



Report type	Phase 1 Preliminary Risk Assessment
Date	9 February 2022
Client	Gemma Verrells
Site address	Poplar Farm, Moor Gate, Holbeach, Spalding, PE12 8QW
Report prepared by	Mr Louis Turner BSc (Hons)
Supervised by	Mr Joseph Turner

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1. Introduction

The following document is a Phase 1 Preliminary Risk Assessment carried out by Oakshire Environmental, commissioned by Gemma Verrells, and includes details of the site, environmental setting, contaminant linkages and an evaluation of risk.

1.1 Project Overview

The client's proposed project involves the conversion, partial demolition and extension of barn into a new dwelling at Poplar Farm, Moor Gate, Holbeach, Spalding, PE12 8QW. A preliminary risk assessment (desk study) has been requested by South Holland District Council, through attachment of conditions on planning application H05-1038-21. Oakshire Environmental have carried out a Phase 1 Preliminary Risk Assessment, as described below.

1.2 Purpose of Investigation

The objectives of the Phase 1 Preliminary Risk Assessment were to:

- Develop a detailed assessment of the site.
- Identify potential contamination sources, receptors and pathways at the site.
- Assess the level of potential contamination risk.
- Determine the requirement or scope of further investigations.

1.3 Scope of Work

- Brief introductory information have been noted to provide context to the report and include an Introduction, Project Overview, Scope of Work and Limitations.
- To develop a detailed assessment of the site, desk studies have been carried out to collate information obtained from sources including the British Geological Society, Environment Agency and Ordnance Survey on planning and site history, ground conditions and environmental setting.
- This information has been used to identify potential contamination sources, receptors and pathways at the site, as part of an initial Conceptual Site Model.
- To assess the level of potential contamination risk, a Conceptual Site Model has been produced to categorise the potential severity of the impact of the contaminant linkage on the receptor and the probability of the contaminant linkage being present.
- Following the assessment of contaminant linkages, an evaluation of contamination risk has been conducted to determine the requirement and scope of further investigations.
- Supporting appendix include photographs, maps and plans of the site.

1.4 Limitations

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This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

2. Site

The following section provides a description of the site, location and proposed development, in addition to, planning and site history, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on Moor Gate in Holbeach and is approximately 3,500m². The site is comprised of agricultural buildings at the north and west, gravel surfacing and a metal storage container at the centre, with an access road from the east, and soft landscaping at the south.

The site is bordered by a storage container and structures to the north, a residential dwelling to the north west, agricultural land to the west and south and Moor Gate to the east. The surrounding area is predominantly agricultural, with isolated residential dwellings. There are no woodlands, ancient monuments or archaeological sites within 500m of the site.

National Grid Reference: 537316 322214

2.2 Proposed Development

The proposed development includes the conversion, partial demolition and extension of the existing barns into a new 5 bed dwelling and the construction of a detached garage block with storage above.

2.3 Relevant Planning History

A search of South Holland District Council's planning website identified the following relevant applications at and near the site.

Table 1: Planning applications at or near the site

Application No.	Year	Address	Proposal	Decision	Details
H05-0457-93	1993	Mill Bank, Holbeach Fen (300m north west)	Erection of replacement dwelling, including demolition of existing	Approved	No contaminated land conditions
H05-1090-96	1997	Walnut Lodge, Mill Bank Road, Fleet (440m south east)	Extension to agricultural store	Approved	No contaminated land conditions
H05-0560-03	2003	Mill Bank Farm, Mill Bank, Fleet (680m north west)	Change of use of grain store to engineering workshop	Approved	No contaminated land conditions
H05-0186-04	2004	Walnut Lodge, Mill Bank End, Holbeach Fen (440m south east)	Change of use from agricultural use to Business Use B1	Approved	No contaminated land conditions
H05-0280-05	2005	Chapel House, Mill Bank, Fleet Fen (190m west)	Change of use of agricultural land to paddock with stables for private use only	Approved	No contaminated land conditions
H05-0377-10	2010	The Cottage, Mill Bank, Holbeach Fen (760m north west)	Proposed replacement dwelling	Approved	No contaminated land conditions
H05-0940-21	2022	Mill Bank, Holbeach (350m south east)	Proposed conversion into single dwelling	Approved	Contaminated land conditions applied. No report available in documents.

2.3 Site History

A detailed assessment of historical Ordnance Survey maps and associated data has highlighted the below on-site and off-site, current and historical land uses.

