



**POLLARDS FARM, DITCHLING ROAD,
BURGESS HILL RH15 0SE
PHASE I GEO-ENVIRONMENTAL
ASSESSMENT ("DESK STUDY")
PWX CONSTRUCTION LTD
27TH FEBRUARY 2025
LS8322**

Site:	POLLARDS FARM, DITCHLING ROAD, BURGESS HILL RH15 0SE	
Title:	PHASE I GEO-ENVIRONMENTAL ASSESSMENT ("DESK STUDY")	
Project:	CONVERSION OF AGRICULTURAL BARN INTO A DETACHED HOUSE	
Client:	PWX CONSTRUCTION LTD	
Date:	27 TH FEBRUARY 2025	
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1.0 INTRODUCTION

1.1 General

Land Science was instructed to undertake a Phase I Geo-Environmental Assessment ("Desk Study") in relation to the change of use with a proposed single dwelling residential development at Pollards Farm, Ditchling Road, Burgess Hill RH15 0SE. The location is shown on Figure 1, which is centred at grid reference TQ 33220 18288.

1.2 Client

The Client for this appointment was PWX Construction Ltd. This report may only be used by this named client and their project team for the purposes set out and subject to the report conditions. It was understood that the Client already owned the property, and that this investigation was not a pre-purchase appraisal.

1.3 Area Under Investigation

The area under investigation comprised a small redundant former agricultural building. The layout is indicated on Figure 2, and a walkover survey is presented in section 2.0. The area was approximately 0.03 hectares.

1.4 Proposed Development

The proposed development was understood to comprise the conversion of the redundant former agricultural building to a 1.5 storey, four bedroom, residential dwelling. The proposed development was covered under planning application number DM/22/0797. Figure 3 illustrates the layout of the proposed redevelopment. The findings of this report may not be valid if the proposed development is altered.

1.5 Previous Investigations

Land Science was not aware of any previous desk studies or ground investigation(s) for this project.

1.6 Scope of Work

The work carried out is described in detail in the following sections but in summary included:

- A phase I geo-environmental assessment desk study.
- Full site inspection to identify areas of concern or indicators of potential hazards.
- Phase I preliminary risk assessment and CSM.
- Recommendations for phase II intrusive investigation works (if required).

The walkover was conducted on 24th February 2025 under the supervision of Land Science.

1.7 Geo-Environmental Objectives

A preliminary phase I assessment was carried out, to identify potential sources of contamination, to develop a preliminary Conceptual Site Model (CSM) and to form the basis of a Preliminary Risk Assessment (PRA).

The report was required to assess risks associated with end users, the proposed redevelopment, adjacent land uses, and the wider environment, in the context of the planning regime.

1.8 Standards

Where practicable, the investigation was undertaken in accordance with the following primary standards and guidance:

- Land Contamination Risk Management (LCRM) Environment Agency 2023.
- BS10175:2011+A2:2017, Investigation of Potentially Contaminated Sites.
- National Planning Policy Framework, December 2024.
- Building Regulations Approved Document C: Site preparation and resistance to contaminants and moisture, HM Government, September 2013.
- NHBC Standards Chapter 4.1: Land Quality - Managing Ground Conditions, 2024.

Other technical sources have been cited in respect of specific aspects of the investigation, as referenced throughout the text.

2.0 WALKOVER SURVEY

2.1 General

A walkover survey was carried out in order to provide an assessment of the existing site conditions and to identify potential areas of concern. A record of the inspection is shown in Appendix A, with photographs in Appendix B.

2.2 Site Description

In summary, the area under investigation comprised a redundant former agricultural barn situated approximately 25m to the south of the large residential 'Pollards Farm' and approximately 13m to the north of 'Pollards Farm Cottage' including a property with outbuildings.

