

Prepared by:
Norfolk Partnership Laboratory, Norse Eastern Ltd, County Hall,
Martineau Lane, Norwich, Norfolk, NR1 2SG
Telephone (01603) 578389

Desk Study and Risk Assessment
Chandos Farm
Bull Road
Suffolk
104487
July 2023

Client: S Newson Walnut Tree Lodge Garden House Lane Rickenhall Suffolk IP22 1EA

i)	Contents	
1.0	Introduction	5
1.2 1.3 1.4	GENERAL REPORT OBJECTIVES SITE LOCATION SITE LAYOUT PLANNING APPLICATION	5 5 5 6 6
2.0	Desk Study	7
2.2 2.3 2.4 2.5 2.6	DESCRIPTION OF SITE AND SURROUNDINGS DESK STUDY RESEARCH UNDERTAKEN PAST AND CURRENT ACTIVITIES AT THE SITE INTENDED FUTURE USE OF THE SITE PLANNING APPLICATIONS OR PERMISSIONS AT THE SITE GEOLOGY HYDROGEOLOGY AND HYDROLOGY	7 14 15 19 19 20 21
3.0 I	dentification of potential contaminants of concern and source areas	22
3.2 3.3	CONSULTATIONS WITH THE LOCAL AUTHORITY CONSULTATIONS WITH THE ENVIRONMENT AGENCY CONSULTATIONS WITH OTHER APPROPRIATE BODIES REVIEW AND SUMMARY OF PREVIOUS REPORTS	22 22 22 22
4.0 F	Risk Assessment	23
4.2 4.3 4.4 4.5	CONCEPTUAL MODEL SOURCES OF CONTAMINATION POLLUTION LINKAGES RECEPTORS DESCRIPTION OF POSSIBLE POLLUTANT LINKAGES FOR CONTROLLED WATERS DISCUSSION OF UNCERTAINTIES AND GAPS IN INFORMATION	23 23 24 25 28 28
5.0	Discussion of risks posed by the site	29
	ON SITE MADE GROUND DEPOSITS POTENTIAL ASBESTOS CONTAINING MATERIALS (CEMENT BOARD CLADDING TO BARN)	29 29
6.0	Recommendations	30

Appendices

Appendix A Site location plan and site plan

Appendix B Geology report

Appendix C Historical land use and historical maps

Appendix D Full Envirocheck report

Appendix E Potential contaminative sources plan

Appendix F Conceptual site model

Appendix G Proposed layout

ii) Distribution

S Newson 1 copy

Norfolk Partnership Laboratory 1 copy

1.0 Introduction

1.1 General

This desk study was carried out at Chandos Farm, Bull Road, Thornham Parva, Suffolk (OSGR 610855/272853). Chandos Farm is located approximately 3.80 kilometres to the west of the town of Eye. Sandra Newson instructed Norfolk Partnership Laboratory (NPL) to carry out the work on an email dated 14/07/2023 after acceptance of NPL's quotation. NPL provides a service within Norse Eastern Ltd.

This investigation fulfils the requirements for a desk study and walkover survey as specified in NHBC Standards, Chapter 4.1 Land Quality - managing ground conditions, January 2019 edition. In addition, a risk assessment has been carried out to the requirements of The Environmental Protection Act Part IIA.

This report is inclusive of a full Envirocheck report, Envirocheck historical maps and historical land use. In addition, consideration is given to the health and safety of construction workers and subsequent residents that may be affected due to any soil contamination.

It is proposed to demolish the existing barn and construct a single residential dwelling.

Although every effort has been made to give a true assessment of the condition of the site within the constraints of the desk study, it is possible that different ground conditions or contamination may exist in parts of the site that is neither recorded nor visible. The risk of such occurrences should be further reduced by the main investigation if required.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

1.2 Report objectives

The objectives of these works are to assess contamination sources, pathways, and receptors, and to determine whether any contamination may be present either within the site boundaries or just outside the site. The report also assesses the extent to which human health, buildings and services and controlled waters may be affected. If contamination is thought likely to be present, recommendations will be made to ascertain the level of contamination and if these levels are within allowable limits.

