

Bell House

Phase I Desk Study Report

April 2024

Phase I Desk Study Report

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Phase I Desk Study Report

Contents Page

Disclaimer	6
1.0 Introduction	6
1.1 Aims and Scope	6
1.2 Terms and Conditions.....	7
1.3 Sources of information	7
2.0 Site Details	8
2.1 Site Location, Description and Walkover	8
2.2 Proposed Development Plan	8
3.0 Site History	8
3.1 History of site and surrounding area.....	8
4.0 Geology, Hydrogeology and Hydrology	9
4.1 Geology.....	9
4.2 Hydrogeology	10
4.3 Hydrology	10
5.0 Environmental Setting	11
5.1 Waste Treatment and Disposal	11
5.2 Regulatory Permits, Incidents and Registers.....	11
5.3 Potentially Infilled Land	11
5.4 Sensitive Land Uses	12
6.0 Potentially Contaminative Sites	12
6.1 Potentially Contaminative Land Uses.....	12
7.0 Geotechnical Assessment	12
7.1 Natural Hazards	12
8.0 Mining	12
9.0 Conceptual Site Model	13
9.1 Introduction.....	13

Phase I Desk Study Report

9.2 Potential Contamination Sources..... 14

9.3 Potential Receptors..... 14

9.4 Potential Pathways..... 15

9.5 Preliminary Risk Assessment..... 16

10.0 Conclusions.....20

11.0 Recommendations.....21

12.0 References.....21

Phase I Desk Study Report

APPENDIX CONTENTS

Appendix A	EnviroInsight Groundsure Report
Appendix B	Historical Ordnance Survey Maps
Appendix C	Proposed Development Plan
Appendix D	Site Walkover Photographs

Phase I Desk Study Report

Disclaimer

This report was produced by **RB Geotechnical** for Mr Tom Miller (The client) for the specific purposes of a Phase I Desk Study related to the proposed barn conversion at Bell House in Bumble Green, Little Waldringfield, Suffolk. This report may not be used by anyone else other than the client without their express permission. In any event, **RB Geotechnical** accepts no liability for any costs, liabilities or losses arising from the use of reliance upon the contents of this report by anyone other than the client.

1.0 Introduction

RB Geotechnical was commissioned by the client to carry out a Phase I Desk Study at barns at Bell House in Humble Green, Little Waldringfield, Suffolk, in relation to the proposed residential barn conversion.

1.1 Aims and Scope

The principal aims of this Phase I Desk Study is to interpret information pertaining to the site, obtained during a desk-based review of available data for the site.

The scope of this study is as follows:

- To provide general information on the site such as location and description;
- To discuss the geology, hydrogeology and hydrology at, and in the vicinity of, the site;
- To summarise the environmental setting of the site; e.g., landfills, permits and sensitive land uses;
- To summarise potential geotechnical risks associated with the site;
- To provide a preliminary summary of potential coal mining risks to the site;
- To discuss and summarise any historical development that have occurred at the site and in the surrounding area;
- To assess potential contamination issues pertaining to the site with consideration of the site's historic use;
- To develop an initial conceptual model linking sources of potential contamination with pathways and receptors; and
- To provide a preliminary risk assessment for the current and proposed end use of the site.

Phase I Desk Study Report

Please note that this Phase I Desk Study excludes an assessment of risks arising from asbestos, unexploded ordnance and/or invasive species.

1.2 Terms and Conditions

This report has been prepared for the client in support of a planning application for the proposed residential barn conversion at Bell House in Humble Green, Little Waldringfield, Suffolk.

1.3 Sources of information

Information on the site layout and current land use of the site is mainly based on information collected from online sources and photos from other sources.

An environmental database search was undertaken by GroundSure to provide supplementary Environmental information for the site and surrounding area. This was collated into an Insight Report by Ground Sure and as such the potential for further data to exist cannot be ruled out.

The existing database and other sources of which this study is based comprise:

- GroundSure EnviroInsight Report, Bell House, 17th April 2024 - Appendix A
- GroundSure 1:10,000 Historical Maps, Bell House, 17th April 2024 - Appendix B
- GroundSure 1:2,500 Historical Maps, Bell House, 17th April 2024 - Appendix B
- Environment Agency website (www.environment-agency.gov.uk);
- British Geological Survey (BGS) Geindex website (www.bgs.ac.uk/geindex)
- Coal Authority Interactive Viewer (www.mapapps2.bgs.ac.uk/coalauthority/home.html)

Although every effort has been made to ensure the accuracy of the information contained herein, no checks have been carried out to ensure the accuracy of information obtained from third parties and no liability can be accepted for any errors or misinterpretation of the third-party information where it has been incorporated into this report.

