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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

DESK TOP STUDY REPORT

Site Address:	Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL
Report Date:	November 2023
Project No.:	18625
Prepared for:	Monks Green Farm Ltd
Planning Application	East Herts Council

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LIST OF ABBREVIATIONS

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

DESK STUDY GENERAL NOTES

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

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

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

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

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

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

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

DOCUMENT INFORMATION AND CONTROL SHEET

Client

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- 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	November 2023		

SUMMARY

Client	Monks Green Farm Ltd
Site Location	Monks Green Farm Mangrove Lane Brickendon Hertford Herts SG13 8QL
Existing Development	Storage barn
Proposed Development	Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens
Site Settings and Previous Uses	The site area is recorded as open land until about 1993 when a poultry barn is recorded within the site area, this remains in place to date, although is currently in use as storage barn. To the east and south of the site area there is grass land in place which is mounded slightly within the southeast. Surrounding the site to the east and south there is woodland in place, which remains in place to date. To the north and west of the site area the open land was developed to form poultry houses to the east, from 1974, and a residential dwelling to the north from 1978.

Geological and Hydrological Profile

Geology		Aquifer Classification
Made Ground	Shallow Made Ground Anticipated	Not Classified
Sand & Gravel	Sand & Gravel	Secondary A Aquifer
London Clay	Clay	Unproductive Stratum

Nearest Surface Water Feature	The nearest surface water feature is recoded as a pond 60 meters to the north west of the site area.
Groundwater Abstractions	The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)
Source Protection Zone	The site lies within a Zone 3 Source Protection zone.
Potential Sources of Contamination	***Features On Site*** • Storage Barn • Yard / parking area • Mounded soil • Poultry Houses ***Features Off Site*** • Light industrial / storage units
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 Secondary 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 nature of the feature surrounding the site area risk to the feature is reduced. A watching brief should be maintained throughout the development, should any significant pollution or suspect materials be encountered reassessment to the risk should be undertaken.
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	A mounded land is recorded in place in the form of a historic pond located on site. As such, this will have been infilled with potentially waste product and degradable materials and as such, the potential for contamination and land gas risk is in place. Based on this, we would confirm that a minimum of six monitoring rounds should be completed over falling or low atmospheric pressures or frozen ground conditions. Appropriate reporting should be completed post site monitoring.
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 land gas / vapour risks. • 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 Monks Green Farm 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 building to form residential units with gardens, as such the derivation of risk has been assigned as a 'Residential Land Use with Home-grown Produce'.

1.2 Reference to the Current Planning Application Details

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

Application No: 3/20/1648/FUL

Proposal: Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens

Decision Grant Planning Permission subject to Conditions

1.3 Decision Notice Relating to Contaminated Land

Condition 3

The scheme shall include all of the following measures unless the Local Planning Authority dispenses with any such requirement specifically and in writing 1. A Phase I site investigation report carried out by a competent person to include a desk study, site walkover, the production of a site conceptual model and a human health and environmental risk assessment, undertaken in accordance with BS 10175: 2011 Investigation of Potentially Contaminated Sites - Code of Practice.

2. A Phase II intrusive investigation report detailing all investigative works and sampling on site, together with the results of the analysis, undertaken in accordance with BS 10175:2011 Investigation of Potentially Contaminated Sites - Code of Practice. The report shall include a detailed quantitative human health and environmental risk assessment.

3. A remediation scheme detailing how the remediation will be undertaken, what methods will be used and what is to be achieved. A clear end point of the remediation shall be stated, and how this will be validated. Any ongoing monitoring shall also be determined.

4. If during the works contamination is encountered which has not previously been identified, then the additional contamination shall be fully assessed in an appropriate remediation scheme which shall be submitted to and approved in writing by the local planning authority.

5. A validation report detailing the proposed remediation works and quality assurance certificates to show that the works have been carried out in full accordance with the approved methodology shall be submitted prior to [first occupation of the development/the development being brought into use]. Details of any post-remedial sampling and analysis to demonstrate that the site has achieved the required clean-up criteria shall be included, together with the necessary documentation detailing what waste materials have been removed from the site.