Table 2: Description of the site and surrounding area over time, according to historical maps

Year	Site Description	Surrounding Area
1888	Site forms part of curtilage of residential dwelling to the north west Building on north boundary Drain along west boundary	Surrounding area is predominantly agricultural fields curtailed by land drains Residential dwelling bordering the site to the north west Ponds 20m north and 60m east Isolated dwellings in the surrounding area
1904		Unchanged
1950	Agricultural buildings at the south west	Unchanged
1969	Agricultural buildings at the south west and smaller building at the north boundary	Residential dwelling to the north east removed and small unlabelled building remaining Pond to the east no longer shown Agricultural buildings constructed at residential dwelling 200m north east Piggery and poultry houses 250m north west
1991 - 1995		Pond to the north no longer shown Small unlabelled building to the north east removed
1999	Two buildings removed and one new barn building constructed at the north west	Unchanged
2003	Drain along west boundary no longer shown	Unchanged
2007		Unchanged
2016		Unchanged

3. Environmental Setting

The following section provides information on the environmental setting of the site, utilising data from the British Geological Survey (BGS), the Department for Environment, Food and Rural Affairs (DEFRA), the Coal Authority and Public Health England (PHE).

Table 3: Summary of the site's environmental setting

Environmental Factor		Details	
Hydrogeology	Aquifer Designation	Superficial	Unproductive
		Bedrock	Unproductive
	Groundwater Vulnerability	Superficial	Very Low
		Bedrock	Very Low
	Source Protection Zones and Abstractions		Site does not lie within a Source Protection Zone
Hydrology	Water Network		Land drains 5m east and 60m north along roads
Geology	Artificial Ground		None within 500m of the site
	Superficial Deposits		Tidal Flat Deposits - Clay and Silt
	Bedrock Geology		Ampthill Clay Formation - Mudstone
	Superficial Permeability		Low
	Bedrock Permeability		Very Low
	Borehole Records		Boreholes completed 700m south west of the site in 1963 identified silty topsoil to 0.46m, silty clay to 2.13m, clayey sandy silt to 3.35m, sandy silt to 6.86m, peaty very silty clay to 8.84m, silty sand to 11.43m and silty sand with fine gravel and shells to 12.19m (groundwater identified at 2.44mbgl).
Workings	Mining and Ground Workings		None within 500m of the site
Radon	PHE UKradon		<1% probability of being above action level
Waste and Landfill	Historical Landfill		Millbank Road inert landfill 350m south east (completed by 1988)
	Permitted Waste Sites		None within 500m of the site

4. Initial Conceptual Site Model

The following section outlines potential contamination sources, pathways and receptors, utilising information gathered in the previous sections, to develop an initial conceptual site model.

4.1 Potential Contamination Sources

Information collated through detailed desk studies has identified the following potential sources of contamination.

Agricultural Use

The site has been used for agricultural purposes since at least 1950, which may have contaminated underlying soil through the release of fuels and oils from machinery, storage of chemicals and fuels, burning of organic and waste materials and the presence of loose asbestos fibres from historical or current asbestos buildings.

Made Ground

There is likely to be made ground on the site, particularly at the west, where buildings have been demolished, in addition to, in the yard and access road. Made ground may contain elevated concentrations of heavy metals and PAHs. It should be noted that made ground is not likely to be widespread or present at significant depths, due to the lack of historical development on the site, and made ground contamination is likely to be localised.

Historical Landfill

There is an historical inert landfill on agricultural land to the south east of the site. Records show that this began in 1985 and the license was surrendered in 1988, suggesting it was completed some time before this. Landfills can pose a risk to developments through the migration of ground gases that can accumulate inside buildings. This is considered to pose a minimal risk to the site due to its distance from the site, the time elapsed since it was completed and the impermeable soil and bedrock in the area.

4.2 Potential Contamination Receptors

Given the proposed use of the site, the following receptors are considered:

- Residential end users
- Controlled waters

4.3 Potential Contamination Pathways

Based on the expected on-site receptors, relevant pathways for the above receptors include:

- Ingestion/inhalation of contaminated soil dust
- Dermal contact with contaminated soil
- Inhalation of soil vapours
- Ingestion of homegrown produce
- Permeation into drinking water pipes
- Ground gas permeation into buildings
- Leaching through soil
- Surface runoff

Pathways between off-site sources and off-site receptors is beyond the scope of this assessment.