Phase I Desk Study Report

2.0 Site Details

2.1 Site Location, Description and Walkover

The 0.1ha sized site is situated off the B1115 Road in Humble Green, Little Waldringfield in Suffolk . The site currently comprises barns constructed from timber, brick and steel frame, which have clearly been constructed at different times and since joined together. Some of the buildings are in greater disrepair to others, and some have corrugated metal roofs and some asbestos roofs. A concrete driveway area runs adjacent and around the Easter edges of the barns, then leading to dirt tracks.

The National Grid Reference for the centre of the site is 593106, 245848.

2.2 Proposed Development Plan

The site is proposed to have the barns redeveloped to form three new residential properties, with a new driveway to the East. The proposed development plan is shown in Appendix C.

3.0 Site History

3.1 History of site and surrounding area

Information relating to the historical development of the site and the surrounding area has been obtained from Historical Ordnance Survey Maps (1:10,000 and 1:2,500). These are presented in Appendix B.

Table 3.1 Summary of on-site and surrounding area history

Map	On-Site Features	Surrounding Area
1885	The site is shown to have a building in the South Western corner, with the rest of the site undeveloped. It is part of Humble Green Farm.	The surrounding area is open farmland and fields, with buildings however situated adjacent to the Western site boundary.
1885 – 1902	The site remains unchanged; however it is now named Bell Farm	The surrounding area remains unchanged.
1902 – 1926	The main buildings on the site remain unchanged, however a section of the building that was once situated adjacent to the Eastern site boundary is no longer present.	The surrounding area remains largely unchanged.

Phase I Desk Study Report

Map	On-Site Features	Surrounding Area
1927 – 1955	The buildings on site have been altered in size and now just a rectangular building is shown in the South Western corner.	All buildings adjacent to the West of the site are no longer present.
1955 – 1971	The site is now shown to contain a number of rectangular barn type buildings through the centre.	A land drain is mapped close to the Southern site boundary. The rest of the surrounding area remains generally unchanged.
1971 – present day	The site remains generally unchanged.	The surrounding area remains largely unchanged.

4.0 Geology, Hydrogeology and Hydrology

4.1 Geology

Information relating to the geology of the site has primarily been sourced from the EnviroInsight Report and the BGS Geindex website.

4.1.1 Made Ground

According to the published geological maps and information on the BGS GeoIndex website, the site is not shown to be underlain by Made Ground artificial deposits.

4.1.2 Superficial Deposits

The site is mapped as being underlain by superficial deposits of the Lowestoft Formation, which is a mixed clayey, sandy, gravelly, chalk till material.

4.1.3 Solid Geology

Geological maps indicate that the site is underlain by bedrock of the Newhaven Chalk Formation.

4.1.4 BGS Boreholes

No historical BGS boreholes of use have been identified.

Phase I Desk Study Report

4.1.5 Faults and Seams

No faults or seams are mapped within 500m of the site boundary.

4.1.6 Radon

The EnviroInsight Report indicates that the property is not within a Radon Affected Area, as Less than 1% of properties are above the Action Level. No Radon protective measures are deemed necessary.

4.2 Hydrogeology

4.2.1 Aquifers

The underlying superficial aquifer is classified as being a Secondary Undifferentiated which is one assigned where either a category A or category B rock type could be present, and this is due to the mixed composition of this stratum. The underlying bedrock is classified as being a Principal aquifer which is defined as a geology of high intergranular and/or fracture permeability, providing high levels of water storage with the underlying soils classified as having an Intermediate Leaching Potential.

4.2.2 Groundwater, Surface Water and Potable Water Abstraction Licences

The EnviroInsight Report indicates that there are no Groundwater, Potable Water or Surface Water Abstractions within 500m of the site boundary.

4.2.3 Licensed Discharges

There is one recorded Licensed Discharge to controlled waters within 500m of the site boundary, situated 294m to the North East of the site as a soakaway.

4.2.4 Pollution Incidents to Controlled Waters

The EnviroInsight Report shows no significant pollution incidents to controlled water within 250m of the site boundary.

4.3 Hydrology

The nearest water networks within 500m of the site boundary is the small land drain mapped from approximately 4m to the South of the site.