Reason

To minimise and prevent pollution of the land and the water environment and in accordance with national planning policy guidance set out in section 11 of the National Planning Policy Framework, and in order to protect human health and the environment in accordance with Policy EQ1 of the adopted East Herts District Plan 2018

1.4 Report Objectives

The objectives of the project were as follows: -

- A review of the geological, hydrological and hydrogeological setting of the site, and public domain environmental information to build up an understanding of the site and its environmental setting/sensitivity.
- Review of historical land uses for the site and surroundings with a particular emphasis on identifying potential ground hazards and on-site and off-site contamination sources.
- A visual walkover inspection of the site to review current and recent site activities, the condition of the site, potential ground related hazards and activities or areas that might have the potential to cause ground contamination as well as possible indicators of contamination; and
- Preparation of a Conceptual Site Model (CSM) with a view to identifying potentially significant source-pathway-receptor linkages followed by a qualitative risk assessment.

1.5 Timescales of the Assessment

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

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

1.6 Level of Technical Confidence Expected

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

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

1.7 Management Constraints

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

2 Characteristics of the site

2.1 The Site

The site is located within a rural area of Hertford in Hertfordshire, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1.

Table 1 Site Detail

Site Address:	Monks Green Farm Mangrove Lane Brickendon Hertford Herts SG13 8QL
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Storage Barn
Previous use of site, (if known)	Former agricultural barn – poultry
Grid Reference	NGR 533490, 208460
Site Area	0.34 Hectares
Local Authority	East Herst District Council
Gradient of the site	The site forms a level area of land with a slightly mounded area within the south east of the site area.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 60 meters to the northwest of the site area where there is a pond within the garden of a residential dwelling.

2.2 Existing Site Use

The site area forms a large storage barn with a driveway and area of grass land.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- To the north of the site area, residential dwellings are in place.
- To the east of the site area, woodland is in place.
- To the south of the site area, woodland is in place.
- To the west of the site area, Monks Green Farm is in place with storage units in place.

2.4 Site Reconnaissance

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

Access

The site area is access via the narrow land in place to the north east of the site area. A driveway leads through the site area. The building can be accessed from the southern and northern side of the building giving both pedestrian and vehicle access.

Site Area

Within the west of the site area there is a large barn in place, formed by a metal clad structure with corrugate metal roof. The floor within the barn was a concrete slab in a good state of repair. At the time of the walk over the building was sectioned into three sections, within the south and north there is storage in place. in the central section there is a gym area in place. Within the north east of the barn there is a small plant room in place.

Within the north and along the east of the barn there is a concrete driveway and parking area in place laid in section with some cracking in place.

Within the east of the site area there is a grassed area in place which has been well kept, to the south of the site there is a grassed mound in place which from discussion with the site owner this was sourced from the soils scraped away to create the barn within the site and has been laid to grass, which is growing well.

Vegetation

Within the east of the site are there is grass in place which is in a good state of growth. Off site to the east and south there is a wood land 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 will be required in order to fully consider risk from Asbestos.

Surrounding Area

To the north of the site area there are residential dwelling in place form the farm house and cottages with garden area.

To the west of the site area there are additional barns and buildings in place formally the farm area, but currently in use as light industrial units and storage with yard areas. To the south of the site area there is a fenced in area where large gas tanks area recorded in place.

To the south of the west of the site area well established woodland is recorded in place.

Site Levels and Ground Cover

The site area forms a level area of land. Along the eastern and southern boundary there is a slight slope down to the woodland.

External to the building to the north and east there is a concrete area in place. along the west and south of the site area there is grass land in place.

Current site activities

The current site use forms a storage barn.

Effluent, Site Drainage and Services

Drainage and services are in place for the new dwelling, although no service search is known to us, therefore the location condition nor status of these services is known. A large gas main is recorded through the south of the site area.

2.5 Site Reconnaissance – Photos

Print 1

Print 2

Print 3

Print 4

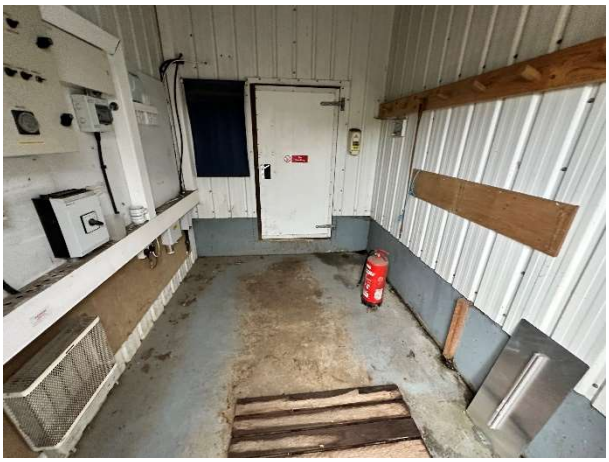

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Table 2 *Walk Over Inspection Risk*

