HESI
Herts & Essex Site Investigations
Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG
01920 822233 | www.hesi.co.uk | info@hesi.co.uk
Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

DESK TOP STUDY REPORT

Site Address:	Coles Green Farm Throcking Road Cottered Buntingford Hertfordshire SG9 9RB
Report Date:	July 2023
Project No.:	18369
Prepared for:	Intouch Planning Ltd
Planning Application	East Herts Council 3/22/1887/ARPN

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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

Intouch Planning Ltd
4 Ennismore Close
Letchworth Garden City
Herts
SG6 2SU

Environmental Consultants:

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

[redacted]
Web: http://www.hesi.co.uk

Project Manager:

Chris Gray, M.Sc

Principal Author:

Rebecca Chamberlain

Qualifications

C.S.Gray

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

Document Status and Approval Schedule

Issue No	*Status*	*Date*	*Prepared by: Rebecca Chamberlain Signature / Date*	*Technical review by: Chris Gray Signature / Date*
1	Final	July 2023	[redacted]	

SUMMARY

Client	Intouch Planning Ltd
Site Location	Coles Green Farm Throcking Road Cottered Buntingford Hertfordshire SG9 9RB
Existing Development	Farm barn
Proposed Development	Residential dwelling and associated landscaping
Site Settings and Previous Uses	The site area is recorded as open land until about 1975 when barns are recorded within the site area, which remain in place to date. Surrounding the site to the east and south east a farm yard is recorded in place from 1975 and again remains in place to date. No other significant features are recorded surrounding the site, some distance from the site ponds were recorded in place and were possibly infilled, although due to the time that has passed the distance from the site and the areas remaining open land risk to the site are reduced.

Geological and Hydrological Profile

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

Nearest Surface Water Feature	The nearest surface water feature is recorded as 9 meters to the south of the site which is recorded as a ditch which extends away from the site.
Groundwater Abstractions	The nearest abstraction well is located 1453 meters to the north of the site which is recorded as a Private Water Undertaking: General Farming and Domestic.
Source Protection Zone	The site lies within a Zone 3 Source Protection Zone

Potential Sources of Contamination

Features On Site

- Farmyard
- Barns
- Private workshop
- Possible asbestos sheeting

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 Secondary Aquifer and 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 south of the site about 9 meters, direct links between the site conditions and the ditch may be in place should significant risk be in place within the site, 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: - o 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 Intouch Planning 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 conversion of the existing barn to form a residential dwellings with gardens, as such the derivation of risk has been assigned as a 'Residential Land Use with Home-grown Produce'.

1.2 Reference to the Current Planning Application Details

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

3/22/1887/ARPN

Change of use of agricultural barn to two one-bedroom dwellings with alterations to fenestration and openings. Demolition of workshop and store.

Prior Approval is Required and Granted Subject to Conditions.

1.3 Decision Notice Relating to Contaminated Land

The following condition is in place.

3 The development hereby permitted shall not begin until a scheme to deal with contamination of land/ground gas/controlled waters has been submitted to and approved in writing by the local planning authority. The scheme shall include all of the following measures, unless the local planning authority dispenses with any such requirement specifically 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 Broad Characteristics of the site

2.1 The Site

The site is located within a rural area of Cottered to the west of Buntingford 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:	Coles Green Farm, Throcking Road, Cottered, Buntingford, Hertfordshire. SG9 9RB
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Farm
Previous use of site, (if known)	As above
Grid Reference	NGR 532720, 229940
Site Area	0.04 Hectares
Local Authority	East Herts Council
Gradient of the site	The site and the surrounding area form a level area of land
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 9 meters to the south of the site area, where a ditch is recorded in place extending away from the site.

2.2 Existing Site Use

The site is currently in use as a stable for a single horse and storage barn for private car and machinery repairs.

2.3 Surrounding Land Uses

The surrounding land uses are detailed below: -

- To the north of the site area a gras paddock is in place.
- To the east of the site area the former farmyard and farm house is in place.
- To the south of the site area there is a yard in place with woodland in place beyond.
- To the west of the site agricultural land is in place.