1.3 Site location

The site is located to the north of Bull Road, in the village of Thornham Parva, Suffolk, (OSGR 631379/278357) which is approximately 3.8 kilometres west of the town of Eye.

A site location plan is in Appendix A.

1.4 Site layout

The study area is square in shape, relatively level and approximately 0.49 hectares in area. A spot height of 47.0m is shown on the Ordnance Survey on Bull Road close to the site entrance.

1.5 Planning application

The site is subject to the planning conditions of Babergh & Mid Suffolk District Council. An historical planning application ref DC/20/01498 is available to view on the planning portal.

2.0 Desk Study

2.1 <u>Description of site and surroundings</u>

A walkover survey was undertaken on 28 June 2023 by Mr S Berwick of Norfolk Partnership Laboratory.

The site is at the end of an unmade track accessed from Bull Road which is approximately 160 metres in length. The track is perpendicular to Bull Road for approximately 50 metres then gently curves 90 degrees to the west. The track accesses the development area in the south east corner.

The study area comprises a roughly square land parcel with a large agricultural barn (former grain store) located in the southern half, predominantly on the eastern side. The barn is a steel portal framed building with intact concrete floor slab. The concrete extends beyond the building by approximately 10 metres on the southern, eastern, and western sides. The walls of the barn are brickwork to half height with the remainder clad with cement board, the roof is also clad with cement board sheets. A small lean to storage shed is to the rear of the barn (north side) which was overgrown with vegetation. At the time of the walkover timber posts and rails and rolls of wire fencing were stored in the barn with some of the timber undergoing preservation. The newly preserved timber was stacked, drying on plastic sheeting in the barn. A number of items were stored on the concrete oversite on the east side of the barn which included wire fencing, a redundant tank, timber, drainage pipes, bricks, and some soil.

A small, corrugated tin shed was located close to the northern boundary. The shed was not accessed although an archaic item of unidentified equipment was present inside. The land to the north and west of the barn was grassed with three mature trees in the north west corner and a shallow pond which had been cleared of vegetation.

A dry surface water ditch was present along the northern boundary of the site. New timber fencing was present along the northern and eastern boundaries with agricultural land to the north and paddocks to the east. A hedgerow and fence formed the boundary on the west side with "The Old Rectory" beyond. A number of single storey brick and tiled and corrugated tin clad barns associated with Chandos Farm were along the southern boundary of the development area. Some corrugated tin roofing sheets, carpet and old lawnmower were present off site close to the barns.

No significant signs of contamination were noted on the walkover survey. The timber preservation was inside the barn on intact concrete with the drying timber stored on plastic sheeting.

A site location plan is included in Appendix A.



Photograph 1: Front elevation of barn (south side)



Photograph 2: West elevation



Photograph 3: North elevation



Photograph 4: East side with materials stored



Photograph 5: Building materials stored on concrete east side



Photograph 6: Materials stored on the slab.



Photograph 7: Drainage pipes stored on slab



Photograph 8: Corrugated tin shed close to northern boundary.



Photograph 9: Pond in the north west corner.



Photograph 10: Dry ditch along the northern boundary.



Photograph 1: Dry ditch along the northern boundary.



Photograph 12: Detritus off site to the south comprising mainly corrugated tin roofing sheets from adjacent barns.

2.2 Desk study research undertaken

In accordance with the recommendations of Chapter 4.1 of NHBC Standards desk study information has also been gathered from numerous sources. These are summarised below:

- Institute of Geological Sciences, Hydrogeological Map of Southern East Anglia, Sheet 1 Regional Hydrological Characteristics and Explanatory Notes.
- Institute of Geological Sciences, Hydrogeological Map of Southern East Anglia, Sheet 2 Chalk, Crag, and Lower Cretaceous Sands: Geological Structure.
- Institute of Geological Sciences British Regional Geology East Anglia and Adjoining Areas (Fourth Edition) 1961.
- British Geological Survey, East Anglia Sheet 52N00, Solid Geology; Scale 1:250,000.
- British Geological Survey, East Anglia Sheet 52N00, Quaternary; Scale 1:250,000.
- BGS Geology Sheet number 190
- Ordnance Survey Digital Map.
- Ordnance Survey Maps 1885, 1886, 1904, 1905, 1926, 1927, 1952, 1958, 1977, 1984, 2000, 2023.
- BRE BR211 Radon: Guidance on protective measures for new dwellings.
- BRE SD1 Concrete in aggressive ground.
- BS 10175:2011 Investigation of potentially contaminated sites.
- Department of the Environment Industry Profiles.
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings, 2007.
- BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