Feature	*Location*	*Elevation*	*Is A Risk Assessment Required?*
Storage Barn	On site	At GL.	✓
Yard / parking area	On site	At GL.	✓
Mounded soil	On site – SE	At GL.	✓
Light industrial / storage units	Off site – W	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
1880	1:2,500	Open land	Monks Green – NW 50m Wood land – S
1883	1:10,560		
1898	1:2,500		
1899	1:10,560		
1924	1:2,500		
1925	1:10,560		
1960	1:10,560		
1974	1:2,500		Poultry Houses – E 5m
1978	1:10,000		Dwelling - N
1993	1:2,500		
1999	1:10,000		
2006	1:10,000	Poultry House	
2023	1:10,000		

Table 4 Overview of Historic Map Assessment Risk

Identified Risk	Distance & Direction	Year	*Is A Risk Assessment Required?*	Justification
Open Land	On Site Off Site – N & W	Pre 1880 – 2006 Pre 1880 -	X	No Source
Woodland	Off site – E & S	Pre 1880 – Present	X	No Source
Monks Green – NW 50m	Off site – NW 50m	Pre1880 – Present	X	Distance from the site will reduce the risk
Poultry Houses	Off site – W	1974 – Recently	✓	
Poultry House	On Site	2006 – Recently	✓	
Dwelling	Off site N 10m	1978 – Present	X	No Source

5 Details of the Intended Future Use of the Site

Conversion of an agricultural building to two separate residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens.

6 References of Planning Applications

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

Application No: 3/20/1648/FUL

Proposal: Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens

Decision Grant Planning Permission subject to Conditions

Historical applications are in place with Council as follows: -

Application No: 3/14/1984/FP
Proposal: Change of use for an existing barn to B1 light industrial/B8 storage use
Decision: Withdrawn

Application Number: 3/98/0762/FP
Proposal: CHICKEN SHED (BREEDING UNIT)
Decision: Grant Plan Permission w Conds 3 Jul 1998

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 on the eastern boundary of an area of Sand and gravel, with Lowestoft Formation recorded just to the east of the site. The bedrock geology is recorded as London Clay.

11.2 BGS Boreholes

To the west of the site are there is a BGS Borehole recorded in place, which shows the following :-

RUBBLE fill	0.4	GL
STIFF ORANGE BROWN CLAY WITH GRAVEL FRAGMENTS	0.7	0.4
MID DENSE ORANGE SAND + GRAVEL	2.0	1.1
STIFF ORANGE BROWN MOTTLED CLAY	3.3	3.1
STIFF GREY CLAY	32.6	6.4
V STIFF BROWN SILTY CLAY	6.3	39.0
HARD GREY CLAY	6.2	45.3
HARD GREY CLAY WITH OCCASIONAL PEBBLES	1.5	51.5
STIFF GREY CLAY WITH SHELLS	1.0	53.0
HARD GREY SANDY CLAY	4.7	54.0
BLACK SANDY CLAY	1.0	58.7
DENSE GREEN SAND	1.6	59.7
HARD GREY CLAY	0.6	61.3
HARD GREY GREEN SAND WITH FLINTS	1.8	61.9
CHALK WITH FLINTS	36.3	63.7
		100m

Table 5 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
Sand & Gravel	Sand & Gravel	2-4 meters	Secondary A Aquifer
Off site – E Lowestoft Formation	*Chalky till, together with outwash sands and gravels, silts and clays*	*2-4 meters*	*Secondary Aquifer Undifferentiated*
Solid Geology Deposits			
London Clay	Clay	15m +	Unproductive Stratum

11.3 Hydrology

The nearest surface water feature is recorded as 60 meters to the northwest of the site which is recorded as a pond within the garden of a residential dwelling.

The nearest discharge consent is recorded 8 meters to the south-east of the site, for Sewage Discharges - Pumping Station - Water Company.

No pollution incident to controlled waters are recorded within 800 meters of 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 Secondary A Aquifer, to the east of the site area the Lowestoft Formation is recorded as a secondary aquifer undifferentiated. The underlying geology is recorded as an Unproductive Stratum which is formed by London Clay.

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

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

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

The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)

The site is recorded within a Zone 3 Source Protection Zone.

11.5 Implication of groundwater

Considering the underlying Secondary A 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 possible.

11.6 Flooding

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

11.7 Landfill Sites

No landfill sites or potentially infilled land is recorded in place within nor surrounding the site area.

11.8 Environmentally Sensitive Sites

Surrounding the site area to the east and south there is an Ancient Woodland recorded in place.