2.4 Site Reconnaissance

The site walk over visit was undertaken in July 2022 on which the weather conditions were recorded as lightly overcast.

Access

The site area is access via a lane which leads from Throcking Road to the south of the site, on to the farm yard where the site area can be freely gain from.

The barn has access point to the north, south and east of the building. The workshop open sided barn within the west of the site is open side to the south giving access.

Site Area

The barn within the east of the site forms a brick building with concreted floor, the area is sectioned in stables with metal frames and wood boarding. The roof of the structure forms a corrugated sheeting which is likely to contain asbestos. At the time of the walk over only one section of this is in use for housing a pony.

The area within the west of the site area is covered by an open fronted barn which a formed by a metal frame with wooden cladding to the north, west and breeze block to the east. The floor is laid to concrete which a small section laid to compact soil within the south east. The roof for this barn is a corrugated metal sheeting. Within the is barn there is metal work, tools, an old vehicle and folk lift, a hydraulic car lift and wooden pallets. The area was fairly tid8y with limited staining on the surface.

Vegetation

Within the site area no vegetation is in place, the building cover the site area.

To the north and west of the site grass land and arable land is in place with some woodland in place to the south west of the site.

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. From discussion with the current site owner no tanks were in place with the site area.

Asbestos Containing Materials

Possible Asbestos containing materials were reviewed on the roof of the barn, the sheeting looked to be intact and in a good state of repair with just one corner of the roof being damaged, no sign of fragments of sheeting were seen on the concrete area surrounding the barn, suggesting that there is limited risk of this forming a risk of fragment being in place within the soils. From the walk over no obvious fragments were seen in place. 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 the fill in site will be required in order to fully consider risk from Asbestos.

Surrounding Area

Surrounding the site area agricultural land is in place to the west of the site, with woodland further to the south west.

To the north of the site area, there is a paddock area for grazing horses at the time of the walk over, with a residential garden further to the north east.

To the east round to the south the farm yard and farm house is in place. This forms an additional open fronted barn to the south of the site area with a concrete yard area extending to the south east some storage containers area in place to the south and a converted barn is in place to the south east. Further barns and storage areas are in place to the south east of the site. The farm is no longer active.

Site Levels and Ground Cover

The site and surrounding area form a generally level area of land.

The site area is land to the buildings which have concrete floors in place.

Current site activities

The current site use forms a vacant farm, with the current owner using the barns as a stable and a private workshop.

Effluent, Site Drainage and Services

Limited drainage and services are in place within the site, an overhead cable was noted along the eastern boundary of the site, although no service search is known to us, therefore the location condition nor status of these services is known.

2.5 Site Reconnaissance – Photos

Print 1 View of the barn forming the western section of the site - to be converted

Print 2 View of the barn forming the western section of the site - to be converted

Print 3 View of the barn forming the western section of the site - to be converted

Print 4 View of the barn forming the western section of the site - to be converted

Print 5 View within the western barn

Print 6 View within the western barn

Print 7 View within the barn within the west of the site

Print 8 View within the barn within the west of the site

Print 9 View within the barn within the west of the site

Print 10 View of the farm yard to the south east of the site area

Print 11 View of the yard area and barn to the south of the site area

Print 12 View of the yard area and barn to the south of the site area

Table 2 *Walk Over Inspection Risk*

Feature	*Location*	*Elevation*	*Is Risk Present?*	*Location to Target*
Farmyard	On and off site	At GL.		Sitewide
Barns	On site	At GL.		Sitewide
Private workshop	On site	At GL.		Sitewide
Possible asbestos sheeting	On site	At GL.		Sitewide