2.3 Past and current activities at the site

The boundary shown on the Envirocheck Report includes the development area and an additional area of barns and land to the south and east. This report will describe the square area to the north where the grain store is presently located, and the new dwelling proposed. The barns and land to the south will be described as off site.

Chandos Farm is annotated on the 1886 OS map. The roughly square development area is vacant with the exception of pond in the north west corner. A number of buildings are present to the south with the land to the east shown covered with deciduous trees. The carriageway layout is as it is presently with Church Lane and Howe Lane shown. St Marys Church, Rectory and Graveyard are annotated to the south with Carters Farm further to the south. The surrounding land is enclosed agricultural fields.

On the 1904 OS map the buildings associated with the farm are clearly defined. The development area remains vacant with the pond in the north west corner. A cluster of barns are to the south within the Envirocheck Report boundary and a number of buildings outside of the boundary known to be Chandos Farmhouse and associated barns. The land to the east is a small Orchard.

No change to the development area is shown on the 1926 OS map.

On the 1952 1:10560 OS a small square building is shown close to the northern boundary.

No changes are shown on the 1958 1:10000 OS map.

On the 1977 OS map the site is at it appears presently with the barn and concrete area to the south shown. The Rectory is annotated on the adjacent land to the west.

No further changes are shown on the 1994, 2000 and 2023 OS map.

The following information was taken from the Suffolk Heritage Explorer website and describes the Chandos farmhouse and barns outside of the development area to the south.

"Recorded as part of the Farmsteads in the Suffolk Countryside Project which was a desk-based study with no site visits undertaken. The records are not intended to be a definitive assessment of the buildings. Dating reflects their presence at a point in time on historic maps and there is potential for earlier origins to buildings and farmsteads. This project highlights a need for a more in depth field study of farmstead to gather more specific age data.

Chandos Farm lies 100m north of St Mary's church in Thornham Parva and appears to have been known as Grange Farm until its purchase during the late-18th century by the Duchess of Chandos and Lord Henniker's Thornham Estate.

At the time of the 1843 Tithe survey it formed a substantial tenanted arable holding of 158 acres. The site contains a grade II-listed farmhouse of circa 1600 with an extensive complex of farm buildings to the north and west. Most of these buildings have been

converted for residential use in recent years and this report concerns only the range to the north which consists of a large timber-framed double threshing barn and an adjoining complex of cattle yards and shelter-sheds.

The Tithe map shows a barn of similar scale in much the same position, but the present structures were built soon afterwards as part of a major refurbishment. Many of the previous barn's timbers were probably re-used in its replacement, which contained two threshing floors entered by gabled porches on the north. The five shelter-sheds were uniformly pantiled with walls of fashionable flint-rubble dressed in red-brick, and the barn was provided with 'two-tier' cladding of clay daub above weatherboarding, with the exception of one wall of its western porch, which was preserved within an early-20th century shed that probably served as a grain store, the barn was reduced in height by approximately 0.60m (2ft) in the mid-20th century. The roof was rebuilt at the same time and both its walls and roof are now clad chiefly in corrugated iron. It is accordingly unclear whether the barn was also pantiled initially to match the shelter-sheds or more steeply pitched for thatch. The easternmost shelter-shed has also been rebuilt in softwood, while some others have partly collapsed. Despite these depredations the group remains of historic interest as it illustrates the sophisticated and complex nature of the yard-based system of mixed animal husbandry known today as Victorian High Farming. It also reflects the status of the Thornham Estate (one of the largest and most important in Suffolk). Although reduced in height the barn remains an imposing building with a particularly well preserved original herringbone threshing floor of gault brick. The evidence of its 'two-tier' cladding is of special historic significance, illustrating a common appearance of local barns before tarred weatherboarding became ubiquitous during the second half of the 19th century."