Further to the north of the site area a Sites of Special Scientific Interest and Special Areas of Conservation is recorded 98 meters from the site area, noted as Wormley-Hoddesdon Park Woods North.

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

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Secondary A Aquifer	Moderate	Possible risk to underlying Gravel Deposits
	Unproductive Stratum	Low	Limited risk of migration to a lower groundwater system
Water Abstraction	Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden	Medium	The nearest abstraction well is located 1210 meters to the southeast of the site.
Source Protection Zone	Zone 3	Medium	
Surface Water	Pond	Low	The nearest surface water feature is recorded as 60 meters to the northwest of the site.
Flooding	NONE		
Ecological	Special Scientific Interest, (SSSI), Special Areas of Conservation	High	Wormley-Hoddesdonpark Woods – 89 meters to the north of the site
	Ancient Woodland	High	To the east and south of the site area

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 7 and 8. This information is recorded in full within the Envirocheck data provided within Appendix 5. The salient points recorded within this data are re-created below.

Table 7 ***Summery of Regulatory Data - Sources***

Data Sources	*On Site*	*Off Site*	*Distance from site.*	*Is A Risk Assessment Required?*
Discharge Consents	None	Sewage Discharges - Final/Treated Effluent - Not Water Company	SE 8m	X
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions			X

Table 8 ***Summary of Regulatory Data - Receptors***

Data Receptors	*On Site*	*Off Site*	*Distance from site.*	*Is this a potential receptor for risk ?*
Nearest Surface Water Feature	None	Pond	NW 60m	✓
Water Abstractions	None	Holiday Sites; Camp Sites And Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)	SE 1210m	✓
OS Water Network Lines	None	Inland river	SE 166m	X
Source Protection Zone	Zone 3		On Site	✓

Table 9 BGS Estimated Chemistry Data

BGS Estimated Soil Chemistry Pollutant	BGS Estimated Soil Chemistry
Arsenic	<15
Cadmium	<1.8
Chromium	60-90
Lead	<100
Nickel	15-30

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

Table 10 Geological Hazards

Geological Hazard	Distance & Direction	Feature	Risk Assessment Required
Non-Coal Mining Areas of Great Britain	On Site		Negligible
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		Moderate

Table 11 Summary of Contemporary Trade Entries

Trade Name	Trade Use	Distance & Direction from Site	Is A Risk Assessment Required?	Comment
Any Old Iron	Metal Finishing Services	N 75m	X	Inactive
Linco Electrical Engineering	Electrical Engineers	NW 94m	X	Inactive
Advanced Facilities Management	Commercial Cleaning Services	NW 94m	X	Inactive
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 12: -

Table 12 Table of Source Risk

Risk Assessment	Source Risk	Source of Information	Location	Date	Considering Site Specific Pathways	
					Assessment Required.	Method of Assessment
A	Storage Barn	Walk Over Survey	On Site		Possible Soil Risk Possible GW Risk Possible Land Gas Possible Vapour Risk	Recover Soil Samples Install Standpipes Land Gas Assessment GW & Vapour Assessments
	Yard / parking area	Walk Over Survey Envirocheck Data	On Site			
	Mounded soil	Walk Over Survey	On Site - SE			
	Light industrial / storage units	Walk Over Survey	Off site - E			
	Poultry Houses	Historical Maps	Off site On Site	1974 – recently 1993 - recently		

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 13 CIRIA Contaminated Land Risk Assessment Table

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

Extracted from CIRIA Publication C552 Contaminated Land Risk Assessment

Table 14 *Risk Assessment A*

Source (Potential Contaminating Use)	*Potential Contaminants*	*Receptors*	*Pathways*	*Associated Hazard, [Severity]*	*Proposed Site Use Risk Assessment*		
					Likelihood of occurrence	*Potential Risk*	*Notes*
Storage Barn ***Yard / parking area*** ***Mounded soil*** ***Light industrial / storage units*** ***Poultry Houses***	TPH's CO_2 CH_4	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	Likely	Moderate	Possible risk in place
			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	Low Likelihood	Moderate / Low	Distance and the nature of the feature reduces the risk
		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	Low Likelihood	Moderate / Low	Distance and the nature of the feature reduces the risk
		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 15 Overview of Risk Assessments - Proposed Site Use

Receptors	*Pathways*	*A* *Storage Barn* *Yard / parking area* *Mounded soil* *Light industrial / storage units* *Poultry Houses*
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	✓
	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.	X
	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 16 Pollutant Risk