The site was accessed from the B2112 via the road Pollards Farm, which led to the large residential 'Pollards Farm'. The site was roughly rectangular in shape with the majority of the site being the barn, measuring 12m in length by 6m in width with a height of approx. 4m. The barn had a concrete footprint and was timber clad, and split in half lengthways east-west, with an open half to the south. There was a side access door and a front sliding access door. The roof was pitched and constructed from black plastic sheeting and roofing tiles. Although the barn dates back to approx. 2006 (according to the maps), with no expected or noted Asbestos Containing Materials (ACM), the condition of the barn was poor with sections of roofing missing.

Inside the barn it had plywood panelling and the ceiling had strip lighting. There was a work bench, wooden ladder and some wooden pallets. The open section contained construction materials including sandbags, wooden pallets, tiles, brick and stacked chopped wood from recent tree felling.

The concrete hardstanding extended from the barn east to the access road. The surrounding area had exposed ground comprising yellow-brown clay following recent site clearance of any vegetation using an excavator. The surface appeared churned up and rutted. Adjacent the southern section of the barn the ground had been excavated and a drainpipe had been exposed with standing water.

There was Heras fencing along the site borders to the north, east and west, with wooden panelling beyond the site border line to the south.

2.3 Neighbouring Land

The northern and western borders had dense scrub and trees, including a large mature oak tree >10m in height within 5m of the existing barn. 'Pollards Farm' was beyond to the north, whilst a field and new housing estate were to the west. To the east was open scrubland with scattered trees before the B2112 road. To the south was the 'Pollards Farm Cottage' including a property with outbuildings.

2.4 Geo-Environmental Conditions

The walkover survey did not identify any areas of particular concern regarding the geo-environmental condition of the site. No significant evidence of tanks, chemical storage, staining or sheens, built up ground, contaminative land uses etc. were noted.

2.5 Geotechnical Conditions

The walkover survey identified the following areas of concern regarding the geotechnical condition of the site.

- A tall mature oak tree >10m in height approx. 5m to the north of the site and a further tree approx. 10m in height from 10m beyond the southern border line. Although the oak was outside the site its canopy overhung the existing barn.

3.0 DESK STUDY

3.1 General

A desk study was carried out to inform the preliminary conceptual understanding of the site and its setting, and to identify potential aspects of concern, in the context of the stated report objectives.

3.2 Historical Mapping

Various historical records were reviewed to assess potential historical land uses and activities that may impact on ground conditions at the site.

A set of historical ordnance survey maps was obtained from Envirocheck and a copy is presented in Appendix C. The following key features were noted:

On site

- The earliest map dated 1875 showed the site comprised two sections of land with a few trees. A boundary line existed in the eastern half of the site, trending north-south.
- By 1897 the boundary line appeared to be a water channel/drainage ditch, however this was no longer shown by 1910 and no significant changes were noted until 1988 when the site became a section of one larger field until 2006.
- By 2006 the majority of the site was shown as a building, assumed to be the present barn.
- The latest map dated 2024 showed the site to be in a broadly similar layout to present day.

Off site

- The earliest map dated 1875 showed a cluster of buildings including a well (later a pump) adjacent site to the south with a few tracks leading north, east and south. Fields were present to the west whilst rough pasture (later shown as Ditchling Common) was present to the east. A railway line (with part embankment) was present 200m southwest trending northwest to southeast. A water channel passed the site in the southeastern corner, flowing from west to northeast with small ponds located approx. 25m southeast, 25m and 75m southwest. A large fish pond with sluice was located approx. 250m southeast flowing northwest.
- By 1937 a further building was located approx. 60m south of the site.
- By 1955 a small building was located approx. 50m north of the site.
- By 1985 the building to the north had been redeveloped into a large building approx. 30m north of the site and a further building was located approx. 40m south of the site.
- The latest map dated 2024 showed the surrounding area to be in a broadly similar layout to the present day.
- The historical map set included aerial photographs dated 1947 and 1999. The 1947 imagery showed the site as part of the larger Pollards Farm surrounded by agricultural fields and open land with a main road approx. 90m east trending north-south. The 1999 imagery showed the site as a section of land with some trees along the borders.