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	*On Site Feature*	*On Site Mitigation (considering all possible pathways)*	*Off Site Feature*	*Off Site Mitigation (considering all possible pathways)*
Date: 1878 Source Map Scale 1:2 500	Open Land	No sources	Open land	No sources
			Buildings - E (residential / farm)	Limited sources
			Pond –SE 50m	No sources
Date: 1883 Source Map Scale 1:10 560				
Date: 1898 Source Map Scale 1:2 500				
Date: 1899 Source Map Scale 1:10 560				
Date: 1923 Source Map Scale 1:2 500				
Date: 1925 Source Map Scale 1:10 560				
Date: 1948 Source Map Scale 1:10 560				
Date: 1960 Source Map Scale 1:10 560				
Date: 1975 Source Map Scale 1:2 500	Barns	Possible Soil Risk Possible Vapour Risk Possible GW Risk	Cole Green Farm –E & SE	Possible Soil Risk Possible Vapour Risk Possible GW Risk
			Pond – SE 50m – REMOVED	Possible Land Gas Risk

Table 4 Historic Map Assessment - Continued.....

Date	*On Site Feature*	*On Site Mitigation (considering all possible pathways)*	*Off Site Feature*	*Off Site Mitigation (considering all possible pathways)*
Date: 1976 Source Map Scale 1:2 500				
Date: 1978 Source Map Scale 1:10 000				
Date: 1993 Source Map Scale 1:2 500				
Date: 1999 Source Map Scale 1:10 000				
Date: 2006 Source Map Scale 1:10 000				
Date: 2023 Source Map Scale 1:10 000				

Table 5 Overview of Historic Map Assessment Risk

Identified Risk	Distance & Direction	Year	Is risk in place?	Considering All Pathways		Justification
				Assessment Required.	Method of Assessment	
Open Land	On and Off Site –NE, E, S, W	Off Site - - 1975	X			No Source
Barns	On Site	1975 –Present	)	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments	
Open land	Off Site	Pre 1878 - Present	X			No Source
Buildings (residential / farm) Cole Green Farm –E & SE	Off Site - E	Pre 1878 –Present 1975 –Present	)	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments	
Pond Infilled	Off Site –SE 50m	Pre 1975 –1975 1975 –present	)	Possible Land Gas Risk	Install Standpipes Vapour Assessments	Distance and small scale of the feature and the area remaining open land will reduce the risks of migration to the site area.

5 Details of the Intended Future Use of the Site

It is proposed to alter the barn to form a two, one bed dwellings with the potential to remove the barn to the west of the dwelling to form residential gardens later.

6 References of Planning Applications

A current planning application is in place with East Herts Council for the site area.

Application No: 3/22/1887/ARPN
Proposal: Change of use of agricultural barn to two one bedroom dwellings with alterations to fenestration and openings. Demolition of workshop and store
Decision: Prior Approval Req/Grant with Conditions 24 Oct 2022

Historical applications are in place with Council for the convention of the barn to the south east of the site area, which the conditions none rate to contaminated land.

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

Decisions with the current owner of the site confirmed that the farm was formally an animal farm with various animal over the years. The workshop within the west of the site, was used for storage of vehicles and the maintenance of farm equipment and vehicles. No significant oil or fuels spills have been recorded, some small spills and drips have occurred leaving some staining on the surface.

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

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

11.2 BGS Boreholes

No BGS Boreholes are reported surrounding the site.

Table 6 Geological Information

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

11.3 Hydrology

The nearest surface water feature is recorded as 9 meters to the south of the site which is recorded as a ditch which extends away from the site.

The nearest discharge consent is recorded 157 meters to the south east of the site, for Sewage Discharges - Final/Treated Effluent - Not Water Company.

No pollution incident to controlled waters are recorded surrounding 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 Aquifer Undifferentiated. The underlying geology is recorded as a Principal Aquifer within the Chalk.

The nearest abstraction well is located 1453 meters to the north of the site which is recorded as a Private Water Undertaking: General Farming and Domestic.

The site lies within a Zone 3 Source Protection Zone.