4.4 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the contaminant linkage on the receptor, if it is assumed to be present, and the probability of the contaminant linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 4: Risk Matrix

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

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

4.5 Conceptual Site Model

The information in this section has been compiled to produce an initial conceptual site model outlining the potential sources, pathways and receptors to consider at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 5: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk	
Agricultural Use	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes	Residential end users	Medium	Low Likelihood	Low to Moderate	The past agricultural use and buildings on the site gives rise to the potential for heavy metal, hydrocarbon and asbestos contamination. This is likely to be localised and significant concentrations are not anticipated, therefore, the risk is considered to be low to moderate.
	Leaching through soil Surface runoff	Controlled waters	Mild	Unlikely	Very Low	Contamination is not expected to be significant and is likely to be localised, therefore, the leaching of contaminants through soil to underlying groundwater and surface runoff. The impermeable underlying bedrock will also limit leaching of contaminants. Furthermore, surface water drainage is not considered to be vulnerable to contaminants.
Made Ground	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes	Residential end users	Mild	Low Likelihood	Low	Made ground at the site may contain elevated concentrations of heavy metals and PAHs, however, made ground is not likely to be widespread or present at significant depths and contamination is likely to be localised, therefore, the risk is considered to be low.
	Leaching through soil Surface runoff	Controlled waters	Mild	Unlikely	Very Low	Contamination is not expected to be significant and is likely to be localised, therefore, the leaching of contaminants through soil to underlying groundwater and surface runoff. The impermeable underlying bedrock will also limit leaching of contaminants. Furthermore, surface water drainage is not considered to be vulnerable to contaminants.
Historical Landfill	Ground gas permeation into buildings	Residential end users	Mild	Unlikely	Very Low	The historical landfill is inert, suggesting minimal risk of ground gas production. Furthermore, its distance from the site and time elapsed since the landfill was completed further mitigate the risk to the site.

5. Conclusions

5.1 Risk Evaluation

The initial conceptual site model identified the following potential contaminant linkages present at the site and the following conclusions have been drawn:

- There is a **low to moderate risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from the site's agricultural use.
- There is a **very low risk** to controlled waters from the leaching of contaminants through soil and surface runoff from the site's agricultural use.
- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from made ground at the site.
- There is a **very low risk** to controlled waters from the leaching of contaminants through soil and surface runoff from made ground at the site.
- There is a **very low risk** to residential end users from ground gas permeation into buildings from the historical landfill to the south east of the site.

Based on the findings of this Phase 1 Preliminary Risk Assessment, the risk to residential end users is considered to be low to moderate and the risk to controlled waters is considered to be very low. It can be assumed that the risk to crops, woodland, archaeological sites and ancient monuments is negligible.

5.2 Further Investigation

Based on the above conclusions, further investigation is recommended in the form of a Phase 2 Intrusive Site Investigation. This should include sampling of shallow soil at the site to be tested for suite of contaminants including heavy metals, hydrocarbons and asbestos. It is important to note that this conclusion is based on the proposed development plan.