3.3 Aerial Imagery

Recent aerial photography covering the site was examined using Google Earth Pro. The 2001 imagery identified the barn on site with concrete surfacing to the east. 'Pollards Farm' was present with a swimming pool to the north. By 2009 there were two shipping containers or vehicles adjacent south

of the barn, however these were no longer shown by 2012. By 2020 'Pollards Farm' had been redeveloped and the swimming pool was no longer shown. Between 2021 and 2023 the roof of the barn appeared to be under maintenance. By 2023 the new housing estate was being constructed northwest of the site.

Google Street View, satellite imagery (2025) showed the barn in a poor state of repair partly under the canopy of a large tree which was located to the north, with further trees along the northern and western borders. Areas to the east and south of the barn had potential fly-tipping waste stacked and scattered over the concrete and grass areas.

Historic England photo archive was checked although there was little imagery in the rural area. However, the Pollards Farm Cottage adjacent to the south was recorded as a listed building for architectural or historic interest.

3.4 Historic Land Use Data

A brief internet search was carried out, which showed a photo of the barn when the estate agent Brock Taylor advertised the property at Pollards Farm (no date provided). The barn was timber clad and open to the south showing some hand tools, with a sliding door located on the eastern wall.

3.5 Current Industrial Land Use Data

The desk study included a search of contemporary land use records from various databases. Such land uses may impact on the condition of the site and the vicinity. The following significant land use information was identified:

Discharge Consent – five off site:

- Pollards Farm (Cottage) 24m south - domestic property with sewage discharges for final/treated effluent to stream/river, dated 1972.
- Old Cottage 65m southwest - domestic property with sewage discharges for final/treated effluent to stream/river, dated 1992.
- Pollards Orchard 71m east and 78m south - domestic property with sewage discharges for final/treated effluent to stream/river, dated 1991 and 2010 respectively.
- Paygate Cottage 218m south - domestic property with sewage discharges for final/treated effluent to stream/river, dated 1999.

Contemporary Trade Directories

There are no contemporary trade directories within 500m of the site.

Points of Interest

There are no points of interest within 50m of the site.

Whilst other records were identified, these were unlikely to be significant in terms of this project due to a combination of their size, distance from the site, and the intervening geology and hydrogeology.

3.6 Planning Portal

The online planning portal for Mid Sussex District Council was checked with records between 2000 and present day reviewed. Several entries were recorded for the immediate area but there were no specific details pertaining to ground conditions or contamination.

The following table summarises details considered to be relevant to the site and immediate area.

Planning reference	Proposal	Relevant information within the submitted documents
Planning application DM/18/5124 (2019)	Offsite at Pollards Farm: Demolition of existing conservatory and garage extension and replacement with new two-storey extension and garage block with roof accommodation. Alternations to private access drive and forecourt within the property demise.	A great crested newt survey was carried out in 2019, which recommended a mitigation strategy was required during the works. A preliminary ecological appraisal report was carried out in 2019, which recommended further protected species surveys, protection of important ecological features and to enhance ecology. A bat survey was carried out in 2019, which recommended a mitigation strategy, lighting precautions, and ecological enhancements.
Planning application DM/25/0361 (2025)	Replacing .05 2w overhead line with 95ABC for site and surrounding properties.	Plan showing where five spans of overhead line were located.

3.7 Ground Conditions

A preliminary ground model was derived for the site based on a combination of various sources including published maps, borehole records (BGS borehole ref. TQ31NW13), previous investigations, and the site history. In summary, the following potential ground model was identified:

Strata	Approximate Depth (mbgl)	Summary Description
Made Ground	<1m	The site has been subject to previous development and there is a potential for construction and demolition wastes, imported fill materials, and zones of disturbed ground, etc.
Superficial		None recorded
Bedrock – Weald Clay Formation – sandstone and mudstone	To depth	Dark grey thinly-bedded mudstones (shales) and mudstones with subordinate siltstones, fine- to medium-grained sandstones, including calcareous sandstone.

In addition, groundwater was anticipated, as follows:

- Perched water – in granular soils upon cohesive soil.

