk although this is likely to be at depth.
Water Abstraction	General Agriculture: Spray Irrigation - Direct	Medium	The nearest abstraction well is located 68 meters to the southeast of the site
Source Protection Zone	NONE		
Surface Water	Ditch	Medium	The nearest surface water feature is recorded as 45 meters to the northwest of the site which is recorded as a ditch, which leads to the east and into a Lake to the north east of the site about 100 meters from the site.
Flooding	NONE		
Ecological	NONE		

12 **Site Drainage and Other Potential Man-Made Pathways**

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

13 **Regulatory Data**

Information relating to the potential hazards associated with environmental regulatory controls are summarised in Table 8 and 9. 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 Summary of Regulatory Data - Sources

<i>Data Sources</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site.</i>	<i>Is A Risk Assessment Required?</i>
Discharge Consents	None	Trade Discharge - Agricultural and Surface	N 302m	X
Local Authority Recorded Landfill Sites	None	Unknown	S 387m	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

<i>Data Receptors</i>	<i>On Site</i>	<i>Off Site</i>	<i>Distance from site.</i>	<i>Is this a potential receptor for risk ?</i>
Nearest Surface Water Feature	None	Ditch	NW 45m	✓
Water Abstractions	None	General Agriculture: Spray Irrigation - Direct	SE 68m	✓
OS Water Network Lines	None	Inland river	N 97m	X
Source Protection Zone	None			X

Table 10 *BGS Estimated Chemistry Data*

<i>BGS Estimated Soil Chemistry Pollutant</i>	<i>BGS Estimated Soil Chemistry</i>
Arsenic	<15
Cadmium	<1.8
Chromium	20-40
Lead	100-200
Nickel	15-30

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

Table 11 *Geological Hazards*

<i>Geological Hazard</i>	<i>Distance & Direction</i>	<i>Feature</i>	<i>Risk Assessment Required</i>
Non-Coal Mining Areas of Great Britain	On Site		Rare
Collapsible Ground	On Site		Very Low
Compressible Ground	On Site		Negligible
Ground Dissolution Features	On Site		Negligible
Landslide	On Site		Negligible
Running Sand	On Site		Negligible
Shrinking or Swelling Clay	On Site		Moderate

Table 12 **Summary of Contemporary Trade Entries**

<i>Trade Name</i>	<i>Trade Use</i>	<i>Distance & Direction from Site</i>	<i>Is A Risk Assessment Required?</i>	<i>Comment</i>
Aromatic U K Ltd	Food Colouring, Flavouring & Additive Manufacturers & Distributors	NE 76m	X	Inactive
United Oddsocks	Clothing Accessory Manufacturers	S 83m	X	Located within the stables of the Manor House.
<i>Further trades extend away from the site, (See Envirocheck Data)</i>				

*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 13: -

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						
A	Parking area and Driveway	Walk Over Survey	On Site		Possible Soil Risk	Recover Soil Samples
	Building (Engine House)	Historical Maps	On Site	1924 – Present 1924 - 1925	Possible GW Risk Possible Vapour Risk	Install Standpipes 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 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 and Driveway Building (Engine House)	TPH's	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact	Medium	Likely	Moderate	Possible risk in place	
			Ingestion of home-grown produce	Medium	Likely	Moderate	Possible risk in place	
			Ingestion of contaminated water through water main pipework	Medium	Likely	Moderate	Possible risk in place	
			Inhalation of vapours	Medium	Likely	Moderate	Possible risk in place	
			Inhalation of land Gases	Medium	Unlikely	Low	No source of Land Gases	
			Inhalation of vapours through contaminated ground waters	Medium	Likely	Moderate	Possible 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	Likely	Moderate	Possible risk in place	
		Ground Water. Abstraction Well.	Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place	
		Flora	Plant Uptake Direct Contact	Medium	Likely	Moderate	Possible risk in place	
	Asbestos	Site Users Construction Workers.	Inhalation dust and fibers (from Asbestos within the building)	Severe	Likely	High	Possible risk in place	
			Inhalation dust and fibers (from asbestos within the soil)	Severe	Likely	High	Possible risk in place	
		Metals Metalloids PAH's	Site Users Construction Workers.	Direct contact. Inhalation dust and fibers. Dermal contact;	Medium	Likely	Moderate	Possible risk in place
				Ingestion of home-grown produce	Medium	Likely	Moderate	Possible risk in place
	Controlled Surface Water;		Leaching, lateral migration of shallow groundwater to a target receptor.	Medium	Likely	Moderate	Possible risk in place	
	Ground Water. Abstraction Well.		Leaching, migration through fissures / cracks which may migrate to a groundwater receptor.	Medium	Likely	Moderate	Possible risk in place	
	TPH's	Buildings. Construction Materials. Services	Direct contact with contaminated soils;	Medium	Likely	Moderate	Possible risk in place	
			Direct contact with contaminated groundwater	Medium	Likely	Moderate	Possible risk in place	