11.5 Implication of groundwater

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

In accordance with Environment Agency guidance document: -

- Groundwater Protection: Principals and Practice (GP3) Part 5 –Remedial Targets Methodology,

The document confirms: -

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

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

11.6 Flooding

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

11.7 Landfill Sites

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

To the north east of the site, NE 26 meters and SE 44 meters, some infilled land is recorded in place, this is likely to form small ponds as seen within the historical mapping. Due to the small scale of these features and the areas remaining open land the likelihood of risk migrating to the site area are low.

11.8 Environmentally Sensitive Sites

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

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

Receptor Type	Receptor(s)	Sensitivity	Comments
Groundwater	Secondary Aquifer Undifferentiated	Moderate	Possible risk to underlying Gravel Deposits, although the Lowestoft Formation is likely to form a clayey strata.
	Principal Aquifer	Low	Limited risk of migration to a lower groundwater system
Water Abstraction	Private Water Undertaking: General Farming And Domestic	Medium	The nearest abstraction well is located 1453 meters to the north of the site
Source Protection Zone	Zone 3		Possible risk in place should groundwater be in place.
Surface Water	Ditch	Low	The nearest surface water feature is recorded as 9 meters to the south of 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 Summery of Regulatory Data - Sources

Data Sources	*On Site*	*Off Site*	*Distance from site.*	*Is potential risk in place?*
Discharge Consents	None	Sewage Discharges - Final/Treated Effluent - Not Water Company	SE 157m	X
Potentially Infilled Land	None	Unknown Filled Ground from 1948	NE 26m	)
		Unknown Filled Ground from 1960	SE 44m	)
Radon Potential - Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions			X

Table 9 Summary of Regulatory Data - Receptors

Data Receptors	*On Site*	*Off Site*	*Distance from site.*	*Is potential risk in place?*
Nearest Surface Water Feature	None	Ditch	S 9m	)
Water Abstractions	None	Private Water Undertaking: General Farming and Domestic	N 1453m	X
OS Water Network Lines	None	Inland river	S 9m	)
Source Protection Zone	Zone 3		On Site	X

Table 10 BGS Estimated Chemistry Data

BGS Estimated Soil Chemistry Pollutant	*BGS Estimated Soil Chemistry*
Arsenic	15-25
Cadmium	<1.8
Chromium	60-90
Lead	<100
Nickel	30-45

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

Table 11 Geological Hazards

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

Table 12 Summary of Contemporary Trade Entries

Trade Name	Trade Use	Distance & Direction from Site	Is potential risk in place?	Comment
R D Brown	Agricultural Machinery - Sales & Service	E 35m	X	**Inactive**
No other trades are recorded within 100 meters - Further trades extend away from the site, (See Envirocheck Data)				

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

14 Identification of Potential Contaminants of Concern and Source Areas

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

Table 13 Table of Source Risk

Risk Assessment	Source Risk	Source of Information	Location	Date	Considering Site Specific Pathways	
					Assessment Required.	Method of Assessment
	On Site Features					
A	Farmyard	Walk Over Survey Historical Maps	On and Off Site	1975 –Present	Possible Soil Risk Possible GW Risk Possible Vapour Risk	Recover Soil Samples Install Standpipes GW & Vapour Assessments
	Barns	Walk Over Survey Historical Maps	On and Off Site	1975 –Present		
	Private workshop	Walk Over Survey				
	Possible asbestos sheeting	Walk Over Survey				
	Off Site Feature					
B	Infilled Pond	Historical Maps	Off site -	1975 –present	Possible Land Gas	Land Gas Assessment
	Unknown Filled Ground	Envirocheck Data	Off Site - NE 26m - SE 44m	from 1948 from 1960		

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 Likelihooc	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihooc	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*
Farmyard ***Barns*** ***Private workshop*** ***Possible asbestos sheeting***	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	Low Likelihood	Moderate / Low	No sources of risk
			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; Ground Water. Abstraction Well.	Leaching, lateral migration of shallow groundwater to a target receptor. 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 *Risk Assessment E*