3.8 Geological Hazards

The desk study included searches of geological hazards. None of the hazards were rated as moderate or above, considered the screening threshold for further investigation.

A search of various databases for coal mining, mining, brine compensation, and natural cavities was carried-out. No relevant features were identified.

3.9 Environmental Setting

The site lies in the following groundwater setting:

- Superficial aquifer: None - No superficial strata were classified.
- Bedrock aquifer: Weald Clay Formation:
 - The sandstone was classified as a Secondary A aquifer - Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
 - The mudstone was classified as Unproductive strata - Low permeability strata that have negligible significance for water supply or river base flow.
- Source protection zone: the site does not lie within a source protection zone.
- Flooding from Rivers and Sea: Zone 1 Low Probability - Land having a less than 1 in 1,000 annual probability of river or sea flooding.
- Surface water flooding on site: Low risk - each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.
- Groundwater flooding on site: potential for groundwater flooding to occur at surface.
- Nearest Surface Water Feature: small drainage channel 7m east.
- Water Network Lines: inland river (underground) 1m southeast, in the Adur and Teville catchment area.
- Water Framework Directive: site is within the Adur and Ouse catchment area.
- Nitrate Vulnerable Zone: Adur East (Sakeham) Nvz - Surface water

Protected habitats

There is a SSSI site, Ditchling Common 17m east of the site.

3.10 Radon Gas

The requirement for Radon Protection Measures (RPM) has been assessed in accordance with BRE 211:2023 Public Health England and the BGS estimate the potential for radon and the requirement for Radon Protection Measures on site as follows:

- Radon probability: Not at risk - less than 1% of homes are estimated by PHE to exceed the threshold for Radon gas in residential dwellings.
- Radon Protection Measures (RPM): No Radon protection is required for new dwellings or extensions constructed at this location.

3.11 UXO Risk Assessment

Free online maps suggest the risk from UXO might be low. As such, no further assessment is considered necessary at this stage.

4.0 CONCEPTUAL SITE MODEL (CSM)

4.1 Source-Pathway-Receptor (SPR) Model

The assessment of potential contamination risks follows a Source-Pathway-Receptor (SPR) approach, following established guidance and best practice. The principle of primary and secondary sources has been adopted:

- A **primary source** for instance a leaking tank or drainage, industrial activity, buried fill materials, etc. identified as part of the desk study and site walkover.
- A **secondary source** is the environmental media (or phases) in which any resulting contamination may occur, being soils, ground gases, volatile vapours, and groundwater:

Secondary Source	Summary
Soil	Soils (Made Ground) contaminated with materials such as ash, clinker, bitumen, refuse, wastes, asbestos, etc. [Endogenic] or soils contaminated by discharges, spillage, drainage, run-off, migration etc. of contaminants from diffuse or point sources [Anthropogenic].
Groundwater	Mobile contaminants entering groundwater, being either perched water (impermeable horizons such as clays or buried structures) or as a water table (more persistent water bodies within productive strata).
Volatile vapours	Volatile or semi-volatile compounds generating vapours which exist in a gas phase and may be generated from soils, groundwater or directly from storage such as underground tanks.
Ground gases	Ground gases occurring from a variety of natural and man-made sources, principally from the decomposition of waste materials, organic matter, organic contaminants. Examples include landfill sites, alluvium, and mine workings etc.

4.2 Qualitative Risk Assessment Framework

A qualitative estimate of risk associated with the identified source-pathway-receptor linkages has been made. Each source, pathway and receptor in each linkage is given a rating from 0-5, and the overall rating for the linkage is expressed as a multiple of the three numbers. The overall risk ratings are concluded in the next chapter (Preliminary Risk Assessment).

Rating	Source	Pathway	Receptor	SPR Linkage
Unlikely	0	0	0	0
Very Low	1	1	1	1-3
Low	2	2	2	4-17
Moderate	3	3	3	18-48
High	4	4	4	49-100
Very high	5	5	5	100+

The scoring is based on professional judgement and qualitative assessment of various factors:

Source - Whether it is on-site or off-site, the distance from the site, the age and time period, the history and evolution, whether it has been redeveloped and when, the overall magnitude or extent, any existing data or observations. Sources are identified from the conceptual site model.