6. References

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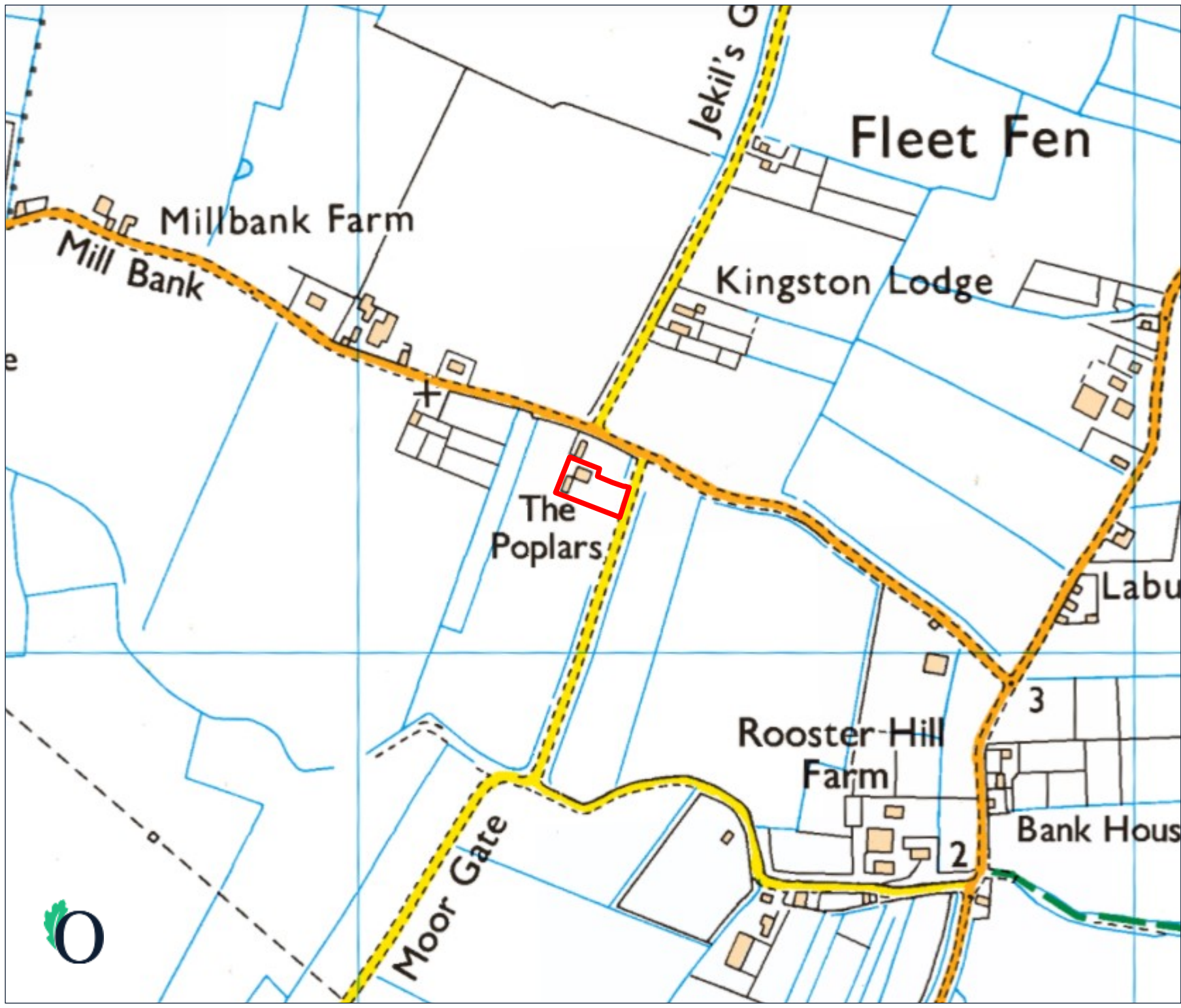
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Appendix A - Site Maps & Plans	
Description	
OS location plan	
Sources	
Contains OS data © Crown copyright and database rights 2021	
Key	
	Site boundary
	
	
	
	
	
	
	
	
Name	Figure 1





Appendix B - Site Photos

Description

Photo of the site from the east, facing west, showing storage containers

Sources

Key

Name	Figure 3
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Appendix B - Site Photos

Description

Photo of gravel yard area and existing barn at the north west of the site, facing west

Sources

Key

Name

Figure 4



5Appendix B - Site Photos

Description

Photo of south boundary of the site, facing west

Sources

Key

Name

Figure 5



Appendix B - Site Photos

Description

Photo of north west of the site, facing east

Sources

Key

Name

Figure 6



Appendix B - Site Photos

Description

Photo of existing building at the west of the site to be demolished, facing north

Sources

Key

Name

Figure 7



Appendix B - Site Photos

Description

Photo of interior of barn building at the north west of the site

Sources

Key

Name

Figure 8



Appendix B - Site Photos		
Description		
Photo of interior of barn building at the north west of the site		
Sources		
Key		
Name		Figure 9



Appendix B - Site Photos

Description

Photo of interior of lean to structure attached to barn building at the north west of the site