Risk Assessment	Land Use	Pollutant	
		Soil, Groundwater & Vapour Risk	
Risk Assessment A	***Storage Barn Yard / parking area Mounded soil Light industrial / storage units Poultry Houses***	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), CO_2, CH_4.	
		Soil Sampling Groundwater & Vapour Assessment	
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. BS3882:2015	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 gas, vapour and groundwater monitoring well installations and monitor the levels of groundwater, gas and vapours.
- Obtain samples of the made ground, natural soils and groundwater for contamination testing at targeted site-specific designed locations. Test soil and groundwater samples for a range of contaminants, as identified in Table 16.
- Obtain samples of soil to test for vapours contaminants, as identified in Table 16.
- 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 3400 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 9-12 samples will be required across the site to provide a 'good' spatial density and an additional 22- 25 sample locations being tested for Asbestos.

Table 17 Soils Assessment - Targeted Sampling

Feature	Contaminant	Method of Investigation
Mound	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes Trial Pits
Yard / parking area		

Table 18 Soils Assessment – Spatial Sampling

Feature	Contaminant	Method of Investigation
Storage Barn	Metals, Semi Metals, PAHs, TPHs	Window Sampler Boreholes Hand Auger Boreholes Trial Pits
Light industrial / storage units	Metals, Semi Metals, PAHs, TPHs, Asbestos	
Poultry Houses	Metals, Semi Metals, PAHs	

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

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. 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 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 should be completed.
- 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

Considering the potential for Land Gas risks due to the potential made ground within the south east of the site area. We suggest that an assessment of the soils within this area be completed and should sources of risk be in place land gas risk assessments must be completed.

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

Table 19 Land Gas Assessment - Response Zone

Feature	Targeted Response Zone	Location to Target	Gas risk
Mound	Made Ground	Site Wide	Land Gases - CO_2, CH_4.

Infilled land is recorded in place off site, although, we would suggest that an assessment of risk could be completed using RB17 A Pragmatic Approach to Ground Gas Risk Assessment (2012). The surrounding land is primarily residential and as such, a pragmatic approach is deemed most suitable for the site and if risk confirmed, additional more intrusive assessments completed.

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

- Install standpipes to allow vapour and Land Gas risk to be considered from the upper made ground.
- Assess vapour risk over a minimum of six monitoring rounds to comply with CIRIA C665 to consider risks to buildings, CLR 11 and R & D Publication 66.
- Monitoring should be completed over falling or low atmospheric pressures or in periods where ground conditions are frozen to provide the worst-case scenario for the site, although, the site is laid to hard cover which will restrict natural ventilation of any gases.
- Reporting of land gas and vapour risk/ can be completed assessing soils in situ using a Photo Ionisation Detector for Volatile Organic Compounds, (which include BTEX). Flow rates should also be noted for reporting purposes.

17.4 Vapour Risk Assessment

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

Table 20 Vapour Risk Assessment - Response Zone

Feature	Targeted Response Zone	Location to Target	Vapour risk
Storage Barn	Made Ground	Site wide	TPH's
Yard / parking area	Made Ground	Site wide	TPH's
Light industrial / storage units	Made Ground / granular soils	Migration onto the site	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 Assessment of:*			*Proposed Method of Assessment*	*Proposed Site Works to Complete*
	Soils	*Vapour and Gas*	*Ground and Surface Water*		
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	X	X	No Action	
Ground Water	✓	✓	✓	Window Sampling - Soil sampling - Install standpipe - Groundwater sampling*	Recover samples of the made ground. Assessment of the underlying natural soils to consider contamination. 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

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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

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Date	Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