Pathway - Proximity and relationship to the associated receptor, frequency, the ground conditions, flow directions, migration pathways. Pathways may vary between each source and each receptor.

Receptor - Direct or indirect effects, human health or non-human receptor, age classes, exposure duration and frequency, types of activity, materials, existing evidence of harm, quality of the receptor and significance of any harm. This will depend on any existing or proposed site uses.

Potential sources and receptors are identified first, before identifying whether any active realistic pathways exist between them.

4.3 Primary Sources

Potential sources of contamination were identified and rated as follows:

Primary sources	Soils	Ground Water	Vapours	Ground Gases
Made Ground <1m – widespread (on site)	Moderate	Very Low	Unlikely	Unlikely
Agricultural barn (on site)	Very Low	Low	Very Low	Unlikely
Agricultural land – fields (offsite)	Very Low	Very Low	Unlikely	Unlikely
OVERALL RATING	Moderate	Low	Very low	Unlikely

Made Ground (on site)

The site may be situated on a subbase or compacted ground underneath the concrete hardstanding of the barn. These materials may contain a wide range of potential contaminants including metals, non-metals, organic contaminants and potential asbestos and therefore the likelihood of soil contamination is moderate. Although groundwater was not expected there is still a chance that contaminants may collect in perched water from the Made Ground and this was rated as very low. The depth of Made Ground was not anticipated to be greater than 1.00m and therefore was unlikely to be a significant source of ground gases. The potential for significant generation of organic vapours from Made Ground was also considered as unlikely.

Agricultural Barn (on site)

The proposed dwelling will be located on the existing agricultural barn's footprint. It is understood from the client that the existing foundations are likely to be removed and replaced with a slab of similar size, forming a barrier over the soils. Very little was recorded during the site walkover with regards to contamination. However, over time the barn may have been used for contaminative activities such as animal waste storage, the storage and use of fuels and vehicles and the use of persistent pesticides, although taking into account the age of the structure the potential for soil contamination was rated as very low. Although groundwater was not expected there is still a chance that contaminants may collect in perched water from the Made Ground and this was rated as low. The nature of barn's use on-site meant that the potential for significant generation of organic vapours was very low.

Agricultural Land (offsite fields)

The land surrounding the site to the west comprised open fields which may have been subject to contaminative activities such as the use of pesticides and the application of animal wastes and as such the likelihood of soil contamination is very low. Although groundwater was not expected there is still a chance that contaminants may collect in perched water from the Made Ground and this was rated as very low. The composition of the surrounding exposed soils and land usage showed that the potential for the significant generation of both organic vapours and ground gases was unlikely.

Waste management facilities where soil and wastes are deposited in the ground can be significant sources of ground gases. No registered waste management facilities where landfilling has occurred were identified on site or within the vicinity.

4.4 Potential Receptors

The following potential receptors associated with the site and the proposed development have been considered in this report:

Receptor	Rating	Justification
End Users	High	Occupants of the proposed redevelopment. The proposed development comprised a residential house with potential private garden area.
Adjacent Land	Moderate	Sensitive land uses identified locally. The site had residential dwellings to the north and south.
Soft Landscaping	Moderate	Areas of planting including lawns, shrubs, trees, etc. The existing soft landscaping was to be retained. No evidence of existing plant phytotoxicity was observed and was unlikely to be a significant issue.
Structural Concrete	Moderate	New foundations etc. cast in contact with the ground. The development was anticipated to include shallow foundations.
Water Supply Pipework	Moderate	Water supplies may be damaged or tainted when mains are laid in contaminated ground. New potable water mains are to be laid.
Groundwater	Low	Water below ground in permeable strata: The site overlies strata (sandstone and mudstone) which is recorded partly as a secondary aquifer and partly as unproductive strata, therefore has a limited potential as a resource for potable or commercial abstractions. The background chemical quality of the aquifer is to be considered. The site does not lie within a groundwater SPZ.
Surface Water	Moderate	Surface water in lakes and rivers etc. A culverted drainage channel passes the southeastern tip of the site flowing west to northeast with the surface channel approx. 7m east. There are also several ponds in the local vicinity, the closest is 25m southwest of the site.