Historical aerial images



1945 aerial image



The 1999 aerial image shows an additional lean-to section on the west side of the barn and three grain storage silos on the concrete slab to the east of the building.



The 2005 aerial image shows no significant changes to the development area. Off site to the south west a new barn conversion is visible.



The 2015 aerial image shows the silos to the east have been removed.



The lean-to section on the west side on the barn is present on the 2021 aerial image, on the most recent image this section has been removed.

2.4 Intended future use of the site

It is proposed to demolish the exiting barn and construct one dwelling with garage.

2.5 Planning applications or permissions at the site

The site is subject to the planning conditions of Babergh & Mid Suffolk District Council.

2.6 Geology

The geology of the region may be summarised as follows:

Pleistocene : Lowestoft Formation

: Crag

Crag was formed when, after a long period of standing above sea level, the area was submerged by a marine transgression caused by movements of the sea floor during a period of coastal instability in the region. The deposits are a variable series of yellowish or reddish-brown sands, laminated clays and pebbly gravels. In places they are highly fossiliferous, shell fragments being especially prolific. The thickness of these deposits is variable between 5 and 60 metres.

The Lowestoft Formation forms an extensive sheet of chalky till, together with outwash sands and gravels, silts, and clays. The till is characterised by its chalk and flint content, and in eastern East Anglia overlies the older glacigenic Happisburgh Formation. The tills within the Lowestoft Formation typically contain a significantly higher percentage of chalk than the underlying tills. Thickness of the deposit is extremely variable, thickest in buried valleys where locally up to 60 metres may be present. Thick accumulations are also more generally present beneath much of northern Essex and south Suffolk.

A geology report can be found in Appendix C.

2.7 Hydrogeology and Hydrology

According to the Regional Hydrogeology Map of Southern East Anglia, the Crag is the principal aquifer for the area. The estimated minimum hydrostatic level of the Crag water table in the vicinity of the site approximately 30 metres above Ordnance Survey Datum.

The site is approximately 47 metres above Ordnance Survey Datum. Therefore, the groundwater is thought to be between 17 metres below the site.

The BGS flood data map indicates that there is limited potential for groundwater flooding to occur at the site.

The site is not located within any Environment Agency Flood Zone. The nearest flood zone is approximately 900 metres to the north.

The site is located within an Environment Agency Total Catchment (Zone 3) for groundwater source protection.

The Aquifer designations are principal for the bedrock Crag and Secondary Undifferentiated for the superficial Lowestoft Formation.

A small pond is present on the site in the north west corner.

Approximately six small ponds are present with a 300 metre radius of the site.

An historical borehole log is available to view on the BGS website id 563260. The borehole was located on the Chandos Farm estate approximately 60 metres to the south west of the study area. The borehole was drilled in 1935 by JJ Gosling to a depth of 74.60 metres.

The Lowestoft Till was encountered below the topsoil and proven at 14.60 metres below ground level where yellow glacial sand and gravel was present to 18.30 metres. The Crag deposit was then present to 56.0 metres where the chalk was then encountered.

No groundwater strike depth was recorded. The rest water level recorded was +116 feet (35m). The borehole location was 52 metres above datum (study area is 47 metres) therefore the hydrostatic level of the water table was 17 metres below ground level.

3.0 Identification of potential contaminants of concern and source areas

Historical land use indicates that the site has had no potentially contaminative past industrial land use. The study area has remained relatively unchanged with the grain store shown on the 1977 historical mapping. No Department of the Environment industry profile was considered relevant to this site. After visual examination and reviewing information from the desk study and walkover survey the following have been identified as potential pollution sources.

- i) On site Made Ground deposits.
- ii) Potential Asbestos Containing Materials (cement board cladding to barn).

These have a variety of potential pollution linkages.

3.1 Consultations with the local authority

No consultations have taken place with the Local Authority. The site is subject to the planning conditions of Babergh & Mid Suffolk District Council.

3.2 Consultations with the Environment Agency

No consultations have taken place with the Environment Agency.