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

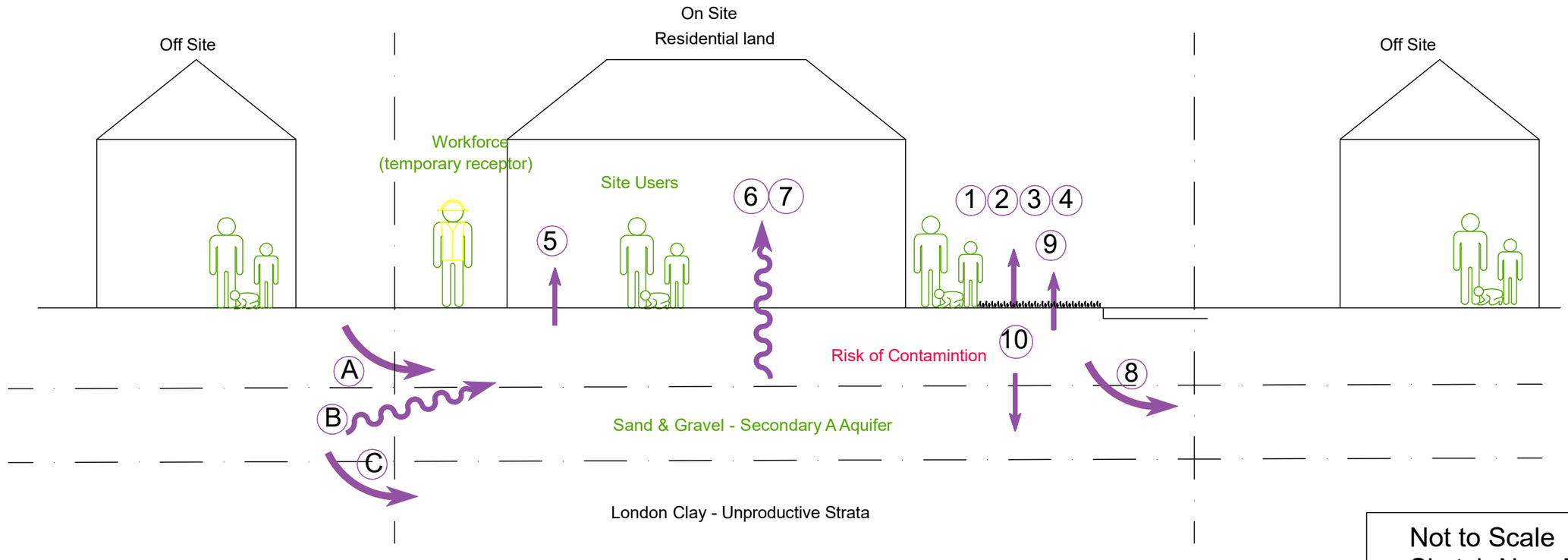
10. Leaching, lateral migration of shallow groundwater to a target receptor

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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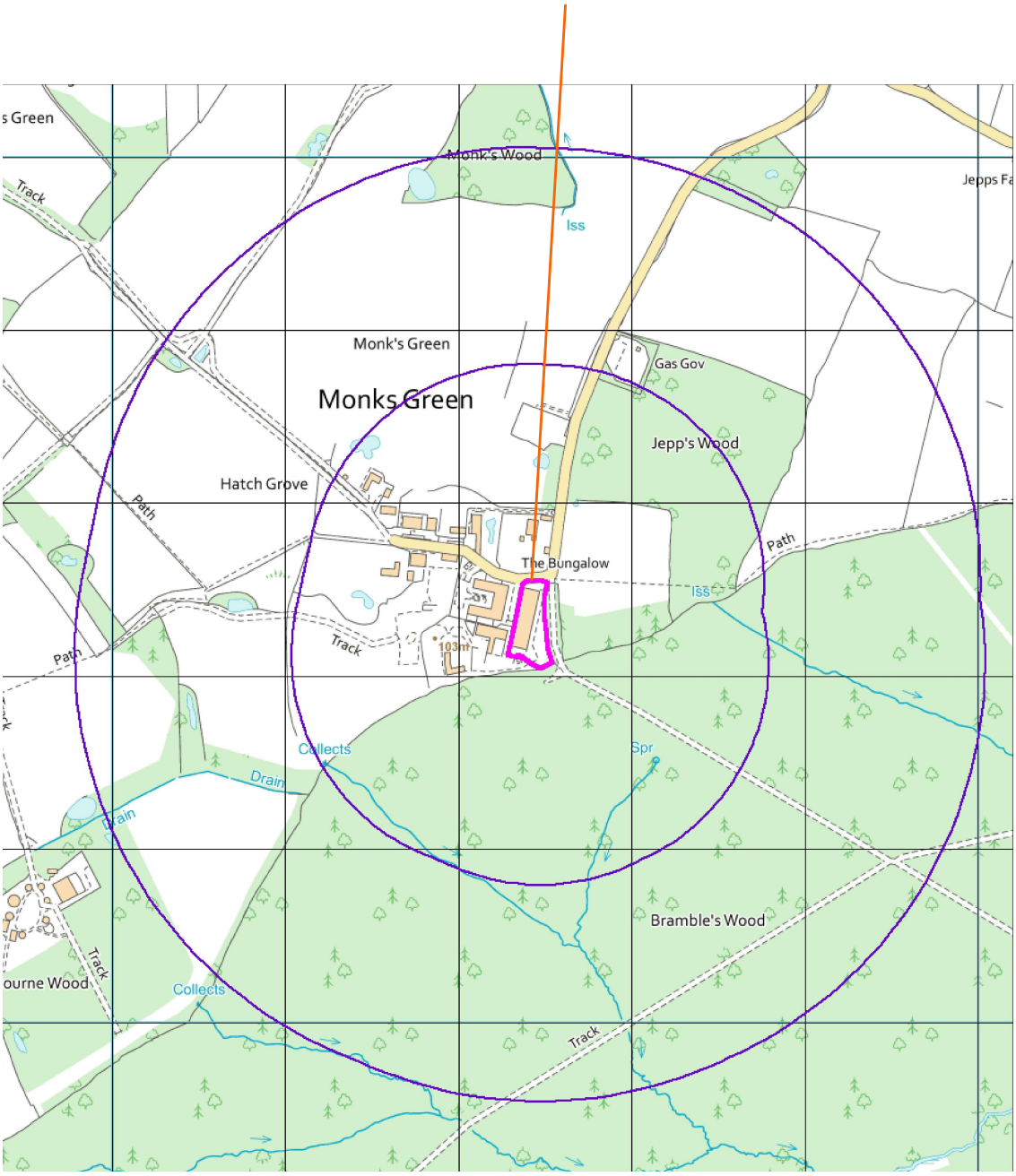
Location Plan