4.5 Receptors Excluded

The following potential receptors were excluded from the assessment as they are covered by other legislative controls and are outside the remit of this report.

- Ecological receptors such as statutory protected species or wildlife areas. An assessment of such risks was outside the scope of this report.

- Site workers such as those involved in construction work or future maintenance. Any risks posed to site workers would be controlled through Health & Safety legislation, including the CDM and COSHH regulations etc.

5.0 PRELIMINARY RISK ASSESSMENT (PRA)

5.1 SPR Linkages and Risk Ratings

The source-pathway-receptor linkages identified are summarised below:

Soils	Pathways	Rating	Receptor	Rating	Overall Rating
Moderate	Dermal contact with soil and soil-borne dust	Very high	End Users	High	High
Moderate	Ingestion of soil and soil-borne dust	Very high	End Users	High	High
Moderate	Inhalation of soil-borne dust	Very high	End Users	High	High
Moderate	Consumption of homegrown produce	Low	End Users	High	Moderate
Moderate	Inhalation of soil-borne dust	Moderate	Adjacent Land	Moderate	Moderate
Moderate	Plant uptake, phytotoxic effects	High	Planting	Moderate	Moderate
Moderate	Chemical attack	High	Concrete	Moderate	Moderate
Moderate	Chemical attack	High	Pipework	Moderate	Moderate
Moderate	Leaching-out, migration to water table	Low	Groundwater	Low	Low
Moderate	Leaching-out, migration to water bodies	High	Surface Water	Moderate	Moderate

Ground water	Pathways	Rating	Receptor	Rating	Overall Rating
Low	Direct contact	Unlikely	End Users	High	Unlikely
Low	Direct contact	Unlikely	Adjacent Land	Moderate	Unlikely
Low	Plant uptake, phytotoxic effects	Very Low	Planting	Moderate	Low
Low	Chemical attack	Very high	Concrete	Moderate	Moderate
Low	Chemical attack	Moderate	Pipework	Moderate	Moderate
Low	Migration to Controlled Water receptor	Low	Groundwater	Low	Low
Low	Lateral migration to water bodies	Moderate	Surface Water	Moderate	Moderate

Vapours	Pathways	Rating	Receptor	Rating	Overall Rating
Very low	Inhalation, ignition	High	End Users	High	Low
Very low	Inhalation, ignition	High	Adjacent Land	Moderate	Low
Very low	Root asphyxiation, phytotoxic effects	High	Planting	Moderate	Low
Very low	Not a significant hazard	-	Concrete	Moderate	Unlikely
Very low	Chemical attack	High	Pipework	Moderate	Low
Very low	Not a significant hazard	-	Groundwater	Low	Unlikely
Very low	Not a significant hazard	-	Surface Water	Moderate	Unlikely

Ground Gasses	Pathways	Rating	Receptor	Rating	Overall Rating
Unlikely	Inhalation, ignition	High	End Users	High	Unlikely
Unlikely	Inhalation, ignition	Unlikely	Adjacent Land	Moderate	Unlikely
Unlikely	Root asphyxiation, phytotoxic effects	Moderate	Planting	Moderate	Unlikely

Unlikely	Not a significant hazard	-	Concrete	Moderate	Unlikely
Unlikely	Not a significant hazard	-	Pipework	Moderate	Unlikely
Unlikely	Not a significant hazard	-	Groundwater	Low	Unlikely
Unlikely	Not a significant hazard	-	Surface Water	Moderate	Unlikely

5.2 Other Factors

The following other areas of possible concern were identified, but were outside the geo-environmental risk assessment:

Site managers are responsible for the safety of persons in their employ under a variety of instruments including the CDM regulations and Health & Safety at Work Act. In terms of working on contaminated sites, guidance can be sought from the CIRIA publication entitled "A Guide for Safe Working on Contaminated Sites". Any work in confined spaces should only be carried out following appropriate risk assessment. Detailed risk assessment for workers is outside the scope of this report.