Sources

Key

Name

Figure 10



Appendix B - Site Photos

Description

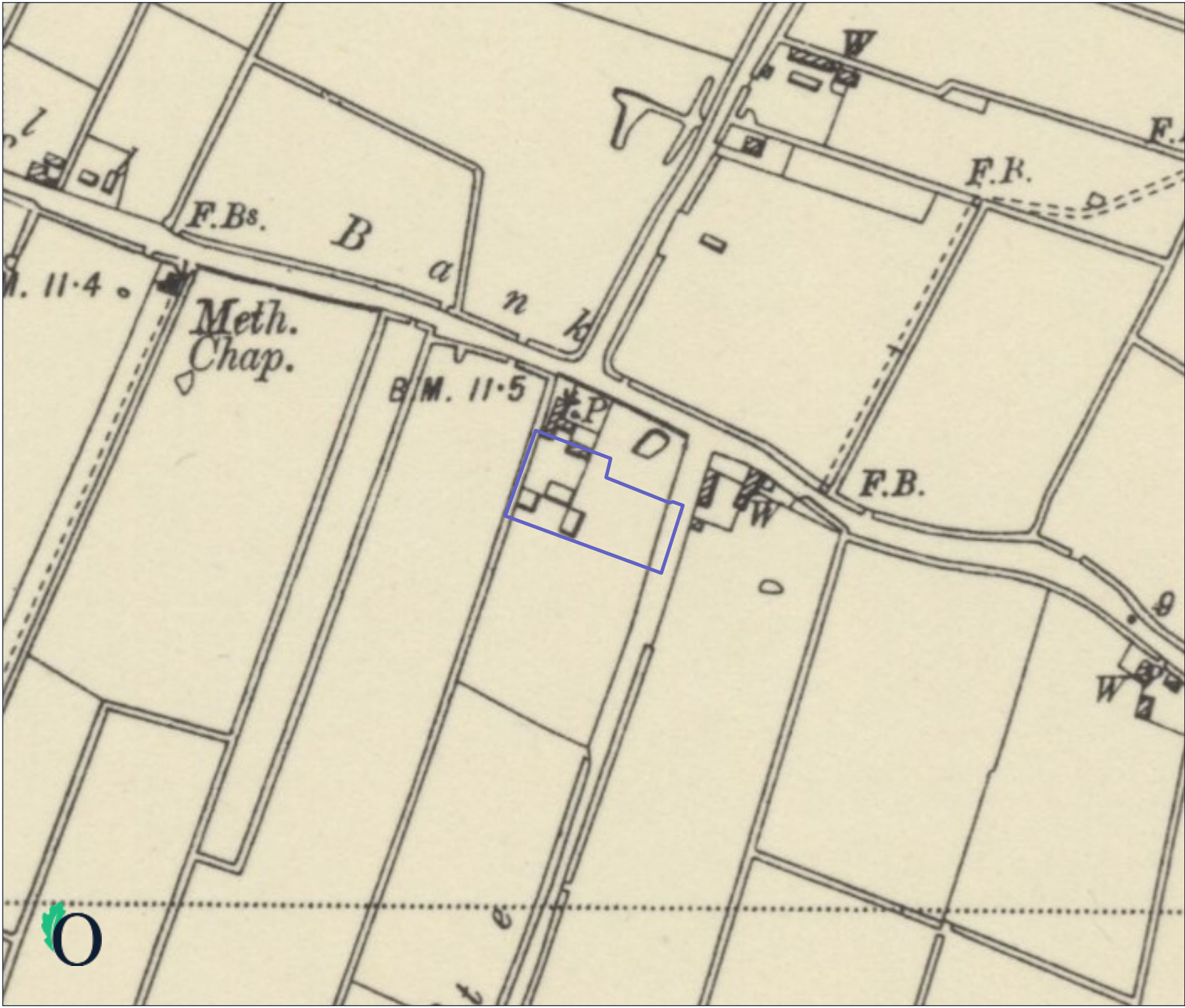
Photo of interior of barn building at the north boundary of the site