N

Site Plan



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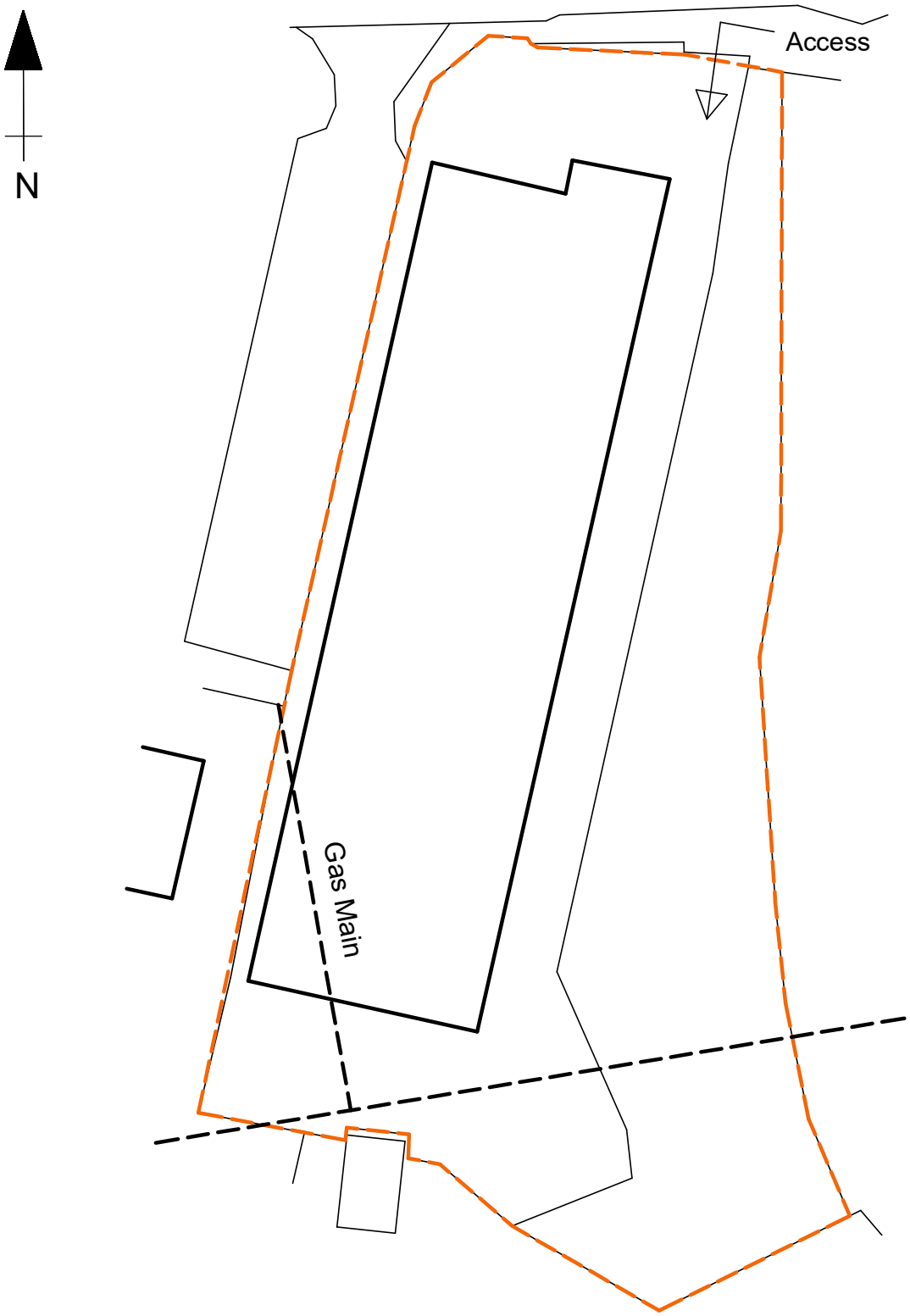
Existing Site Plan