Weil's Disease is a bacterial infection spread by animals caused by *Leptospira* bacteria. Leptospirosis generally causes mild flu-like symptoms, such as headache, chills and muscle pain, but in severe cases can be life-threatening and cause organ failure and internal bleeding. Leptospirosis can be caught by touching soil or water contaminated with the urine of wild animals (generally cattle, pigs, dogs and rodents, particularly rats) infected with the bacteria. Higher risks may arise through contact with sewage or freshwater. Leptospirosis is rare in the UK; only 55 cases were confirmed by laboratory testing in England and Wales between 2020 and 2023 (many of the cases originated overseas).

Damaging, disturbing or removing protected species can result in prosecution under a range of environmental legislation. Potential impacts on the ecological environment include:

- Disturbance of birds, badgers, bats and other protected species
- Removal and fragmentation of habitats
- Disturbance to aquatic wildlife and water quality
- Disturbance to wildlife from noise and vibration
- Damage to trees and hedgerows.

It is recommended that the advice of an appropriately qualified ecologist should be sought prior to undertaking any works.

6.0 SUMMARY PHASE I ASSESSMENT

6.1 Qualitative Ratings

Overall, the level of risk ranged between unlikely and high. Consequently, a **High** level of risk has been assigned to the site in respect of the proposed development. This is primarily due to the Made Ground below the barn and the proposed residential end use.

6.2 Recommendations

It would be necessary to undertake basic ground investigation works, which may include;

- Shallow boreholes, or trial pits, to assess the composition and depth of any Made Ground and any field evidence of contamination into the underlying soils.
- Selected samples (including materials bearing field evidence of contamination) should be sent for laboratory analysis. The main analytical suite is identified below.
- Soil samples should be screened for vapours using a Photoionisation Detector (PID).
- Positions should be located in areas of concern; i.e. targeted to specific points of potential contamination such as the Made Ground underlying the hardcover concrete of the barn, and in receptor sensitive locations such as proposed garden area, below the footprint of the dwelling, in the location of buried services, etc.
- Positions should be located adjacent to the site boundaries, to evaluate the potential for contamination to have migrated laterally offsite and impact on adjacent land users.
- Samples of any perched water should be collected for laboratory testing.

The analytical suite, based on the known site history and walkover survey, should include:

- General parameters: acidity (pH), fraction of organic carbon.
- Metals; arsenic, cadmium, chromium (total), lead, mercury, selenium, boron, copper, nickel and zinc.
- Non-metals: water soluble sulphate, sulphide, total cyanide.
- Targeted organic parameters; TPH (speciated), BTEX, speciated PAHs, VOCs and SVOCs, scheduled based on PID screening and field evidence etc.
- Visual asbestos screening of all Made Ground samples. Where possible asbestos fibres or ACMs are identified, these should be examined under a microscope to determine type and quantification tests should be carried out.

Further positions may be required, additional samples analysed or additional determinands added to the analysis, as appropriate, based on any field evidence of possible contamination encountered.

In addition, the requirement for Waste Acceptance Criteria (WAC) testing should be considered to categorise soils in terms of disposal.

It would be prudent to confirm the scope of ground investigation works with the Local Authority and other stakeholders before carrying out these works.