Sources

Key

Name

Figure 11



Appendix C - Historical Maps

Description

Historical map dated 1950

Map scale: 1:10,560

Sources

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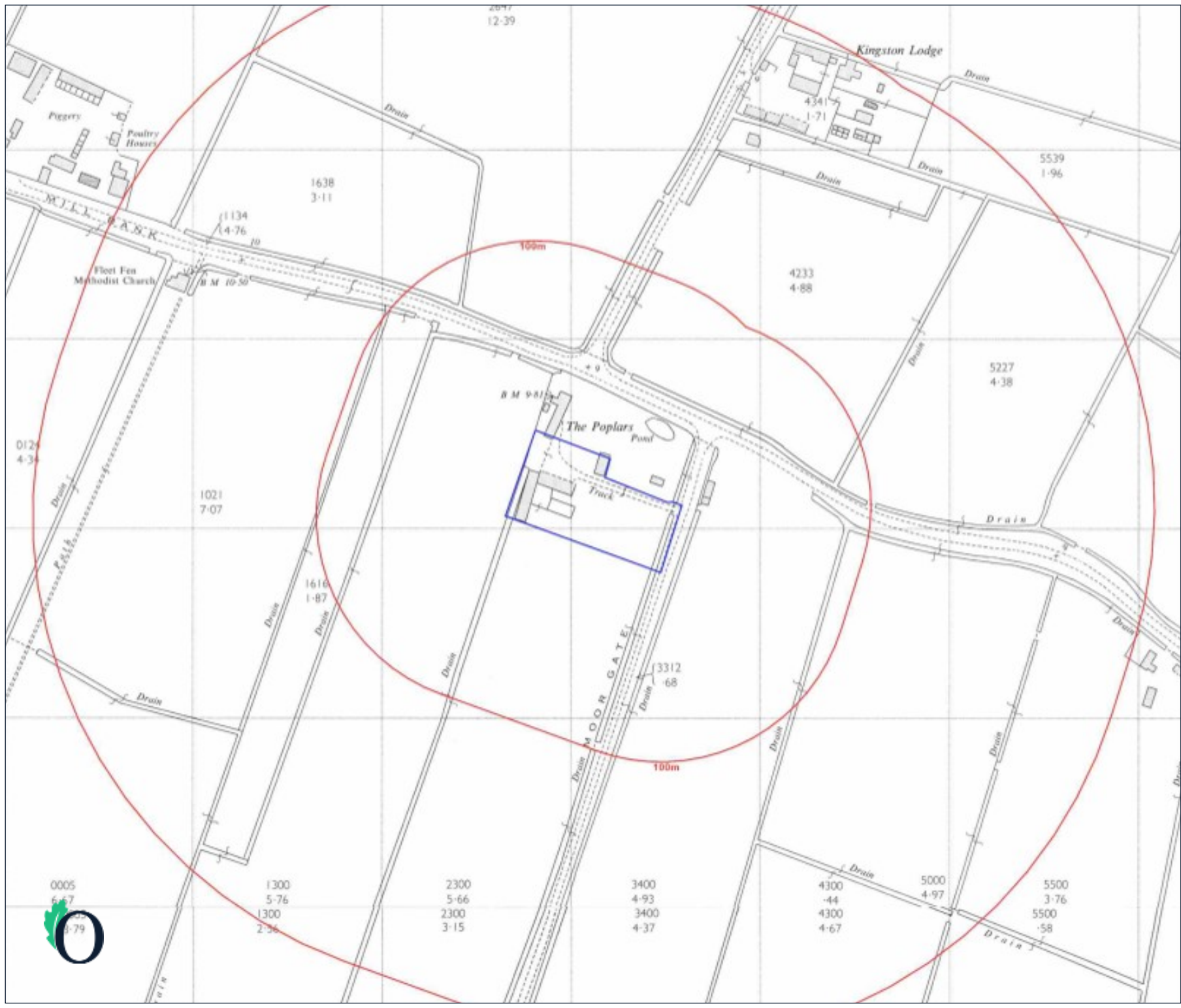
Key

	Site boundary

Name

Figure 14





Appendix C - Historical Maps

Description

Historical map dated 1969

Map scale: 1:2,500

Sources

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Key

	Site boundary

Name

Figure 15





Appendix C - Historical Maps

Description

Historical map dated 1991 - 1995

Map scale: 1:2,500

Sources

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100035207

Key

[illegible]

Name

Figure 16





Appendix C - Historical Maps

Description

Historical map dated 2003

Map scale: 1:1,250

Sources

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Key

	Site boundary

Name

Figure 17





Appendix C - Historical Maps	
Description	
Aerial photograph dated 1999	
Sources	
© 2021 Infoterra Ltd & Bluesky	
Key	
	Site boundary
Name	Figure 18





Appendix C - Historical Maps	
Description	
Aerial photograph dated 2007	
Sources	
© 2021 Getmapping plc	
Key	
	Site boundary
	
	
	
	
	
	
	
	
	