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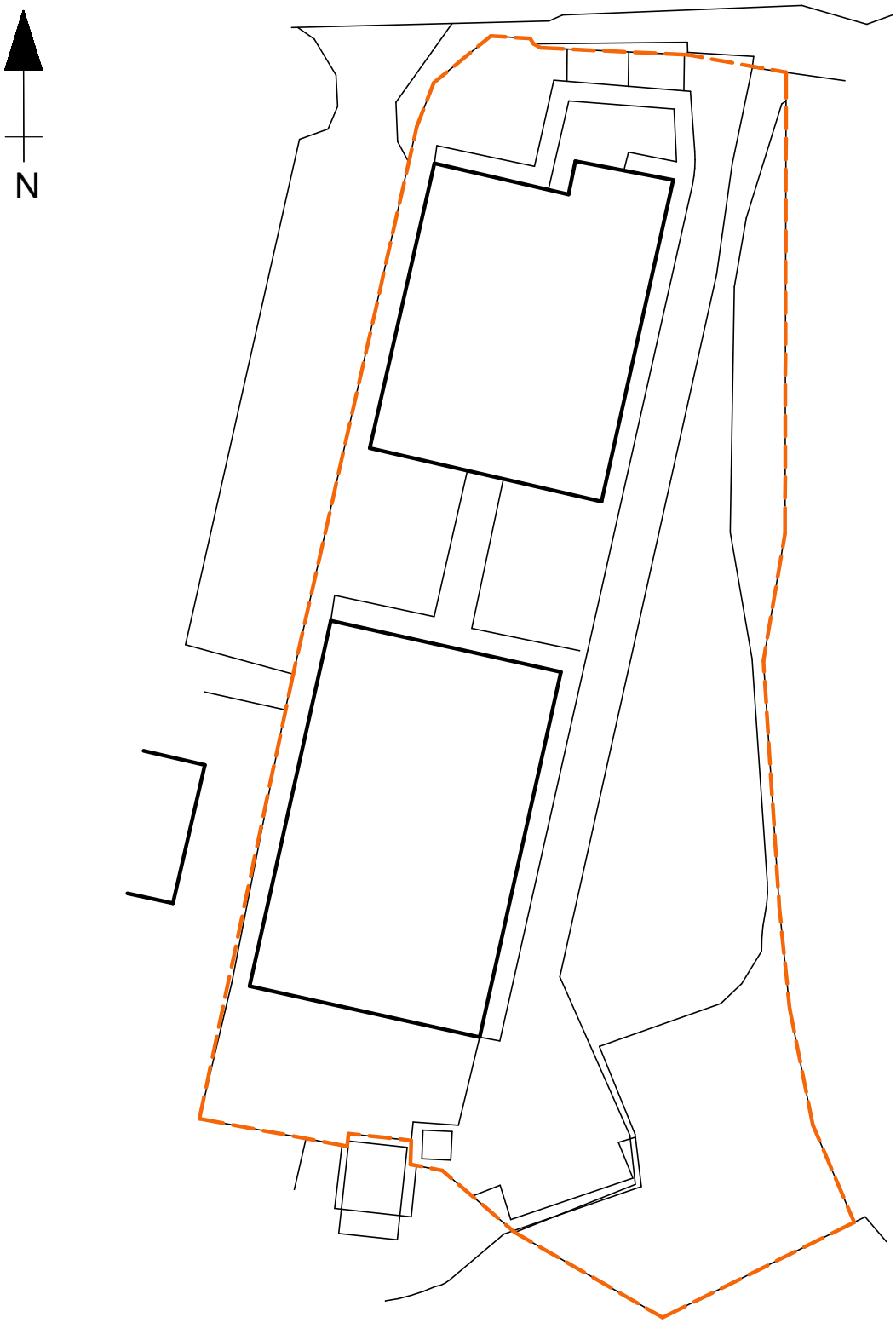
Proposed Site Plan



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