Source (Potential Contaminating Use)	*Potential Contaminants*	*Receptors*	*Pathways*	*Associated Hazard, [Severity]*	*Proposed Site Use Risk Assessment*		
					Likelihood of occurrence	*Potential Risk*	*Notes*
Infilled Pond –SE 50m ***Unknown Filled Ground*** - NE 26m - SE 44m	Land Gases CO_2, CH_4.	Site Users Construction Workers.	Inhalation of vapours, (gas and organic)	Medium	Low Likelihood	Low	Distance and small scale of the feature and the area remaining open land will reduce the risks of migration to the site area.
			Explosive risk from Land Gas	Severe	Unlikely	Moderate / Low	Low risk of explosive concentrations

Table 17 Overview of Risk Assessments - Proposed Site Use

Receptors	*Pathways*	*A* *Farmyard* *Barns* *Private workshop* *Possible asbestos sheeting*	*B* *Infilled Pond* –SE 50m *Unknown Filled Ground* - NE 26m - SE 44m
Site Users Construction Workers	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact		X
	Ingestion of home-grown vegetation		X
	Ingestion of contaminated water through water main pipework		X
	Inhalation of vapours from soils		X
	Inhalation of vapor from contaminated ground waters		X
	Inhalation of land gas vapours	X	X
	Inhalation Asbestos dust and fibers (from Asbestos within the building)		X
	Inhalation Asbestos dust and fibers (from asbestos within the soil)		X
Adjoining Land Owners	Direct Contact, Inhalation of Dust and Fibres, Dermal Contact		
	Ingestion of home-grown vegetation		
	Ingestion of contaminated water through water main pipework		No Liability from third parties
	Inhalation of vapours from soils		
	Inhalation of vapours from contaminated ground waters		
Flora	Plant Uptake / Direct Contact		X
Groundwater; Abstraction Well & Surface Water	Leaching, lateral migration of shallow groundwater to a River or surface water receptor.		
	Leaching, lateral migration of shallow groundwater system underlying the site and subsequent abstraction well or SPZ		No Liability from third parties
Buildings	Direct contact with contaminated soils.		X
	Direct contact with contaminated groundwater		X

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

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

16 Discussion on Sources of Contamination

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 18 Pollutant Risk

Risk Assessment	Land Use	Pollutant	
A	***Farmyard*** ***Barns*** ***Private workshop*** ***Possible asbestos sheeting***	***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) ***Soil Sampling Groundwater & Vapour Assessment***	
B	***Infilled Pond – SE 50m*** ***Unknown Filled Ground*** - NE 26m - SE 44m	Distance and small scale of the feature and the area remaining open land will reduce the risks of migration to the site area.	
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	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, (EA), GP3 'Groundwater Protection: Policy and Practice'.

Based on the site area and size of the site, (approximately 400 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 1-2 samples will be required across the site to provide a 'good' spatial density and an additional 2-3 sample locations being tested for Asbestos.

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

- Determine the ground and groundwater conditions.
- Determine if there are any obstructions such as old service and foundations, buried tanks, etc.
- Obtain samples of the made ground, natural soils and groundwater for contamination testing at targeted site-specific designed locations. Test soil and groundwater samples for a range of contaminants, as identified in Table 18.
- Obtain samples of soil to test for vapours contaminants, as identified in Table 18.
- Visually appraise soils to consider olfactorily or visual presence of contamination factors, risk, vapours or fragments.
- If increased depths of fill or significant risks look to be in place install gas, vapour and groundwater monitoring well installations and monitor the levels of groundwater, gas and vapours.
- 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.