Name	Figure 19





Appendix C - Historical Maps

Description

Aerial photograph dated 2016

Sources

© 2022 Google Earth

Key

 Site boundary



Name

Figure 20





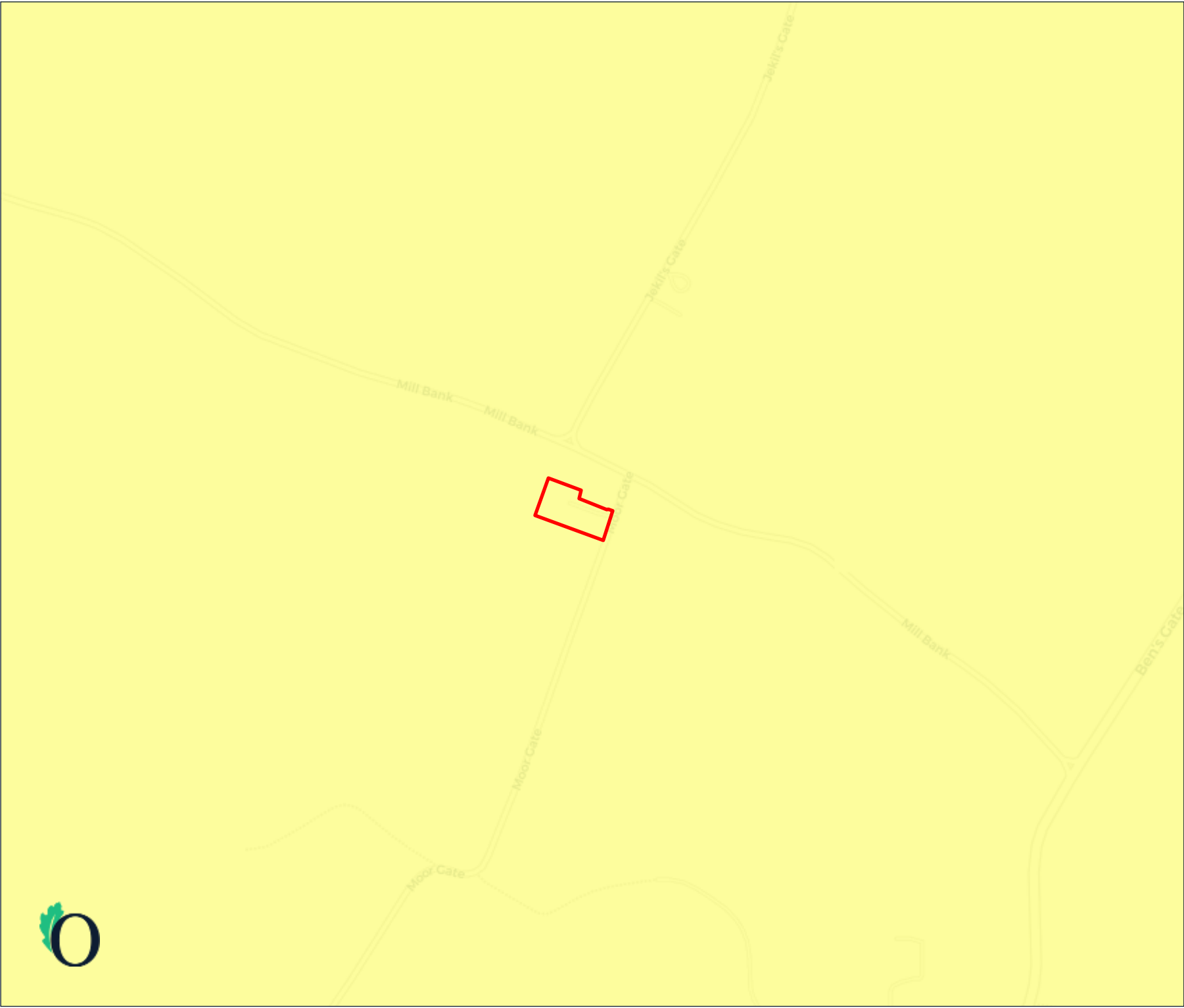
Appendix D - Geological Maps	
Description	
BGS map showing superficial hydrogeology on site	
Sources	
DEFRA Magic Map	
British Geological Society (2021)	
Key	
	Site location
	Principle
	Secondary A
	Secondary B
	Secondary Undifferentiated
	Unproductive
Name	Figure 21