REFERENCES

A number of technical references have been referred to in the preparation of this document, including:

- Smith, I. (2014) Smith's Elements of Soil Mechanics. Chichester. Wiley Blackwell. 9th edition.
- Highways England 2009. Interim Advice Note 73/06 revision 1: Design Guidance for Road Pavement foundations (draft HD25).
- BRE Design Guide 365. Soakaway design ("DG365").
- Radon: Guidance on protective measures for new buildings, BRE Report BR 211, 2023 6th edition.
- Groundwater protection: Principles and practice (GP3) August 2013 Version 1.1.
- Revised EU Waste Framework Directive 2008 2008/98/EC [transposed into English law under The Waste (England and Wales) Regulations 2011].
- European Community (EC) Directive 1999/31/EC [transposed into English law under the Landfill (England and Wales) Regulations 2002].
- Defining Waste Recovery - Permanent Deposit of Waste on Land, EPA13 v1.0, EA 2010.
- The definition of waste: Development Industry Code of Practice, v2, CL:AIRE 2011.
- Guidance on the classification and assessment of waste Technical Guidance WM3 ("WM3") EA publication (1st edition 2015).

REPORT CONDITIONS

The Client

This report may only be used by the client named in section 1 and their appointed project team for the purpose of design, obtaining planning, building regulations approval, and in connection with finance. This report must not be used by any other persons or for other purposes without express written agreement of Land Science.

General

Land Science takes all reasonable professional care in the preparation of this report, using current standards and industry practice. However, the evaluation of ground conditions depends on an interpretation and extrapolation of the conditions revealed by a limited data set. The level of risk is related to the extent of investigation and no site is ever free of risk. The client should understand their risks and liabilities. We accept no liability whatsoever in respect of:

- The scope, extent or design of an investigation.
- Any conditions not directly revealed by the investigation.
- Published standards or methodologies used or adopted in this report.
- The opinion of any other party including any regulator, authority or stakeholder.
- Any dispute, claim or consequential loss arising from any findings of this report.
- Third party information and data.

This report relates solely to ground-related matters as set out in the objectives and makes no representation on other matters such as ecology, arboriculture, invasive plant species, the condition of buildings and structures, hazardous building materials such as insulation or asbestos, the locations of boundaries, unexploded ordnance, and or planning constraints etc. Further reports should be commissioned in this respect as appropriate.

Regulators and Approvals

This (and any other) report should be submitted to relevant authorities for their own assessments and to provide their approval or comments accordingly. This should be in good time before commencing on site in case additional work is to be carried out.

Standards, technical guidance and regulatory positions change over time and which may therefore affect the findings and recommendations made in this report; this should be verified by the client prior to any critical project milestones. Where this information is used in design, the designer should verify that the information is appropriate and has been used correctly.

Variations with Time

The report relates to conditions revealed at the time of the investigation and any monitoring visits. Some parameters may vary over time or seasonally; groundwater levels, ground gas compositions, or concentrations of contaminants are particularly variable in this respect. Further monitoring or verification should be considered as appropriate.

GLOSSARY OF TERMS

ACM	Asbestos Containing Material
BGS	British Geological Survey
BRE	Building Research Establishment
BS	British Standard
C4SL	Category 4 Screening Level
CBR	California Bearing Ratio
CDM	Construction Design and Management regulations
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLEA	Contaminated Land Exposure Assessment model
CSM	Conceptual Site Model
EA	Environment Agency
EQS	Environmental Quality Standards
FOC	Fraction of Organic Carbon
GAC	Generic Assessment Criterion
GQRA	Generic Quantitative Risk Assessment
mbgl	Meters Below Ground Level
NHBC	National House Building Council
mOD	Metres above Ordnance Datum
PAH's	Polycyclic Aromatic Hydrocarbons
PHE	Public Health England
PID	Photo-Ionisation Detector
PQRA	Preliminary Quantitative Risk Assessment
PSD	Particle Size Distribution Test
RMS	Remediation Method Statement
S4UL	Suitable for Use Level
SOM	Soil Organic Matter
SPZ	Source Protection Zone
SPT	Standard Penetration Test
SSSI	Sites of Special Scientific Interest
ST-WEL	Short Term Workplace Exposure Limit
SVOC's	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRRL / TRL	Transport Road Research Laboratory
TWA-WEL	Time Weighted Average Workplace Exposure Limit
UK HBF	United Kingdom House Building Federation
VOC's	Volatile Organic Compounds
WAC	Waste Acceptance Criteria