3.3 Consultations with other appropriate bodies

No other bodies have been consulted during the compilation of this report.

3.4 Review and summary of previous reports

No other reports have been seen regarding the site.

4.0 Risk Assessment

4.1 Conceptual Model

The known or perceived sources of contamination and pollution linkages are assessed in this section. The conceptual model is realised here in tabulated form.

4.2 Sources of contamination

Historical land use indicates that the site has had no potentially contaminative past industrial land use. The study area has remained relatively unchanged with the grain store shown on the 1977 historical mapping. No Department of the Environment industry profile was considered relevant to this site. After visual examination and reviewing information from the desk study and walkover survey the following have been identified as potential pollution sources.

- i) On site Made Ground deposits.
- ii) Potential Asbestos Containing Materials (cement board cladding to barn).

4.3 Pollution Linkages

Each of the potential contaminants may have a number of pollution linkages. Each of these linkage types has a number of potential pathways.

- i) Surface soil linkages
 - a) Direct contact ingestion or absorption
 - b) Indirect contact ingestion or absorption
 - c) Leaching to groundwater
- ii) Subsurface soil linkages
 - a) Direct contact ingestion or absorption
 - b) Indirect contact ingestion or absorption
 - c) Leaching to groundwater
- iii) Surface water linkages
 - a) Direct contact ingestion or absorption
 - b) Indirect contact ingestion or absorption
 - c) Percolation to groundwater
- iv) Groundwater linkages
 - a) Direct contact ingestion or absorption
 - b) Indirect contact ingestion or absorption
- v) Airborne linkages
 - a) Vapour intrusion into confined / indoor spaces
 - b) Inhalation or absorption of particulates
 - c) Inhalation or absorption of volatile compounds

4.4 Receptors

A number of potential receptors exist. These can be broadly grouped as

- i) Construction Worker
- ii) Future Resident
- iii) Trespasser
- iv) Local population
- v) Flora and fauna
- vi) Buildings
- vii) Surface Water
- viii) Groundwater

For each source, the linkage type, pathway and potential receptors can be identified. A level of risk if no action is taken can then be assigned to each of these linkages. The level of risk has been divided into six categories as follows

Very Low Risk – Considered very unlikely or impossible Low Risk – Considered conceivable but unlikely Medium Risk – Considered possible but unusual High Risk – Considered probable ie about 50% chance Very High Risk – Considered that it is to be expected to happen Certainty – Considered that it will happen

Note: These risks are related to the probability of an event happening. They do not relate to the severity of the effects on human health or flora and fauna nor the financial consequences if the event should happen.

4.4.1 On site Made Ground deposits

Inikage	Linkage type	Pathway	Receptor	Risk
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Trespasser Low	linkage	or absorption	Desident	1
Direct contact Surface water Low				-
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Vapour intrusion into Resident Low indoor spaces				
			Local population	Low

4.4.2 Potential Asbestos Containing Materials (cement board cladding to barn).

Linkage type	Pathway	Receptor	Risk
Surface soil	Direct contact ingestion	Construction Worker	Low
linkage	or absorption		
		Resident	Low
		Trespasser	Low
		Flora and fauna	Low
	Direct contact	Surface water	Low
	Indirect contact ingestion or absorption	Resident	Low
Subsurface soil linkage	Direct contact ingestion or absorption	Construction Worker	Low
		Resident	Low
		Flora and fauna	Low
	Direct contact	Buildings and services	Low
	Indirect contact ingestion or absorption	Resident	Low
	Leaching to groundwater	Local population	Low
		Flora and fauna	Low
		Construction Worker	Low
		Groundwater	Low
Surface water linkage	Direct contact ingestion or absorption	Construction Worker	Low
		Resident	Low
		Trespasser	Low
		Flora and fauna	Low
	Direct contact	Buildings and services	Low
		Surface water	Low
	Percolation to groundwater	Local population	Low
		Flora and fauna	Low
		Groundwater	Low
Groundwater linkage	Direct contact ingestion or absorption	Construction Worker	Low
		Local population	Low
		Flora and fauna	Low
	Direct contact	Buildings and services	Low
		Groundwater	Low
	Indirect contact ingestion or absorption	Local population	Low
		Flora and fauna	Low
Airborne linkage	Inhalation of particulates	Construction Worker	Very High
		Resident	Low
		Trespasser	Very High
		Flora and fauna	Low
		Local population	Low
	Inhalation of volatile compounds	Construction Worker	Low
		Resident	Low
		Trespasser	Low
		Flora and fauna	Low
		Local population	Low
	Vapour intrusion into indoor spaces	Resident	Low
		Local population	Low