Table 19 Soils Assessment - Targeted Sampling

Feature	*Contaminant*	*Method of Investigation*
Workshop	Metals, Semi Metals, PAHs, TPHs, Asbestos, VOCs	Window Sampler Boreholes Hand Auger Boreholes Trial Pits

Table 20 Soils Assessment – Spatial Sampling

Feature	*Contaminant*	*Method of Investigation*
Farm Yard	Metals, Semi Metals, PAHs, TPHs, Asbestos	Window Sampler Boreholes Hand Auger Boreholes Trial Pits
Barns		
Possible asbestos sheeting		

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

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 21 Vapour Risk Assessment - Response Zone

Feature	*Targeted Response Zone*	*Location to Target*	*Vapour risk*
Farmyard	Made Ground	Site wide	TPH's
Barns	Made Ground	Site wide	TPH's
Private workshop	Made Ground	Site wide site	TPH's, VOC'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 22 *Overview of Works*

Receptor	*Scope of Investigation Works Required Assessment of:* *Soils*	*Vapour and Gas*	*Ground and Surface Water*	*Proposed Method of Assessment*	*Proposed Site Works to Complete*
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	✓	✓	✓	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	✓	✓	✓		
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

HESI
Herts & Essex Site Investigations
Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG
01920 822233 | www.hesi.co.uk | info@hesi.co.uk
Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

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Barn at Coles Green Farm Throcking Road Cottered Buntingford Herts SG9 9RB

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

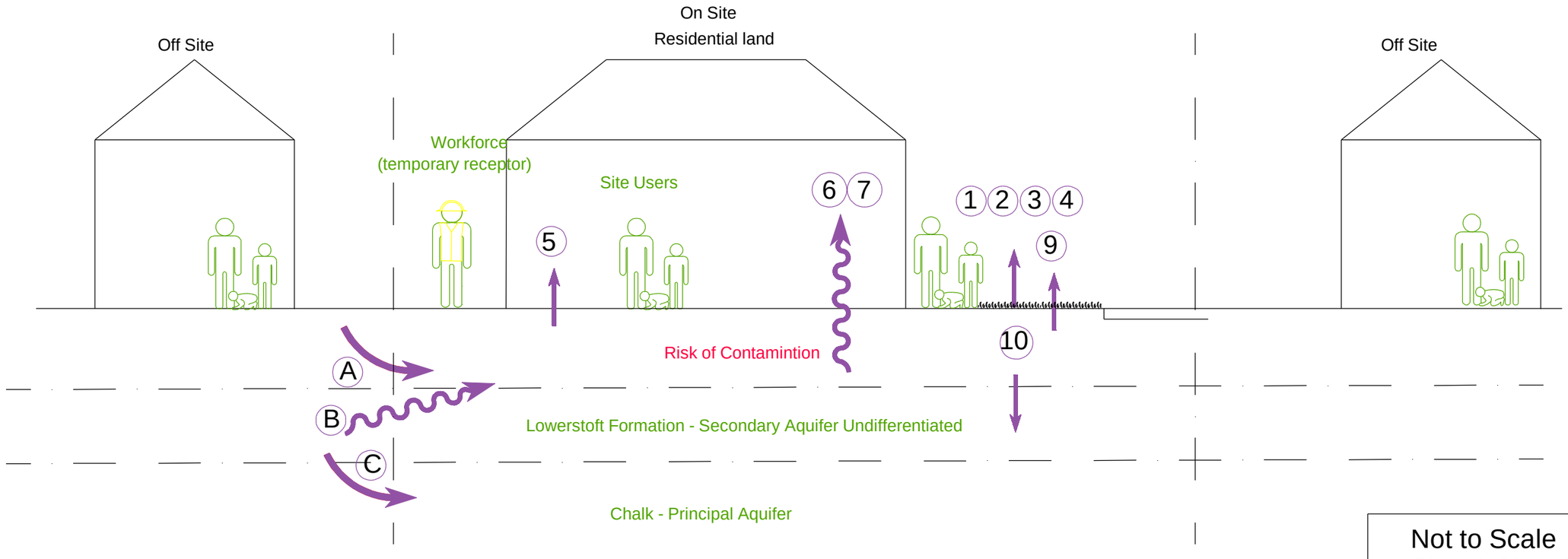
10. Leaching, lateral migration of shallow groundwater to a target receptor