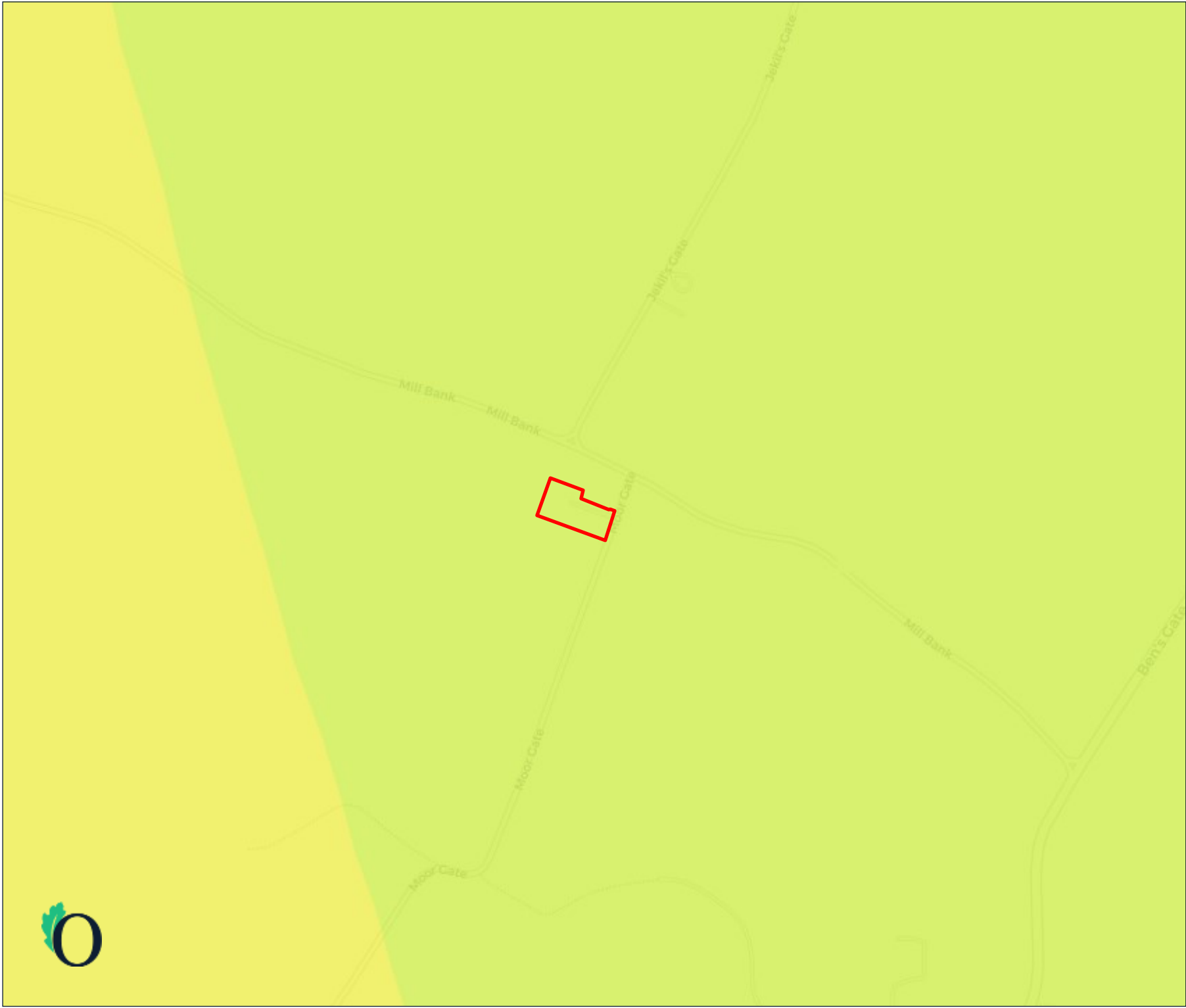
Appendix D - Geological Maps	
Description	
BGS map showing bedrock hydrogeology on site	
Sources	
DEFRA Magic Map	
British Geological Society (2021)	
Key	
	Site location
	Principle
	Secondary A
	Secondary B
	Secondary Undifferentiated
	Unproductive
Name	Figure 22





Appendix D - Geological Maps	
Description	
BGS map showing superficial deposits on site	
Sources	
British Geological Society (2021)	
Key	
	Site boundary
	Tidal Flat Deposits
Name	Figure 23





Appendix D - Geological Maps

Description

BGS map showing bedrock geology on site

Sources

British Geological Society (2021)

Key

	Site boundary
	Ampthill Clay Formation
	West Walton Formation

Name	Figure 24
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