Phase I Desk Study Report

4.3.1 Flood Risk

The EnviroInsight Report states that the site is not situated within either a Zone 2 Fluvial/Tidal Model or Zone 3 Fluvial Model floodplain. The site is classified as being at a **LOW** Risk of flooding from Rivers or Sea, with a **NEGLIGIBLE** Risk of Surface Water and **LOW** Risk of Groundwater flooding.

4.3.2 Source Protection Zones

The site is situated within a Source Protection Zone, Category 3 (Total Catchment).

5.0 Environmental Setting

5.1 Waste Treatment and Disposal

5.1.1 Landfill Sites

There are not currently active or historical landfill sites mapped within 250m of the site boundary.

5.1.2 Other Waste Sites

No other waste sites are mapped within 250m of the site boundary.

5.2 Regulatory Permits, Incidents and Registers

5.2.1 Control of Major Hazard Sites /Notification of Installations Handling Substances

The EnviroInsight Report indicates there are no Control of Major Hazard sites (COMAH), or Notification of Installations Handling Substances (NIHHS) mapped within 250m of the site boundary.

5.2.2 Planning Hazardous Substance Consents

There are no records of Planning Hazardous Substance Consents within 500m of the site.

5.3 Potentially Infilled Land

No infilled ground is mapped within 250m of the site boundary.

Phase I Desk Study Report

5.4 Sensitive Land Uses

The site itself is situated within two Nitrate Vulnerable Zones at the Lower Stour as Surface Water and Sandlings and Chelmsford Groundwater. The site is also within an SSSI (Site of Special Scientific Interest) Impact Risk Zone associated with infrastructure. An SSSI is also mapped 507m to the North East at Brent Eleigh Woods. Designated Ancient Woodland is mapped 507m to the North East and 738m to the North East at Camps Woods. No other classified sensitive land uses are mapped either on or within 1000m of the site.

6.0 Potentially Contaminative Sites

6.1 Potentially Contaminative Land Uses

Other than the barns and area surrounding the barns being used for farming, no other historical or current potentially contaminative land uses have been mapped within 250m of the site boundary.

7.0 Geotechnical Assessment

7.1 Natural Hazards

The EnviroInsight Report states that the site has a **Negligible** risk of Ground Dissolution of Soluble Rocks and Compressible Deposits, a **Very Low** risk of Running Sands, Collapsible Deposits and Landslides and a **Low** risk of Shrink swell clays.

8.0 Mining

The site is not within a Coal Mining Area.

It is however within a Non-Coal Mining Area with Chalk being the potential commodity. The Groundsure Report does however state that the potential for difficult ground conditions are unlikely and do not need considering.

Phase I Desk Study Report

9.0 Conceptual Site Model

9.1 Introduction

A preliminary **Conceptual Site Model** (CSM) has been developed for the site, to assess any constraints on the proposed development arising from contamination which may be present. The CSM describes the relationship between contamination which may be present from past and current activities, both on and off site, along with potential receptors of that contamination.

The site has been assessed in line with current UK guidelines and follows the procedures set out in the Environmental Agency 'Land Contamination Risk Management' (LCRM) web pages which are accessible via the government website.

LCRM provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme of the former Department of the Environment. LCRM has adopted and refined the methodology and terminology that has been used in contaminated land risk assessment for a number of years.

LCRM defines the three essential elements to any risk:

- **A contaminant source** - a substance that is in, on or under land and has the potential to cause harm or to cause pollution of controlled waters;
- **A receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and
- **A pathway** - a route or means by which a receptor can be exposed to or affected by a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of source-pathway-receptor is described as a **Potential Pollutant Linkage (PPL)**.

It should be noted that at this preliminary stage, the assessment is based only on a desk-based study. A quantitative assessment of the potential risk is not possible at this stage of the assessment.

Phase I Desk Study Report

This report presents a Preliminary Conceptual Site Model and Preliminary Risk Assessments for the site, based on a **Residential** end use.

9.2 Potential Contamination Sources

9.2.1 On Site Sources

On-site sources of contamination have been identified as potential contaminated soils around the edges of the barns where historical farming vehicles and machinery have been used over the years. Additionally, there is a risk of potential Made Ground on site associated within historical construction and demolition of buildings over the years. The presence of potential asbestos containing materials has been identified as a potential on-site risk.

9.2.2 Off Site Sources

No potential off-site sources of contamination have been identified which could affect the proposed development.

9.3 Potential Receptors

9.3.1 Human Receptors

Based on the proposed use of the site, on-site receptors include:

- Current site users;
- New residents;
- Construction workers involved in the proposed development. Note that potential contamination risks to construction workers will be mitigated by appropriate risk assessments and mitigation measures required by Control of Substances Hazardous to Health (COSHH) and Construction, Design and Management (CDM) regulations.