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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Herts & Essex Site Investigations
Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG
01920 822233 | www.hesi.co.uk | info@hesi.co.uk
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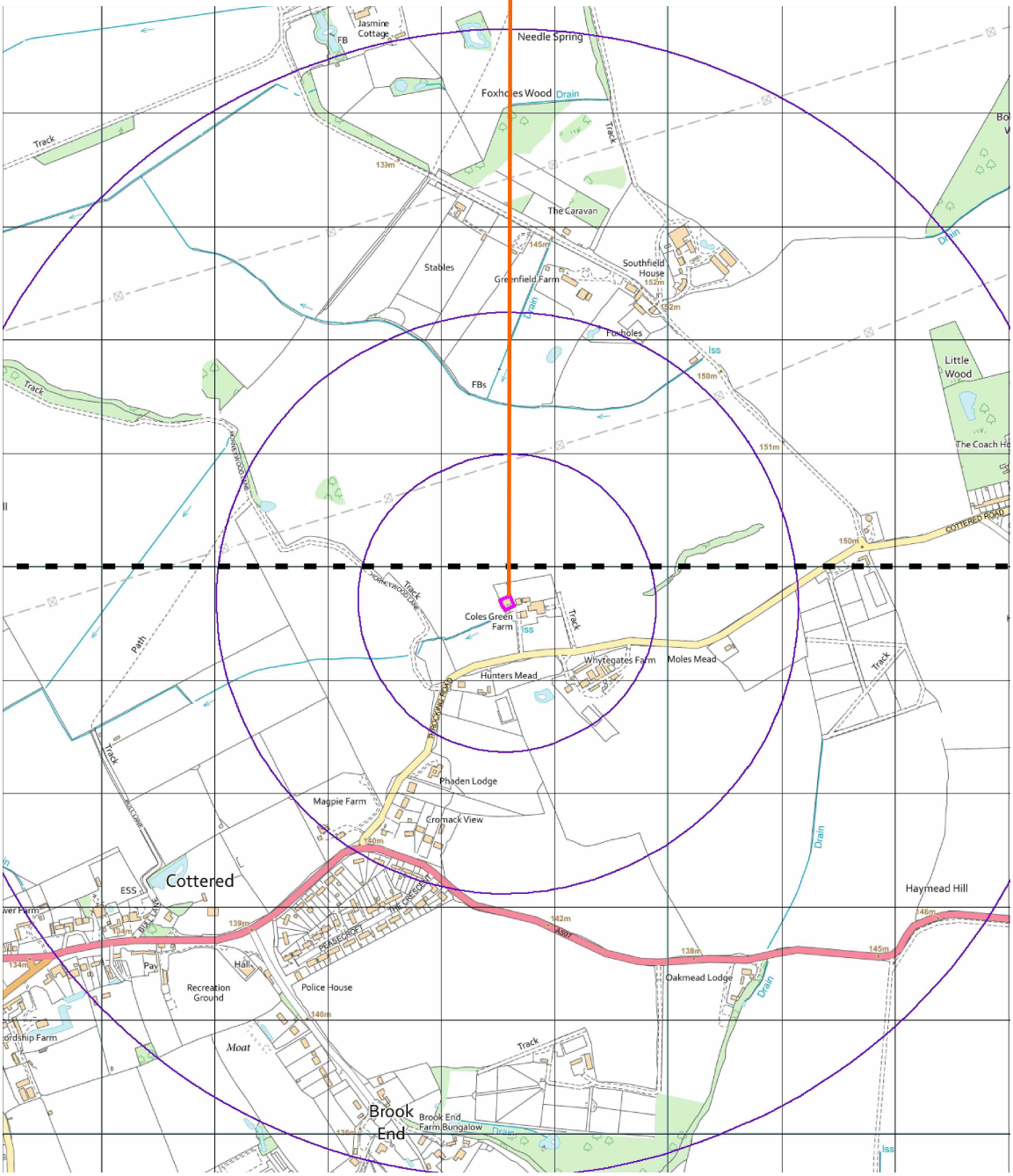
Location Plan