Table 16 Overview of Risk Assessments - Proposed Site Use

Receptors	Pathways	A	
		Parking area and Driveway	Building (Engine House)
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	✓
	Ingestion of home-grown vegetation	✓	✓
	Ingestion of contaminated water through water main pipework	✓	✓
	Inhalation of vapours from soils	✓	✓
	Inhalation of vapor from contaminated ground waters	✓	✓
	Inhalation of land gas vapours	X	X
	Inhalation Asbestos dust and fibers (from Asbestos within the building)	✓	✓
	Inhalation Asbestos dust and fibers (from asbestos within the soil)	✓	✓
Adjoining Land Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact	✓	✓
	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	✓	✓
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.	✓	✓
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ	✓	✓
Buildings	Direct contact with contaminated soils.	✓	✓
	Direct contact with contaminated groundwater	✓	✓

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

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

16 Discussion on Sources of Contamination

The assessments of the site have drawn conclusions of historical and ongoing land uses which may impact on the proposed development which will be further considered through location, (either on or off site) and nature of risk. These are discussed below: -

Table 17 Pollutant Risk

Risk Assessment	Land Use	Pollutant
Risk Assessment A	Parking area and Driveway	Soil, Groundwater & Vapour Risk 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, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band).
	Building (Engine House)	Soil Sampling Groundwater & Vapour 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. BS3882:2015
Spatial Sampling, (General Assessment)		25-meter Centres In accordance with BS10175: 2011+A2:2017.
		Asbestos 5-10-meter Centres In accordance with BS10175: 2011+A2:2017.

17 Next Steps

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

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

- National Planning Policy Framework.
- British Standards 10175:2011+A2:2017
- Land contamination risk management (LCRM)
- 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, (2010) GPLC1 Guidance Principles for Land Contamination.

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

- Determine the ground and groundwater conditions.
- Determine if there are any obstructions such as old service and foundations, buried tanks, etc.
- Install groundwater monitoring well installations and monitor the levels of groundwater, gas and vapours, if required.
- Obtain samples of the made ground, natural soils and groundwater for contamination testing at targeted site-specific designed locations. Test soil and groundwater samples for a range of contaminants, as identified in Table 17.
- Obtain samples of soil to test for vapours contaminants, as identified in Table 17.
- Visually appraise soils to consider olfactorily or visual presence of contamination factors, risk, vapours or fragments.
- All laboratory testing should be completed to MCERT/UKAS accredited standard.
- All detection limits provided by chemical laboratories must fall below the set screening values.

17.1 Soil Assessment

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

Based on the site area and size of the site, (approximately 1000 m²), we would recommend that the site should be subjected to a sampling density of between 15-20 meter grid pattern or moderate risk pollutants which is broadly in line with that proposed by 10175:2011+A2:2017 and offers a greater density sampling pattern of 10-15 meter grid pattern for high risk pollutant such as Asbestos. As such, we can confirm that a likely 3-4 samples will be required across the site to provide a 'good' spatial density and an additional 6-7 sample locations being tested for Asbestos.

Table 18 **Soils Assessment - Targeted Sampling**

Feature	Contaminant	Method of Investigation
Parking area and Driveway	Metals, Semi Metals, PAHs, TPHs	Window Sampler Boreholes
Building (Engine House)	Metals, Semi Metals, PAHs, TPHs	Hand Auger Boreholes Trial Pits

Table 19 **Soils Assessment – Spatial Sampling**

Feature	Contaminant	Method of Investigation
Made Ground	Metals, Semi Metals, PAHs, TPHs, Asbestos VOCs PCBs	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 – Sutable 4 Use Levels in the absence of Atkins adopted values.

17.2 Groundwater Assessment

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

The Geology within the site should be confirmed.

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

Standpipes should be installed across the site, in order to orientate the groundwater table to identify groundwater flow direction if significant risks are encountered. Ideally three standpipes should be installed for groundwater assessment such that orientation of the groundwater table can be undertaken.