9.3.2 Controlled Waters Receptors

The following on-site controlled waters receptors include:

- Groundwater within the underlying Aquifers.

Phase I Desk Study Report

9.3.3 Buildings Receptors

The proposed new buildings are a potential receptor.

9.4 Potential Pathways

9.4.1 On-Site Human Receptors

Potential pathways to future human receptors on site include:

- Dermal contact or ingestion with contaminated soils;
- Inhalation of contaminants in soil derived dust;
- Migration and inhalation of gases and vapours outdoors or indoors;
- Contamination of drinking water pipes by contaminated soils/water leading to the ingestion of contaminated drinking water.

9.4.2 Controlled Waters

Potential pathways to on-site controlled water receptors (groundwater) include:

- Leaching of contaminants and/or migration of contaminants from the unsaturated zone of soils to groundwater (Principal Aquifer) in natural strata;
- Vertical migration of contaminants in shallow groundwater to deeper strata and aquifers;
- Lateral migration of impacted water through service conduits, drainage systems and possible perched groundwater pathways to surface water receptors.

9.4.3 Buildings

Potential pathways from off-site sources to the on-site property receptor include:

- Migration and accumulation of ground gas or vapours in buildings or structures.

Phase I Desk Study Report

9.5 Preliminary Risk Assessment

Based on the stated potential sources of contaminants identified and the receptors and pathways described, an assessment of the environmental risks has been made with reference to the significance and degree of risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of a major or minor significance.

A preliminary Conceptual Site Model (CSM) of the Potential Pollutant Linkages (PPL) has been developed based on the information derived from this desk study for the site. This CSM has been used to identify potentially Relevant PPLs for the current and proposed end uses which have been assessed qualitatively using CIRIA 552 guidance, as described in Table 9.1 and Table 9.2.

Table 9.1 Classification of Consequence

Consequence	Criteria
Severe	Short term (acute) risk to Human Health likely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Short term risk of pollution of sensitive water resource. Catastrophic damage to buildings / property
Moderate	Chronic damage to Human Health likely, over a long term, to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Pollution of sensitive water resources
Mild	Health effects to Human Health that are unlikely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings / structures / services or the environment
Negligible	Non-permanent health effects to Human Health that are unlikely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Those that are easily prevented by means such as personal protective clothing. Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.

Phase I Desk Study Report

Table 9.2 Classification of Probability

Probability	Criteria
Almost Certain	Circumstances are such that an event either appears very likely in the short term and almost inevitable over the long term or there is evidence of currently harm occurring
Likely	Circumstances are such that an event, whilst not inevitable, is possible in the short term and is likely to occur over the long term
Unlikely	Circumstances are such that it is possible an event could occur, but it is by no means certain to occur even over a longer period, and it is less likely in the shorter term
Very Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable even in the medium to long term
Extremely Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are highly improbable even in the long term

Once the consequence and probability have been classified, these can then be compared to produce a risk category (using Table 9.3), ranging from **Very High Risk** to **Very Low Risk**, with the definitions summarised in Table 9.4.

Table 9.3 Comparison of Consequence against Probability

Consequence Probability	Severe	Moderate	Mild	Negligible
Almost Certain	Very High Risk	High Risk	Moderate Risk	Low Risk
Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
Unlikely	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
Very Unlikely	Low Risk	Low Risk	Very Low Risk	Very Low Risk
Extremely Unlikely	Very Low Risk	Very Low Risk	Very Low Risk	Very Low Risk

Phase I Desk Study Report

Table 9.4 Description of the Classified Risks and Likely Action Required

Risk	Criteria
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action
High	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
Moderate	It is possible that without appropriate remediation action, harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild
Low	It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at works, if any harm were to be realised, any such effects would be mild.
Very Low	There is very low possibility that harm could arise to the receptor, but it is likely that this harm, if realised, would be mild at worst

In accordance with CLR11, professional judgement has been employed to evaluate the risk on a qualitative basis using available information.

A summary of the pollution linkages identified during the desk study are provided in Table 9.5.