N

Site Plan



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Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG
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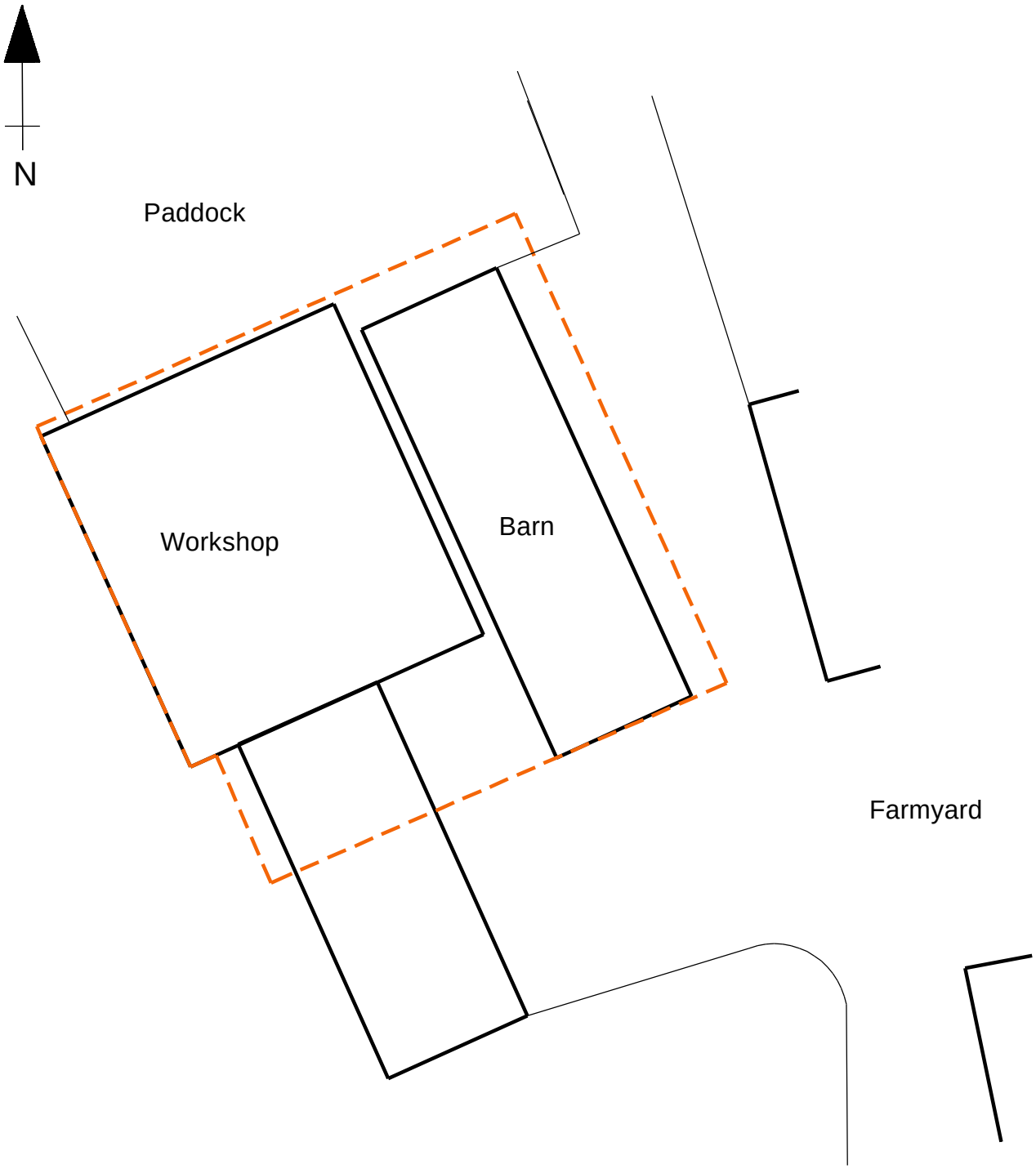
Existing Site Plan



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Herts & Essex Site Investigations
Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG
01920 822233 | www.hesi.co.uk | info@hesi.co.uk
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Proposed Site Plan

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