4.5 Description of possible pollutant linkages for controlled waters

According to the Regional Hydrogeology Map of Southern East Anglia, the Crag is the principal aquifer for the area. The estimated minimum hydrostatic level of the Crag water table in the vicinity of the site is approximately 30 metres above Ordnance Survey Datum.

The site is approximately 47 metres above Ordnance Survey Datum. Therefore, the groundwater is thought to be 17 metres below the site.

4.6 <u>Discussion of uncertainties and gaps in information</u>

It may be possible that there are areas of contamination that have not been found during the walkover survey or the studying of historical maps.

5.0 Discussion of risks posed by the site

5.1 On site Made Ground deposits

The historical mapping shows the site has remained within the Chandos Farm complex which predates the first edition OS maps. The development area is relatively unchanged with the barn shown on the 1977 historical map. A lean-to section was once present on the west side with grain silos on the east side. The building materials stored on concrete the east side pose no risk to the site. The timber post and rails which were being preserved in the barn at the time of the walkover also represent s low risk with the posts and rails stacked on polythene for drying in case of spills.

It is possible there are Made Ground deposits present which are likely to be localised construction materials and concrete foundations below the barn and surrounding concrete curtilage to the west, east and south.

The risk associated with potential Made Ground deposits on this site are Low (considered conceivable but unlikely).

5.2 Potential Asbestos Containing Materials (cement board cladding to barn)

Cement board sheeting is present as cladding and roofing material to the onsite barn. This material is likely to contain Asbestos, therefore a potential Very High Risk (considered that it is to be expected to happen) has been assigned to two of the potential receptors via an airborne linkage. Broken and damaged sheets represent a risk due to the release of fibres. In this instance no broken sheets were seen on the site.

It is recommended that all potential Asbestos containing material (ACM) should be removed by a suitably licensed contractor and disposed of to a suitably licensed facility. Consignment notes for any removed asbestos and documentation stating that all Asbestos has been disposed of from the site should be submitted to Babergh & Mid Suffolk District Council.

After the removal of all ACM from the site, following the conditions above, the remaining potential risk is very low.

Very Low Risk – (considered very unlikely or impossible) can be applied to this potential contamination source.

6.0 Recommendations

Based upon the information contained herein it is recommended that an intrusive site investigation and quantitative risk assessment is not considered necessary on this site for contamination purposes.

The location of the new dwelling, garage/car port is in the same location as the existing barn and concrete curtilage which will be demolished. It is highly likely any potential Made Ground deposits present below the existing structure will be excavated during the demolition phase (ie stanchion pad foundations and strip foundations for external brick walls). The lawned areas to the north and west will remain unchanged. It is therefore recommended that post demolition the area is inspected by a competent person to assess the subsoils. If suspect Made Ground materials are present samples will be retrieved and testing carried out for contaminants of concern.

It is recommended that for compliance in a residential end use scenario, on completion, four random Topsoil samples should be taken from the garden area surrounding the new dwelling and tested for contaminants of concern including metals, PAH's, and Asbestos presence/absence. Results will be assessed against SGV's, Atkins ATRISK threshold values for residential with home grown produce land use with 1% soil organic matter and LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment.

Consignment notes for any removed asbestos and documentation stating that all ACM has been disposed should be submitted to Babergh and Mid Suffolk Council.

If the above recommendations are followed the site will be fit for residential end use.

Norfolk Partnership Laboratory Site Investigation Section

This report was prepared under the direction of

Head of Laboratory Services

I D Brown

Author of report

Assistant Engineer

Board

S P Berwick

Date:04/07/2023