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

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

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

Table 20 **Vapour Risk Assessment - Response Zone**

<i>Feature</i>	<i>Targeted Response Zone</i>	<i>Location to Target</i>	<i>Vapour risk</i>
Parking area and Driveway	Made Ground / Chalk	Site wide	TPH's
Building (Engine House)	Made Ground / Chalk	Site wide	TPH's

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

17.5 Working Brief

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

Table 21 **Overview of Works**

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

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

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

APPENDIX ONE

CONCEPTUAL MODEL

Site Conceptual Model - Proposed Site Plan



APPENDIX TWO

SITE PLANS

The Bothy, Hexton Manor, Hexton, Herts SG5 3JH

Location Plan

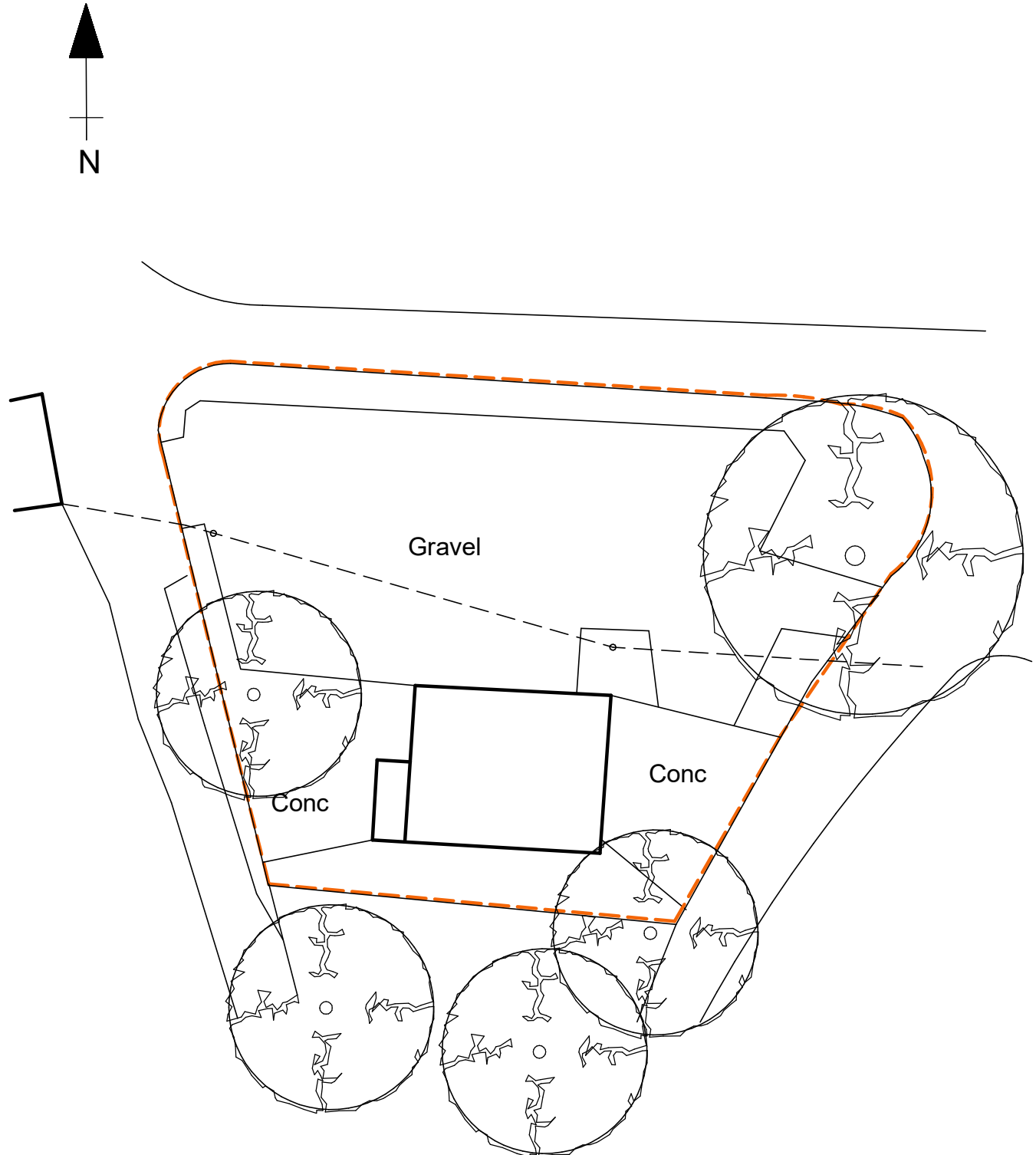


Site Plan



The Bothy, Hexton Manor, Hexton, Herts SG5 3JH

Existing Site Plan



The Bothy, Hexton Manor, Hexton, Herts SG5 3JH

Proposed Site Plan