Phase I Desk Study Report

Table 9.5 Conceptual Site Model of Potential Pollutant Linkages

Source	Receptor	Pathway	Risk	Discussion
Contaminants in soil, soil derived dust, surface water run-off, groundwater, and as vapours/ground gas	New Residents	<ul style="list-style-type: none"> • Dermal contact or ingestion contaminants in soil-derived dust and entrained surface water run-off from areas where soil is exposed at the surface or where excavation takes place and in shallow groundwater in the natural strata if excavation takes place below the water table. • Inhalation of contaminants in soil derived dust from areas where soil is exposed at the surface of where excavation takes place. • Inhalation of soil and water derived vapours and ground gas outdoors • Inhalation of soil derived, and water derived vapours and ground gas indoors where it may have accumulated in buildings and enclosed spaces. 	Moderate/Low	<p>Possible soil contaminants around the ground of the barns associated with historical farming use and past construction and demolition of buildings.</p> <p>Possible sources of asbestos containing materials within the current buildings.</p> <p>Potential contaminants in the form of heavy metals, hydrocarbons and asbestos.</p>
	Construction Workers	<ul style="list-style-type: none"> • Dermal contact or ingestion contaminants in soil-derived dust and entrained surface water run-off from areas where soil is exposed at the surface or where excavation takes place and in shallow groundwater in the natural strata if excavation takes place below the water table. • Inhalation of contaminants in soil derived dust from areas where soil is exposed at the surface of where excavation takes place. 	Low	Construction workers will wear necessary PPE during the development works, thus reducing any risk of contact with potential contaminants.
Contaminants in Soil	Groundwater within the underlying soils and bedrock (Principal Aquifer)	<ul style="list-style-type: none"> • Leaching of contaminants and/or migration of free phase contaminants from the unsaturated zone soils to groundwater in the natural strata • Vertical migration of contaminants in shallow groundwater to deeper strata and aquifer 	Low	The aquifer is likely to be at a depth that will not be affected by potential soil contaminants
Contaminants in soil, surface water runoff, groundwater and as vapours/ground gas	Surface Water	<ul style="list-style-type: none"> • Lateral migration of contaminants and/or migration of free phase contaminants present in the Made Ground via groundwater to surface water discharge • Lateral migration of contaminants and/or migration of free phase contaminants present in the Made Ground and entrained in surface water runoff 	Low	No surface water features on the site are deemed to present a risk to future human usage.
Contaminants in soil, groundwater and as vapours/ground gas	Building	<ul style="list-style-type: none"> • Accumulation of soil and water derived vapours/and or ground gas in enclosed spaces 	Low	No Risk
Contaminants in soil	Water Supply Routes	<ul style="list-style-type: none"> • Migration of heavy metal contaminants into newly placed water supply routes 	Low	No Risk

Phase I Desk Study Report

10.0 Conclusions

The site is proposed to be re-developed with the conversion of the existing barns into three new residential properties with a new driveway.

Potential on-site sources of contamination have been identified as possible soil contamination around the buildings due to historical farming use in addition to potential Made Ground associated with historical demolition and construction on site through the years. Possible asbestos containing materials were also identified on site.

Potential off-site sources of contamination have been identified as possible ground gases associated with the nearby historical colliery.

In summary, on the basis of the above listed contaminant sources it is concluded that:

- Contaminants are possibly present in, on or under the land at the site from on-site sources; and
- Future on site receptors to any form of contamination have been identified as the construction workers, residents, the new buildings, surface water and the groundwater.

A qualitative risk assessment of the identified potential pathways of contamination to the site have been summarised in Table 9.5. The following risks have been designated:

- Future Human Receptors –Moderate/Low Risk
- Construction Workers –Low Risk
- Groundwater –Low Risk
- Surface Water –Low Risk
- New Buildings – Low Risk
- Utilities – Low Risk

Phase I Desk Study Report

Based on the review of all available historical data, it has been established that overall, a **MODERATE/LOW** risk of potential pollutant linkage to the site exists. This risk has been identified due to the potential for soil contamination on-site.

11.0 Recommendations

Due to the potential for contaminated soils beneath the site in addition to possible sources of asbestos it is recommended that a number of samples of the shallow soils in any proposed soft landscaped garden areas are collected and sent to be tested for a range of potential contaminants, including heavy metals, hydrocarbons and asbestos. The following works are recommended:

- Hand Dug Trial Pits in areas of proposed landscaped back gardens to obtain shallow soil samples for contamination testing;
- Soil laboratory contamination testing

12.0 References

- BS 5930: (2015) Code of Practice for Site Investigations. British Standards Institution.
- BS 10175: (2011) Code of Practice for the Investigation of Potentially Contaminated Sites. British Standard Institution.
- CIRIA 552: (2001) Contaminated Land Risk Assessment, A guide to good practice.