



Phase I Geo-Environmental Report

Land off Henthorn Road, Clitheroe

For:

Gladman Developments Ltd.

SHF.1132.159.GE.R.001

Contact Details:

Enzygo Ltd.
Samuel House
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
fax: 0114 290 3688
www: enzygo.com

Phase I Geo-Environmental Report for Land off Henthorn Road Clitheroe

Project:	Land off Henthorn Road, Clitheroe
For:	Gladman Developments Ltd.
Ref:	SHF.1132.159.GE.R.001
Status:	Final
Date:	July 2018
Author:	Dr Stephen Black - BSc (Hons) , MSc , PhD . Associate Director
Reviewer:	Nick Brook - BSc (Hons) , FGS . Geo-Environmental Engineer
Approver:	Dr Stephen Black - BSc (Hons) , MSc , PhD . Associate Director

Disclaimer:

This report has been produced by Enzygo Limited within the terms of the contract with the client and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Enzygo Limited Registered in England No. 6525159
Registered Office Stag House Chipping Wotton-Under-Edge Gloucestershire GL12 7AD

TABLE OF CONTENTS

1.0 INTRODUCTION	1
<i>Background</i>	1
<i>Proposed Development</i>	1
<i>Objectives</i>	1
<i>Risk Classification</i>	2
2.0 SITE SETTING	3
<i>Site Description</i>	3
<i>Current Site Description</i>	3
<i>Surrounding Area</i>	3
3.0 SITE HISTORY	4
4.0 ENVIRONMENTAL SETTING	5
<i>Ground Conditions</i>	5
<i>Groundwater</i>	5
<i>Coal Mining</i>	5
<i>Non-Coal Mining and Cavities</i>	5
<i>Ground Workings</i>	6
<i>Hydrology</i>	6
<i>Radon Risk Potential</i>	6
<i>Natural Hazards Finding</i>	6
<i>Sensitive Land Uses</i>	7
<i>Environmental Sensitivity</i>	7
<i>Current Industrial Land Uses</i>	7
5.0 CONSULTATIONS	8
<i>Regulatory Database</i>	8

<i>Landfill Sites and Waste Treatment Sites</i>	<i>9</i>
6.0 PRELIMINARY CONCEPTUAL MODEL	10
7.0 DISCUSSION AND RECOMMENDATIONS	11
<i>Discussion.....</i>	<i>11</i>
<i>Recommendations.....</i>	<i>11</i>
Appendix 1 – Groundsure Reports	12

1.0 INTRODUCTION

Background

- 1.1 Enzygo Limited has been commissioned by Gladman Developments to prepare a Phase I Geo-Environmental Report for a site, located off Henthorn Road, Clitheroe.

Proposed Development

- 1.2 It is our understanding that the proposed development is for residential, with gardens, landscaping and associated infrastructure.

Objectives

- 1.3 The objectives of the study are to:
- Review historical plans, geology, hydrogeology and site sensitivity information to complete a Desk Study. A Groundsure report has been obtained, a copy of which is included in Appendix 1;
 - Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
 - Conduct a comprehensive site walkover, to visually assess ground conditions and drainage;
 - Provide a factual and interpretative report relating to the desk study; and
 - Provide preliminary recommendations in relation to environmental risk, potential remedial options and to present an initial assessment of ground engineering considerations.

Risk Classification

- 1.4 Enzygo has utilised the available information, together with our experience to assess the likely risks to development from land quality issues. Definitions of the risk terms used are provided in the table on the following page.

Risk	Description
Dismissed	The risk has been dismissed.
Negligible	No contamination risk has been identified which is likely to affect development.
Low	No significant contaminated land risks have been encountered which would affect development, and there is a low risk that remediation will be required.
Low-Moderate	There are unlikely to be significant contaminated land issue associated with the site which will adversely affect its re-development. However, minor or localised contamination may be present which may require remediation. Remediation should be possible under a discovery strategy and with a call-out service.
Moderate	Some potential contaminated land risks have been encountered or identified which may affect re-development. The risks identified are unlikely to affect the entire site or preclude development. Remediation is considered feasible as part of the development process, and no further investigation is considered necessary.
Moderate-High	Some potentially significant contaminated land risks have been identified at the property that requires remediation. It is recommended that a separate remedial methodology is prepared, supported by a site-specific risk assessment.
High	Significant potential contaminated land risks have been identified and remediation is required; supported by further intrusive ground investigation, risk assessment and remedial design.

- 1.5 Where adverse risks are identified, these are discussed within the report.

2.0 SITE SETTING

Site Description

Table 1) Site location details

Item	Description
Site Address	Land off Henthorn Road, Clitheroe
National Grid Reference	Approximate centre of the site: 372936mE, 440830mN

Current Site Description

- 2.1 The following description has been compiled from the inspection of the site undertaken by an experienced geo-environmental engineer on 11th July 2018.
- 2.2 The site comprises an open grassed field, which generally slopes gently to the south. In the east is a shallow 'gully' with a watercourse at the base, flowing to the south southeast. This area is separated from the rest of the site by a post and wire fence.
- 2.3 There are some trees and hedges, principally around the site boundaries. Two ponds are present on the northern boundary.
- 2.4 The site appears to have been used for grazing and there was no evidence of likely significant contamination or fly-tipped material.

Surrounding Area

- 2.5 Land uses surrounding the site are summarised in Table 2 below:

Table 2) Surrounding land uses

Direction	Land Use
North	Residential development and new construction
East	Residential development and open land, beyond Henthorn Road
South	Open agricultural land
West	Open agricultural land with farm and river beyond, approximately 100m to west

3.0 SITE HISTORY

3.1 A review of historical Ordnance Survey maps and information pertinent to the site and within a 250m radius is summarised below:

Table 3) Historical land uses on the Site and within the surrounding 250m.

Map/Imagery Date	On Site	Surrounding Area (within 250m)
1848	Open agricultural land with 'Hough Clough' (watercourse) running through the southeast corner	Open agricultural land, with Mill Lane (now named Henthorn Road) bounding site to southeast
1884	No significant change	As above, with 'Siddows Hall' to southwest and Henthorn Village to the northeast; Mill Lane now renamed Henthorn Road
1964	No significant change; ponds annotated as 'ponds'	No significant change
2014	No significant change	Residential development encroaching on site from the northeast

3.2 No new risks are identified from historical maps.

4.0 ENVIRONMENTAL SETTING

Ground Conditions

- 4.1 The British Geological Survey (BGS) records indicate that the site is underlain by the following geological sequence:

Table 4) Geological summary of the site.

Geological Unit	Type	Description	Aquifer Classification
Drift	Glacial Till	sandy clay locally with sand and gravel bands and lenses	Secondary (undifferentiated layers)
Bedrock	Clitheroe Limestone and Hodder Mudstone	limestone and mudstone	Secondary A

- 4.2 No Made Ground is identified on or adjacent to the site by the BGS.
- 4.3 There are no records of landslips within 250m of the site.
- 4.4 Estimates of background estimated soil chemistry for the site suggests no exceedance of residential Generic Assessment Criteria (GAC) values.
- 4.5 There are no BGS borehole records close the site.

Groundwater

- 4.6 The site does not lie within a Source Protection Zone (SPZ).
- 4.7 There are no records of licensed groundwater abstractions within 2000m of the site.

Coal Mining

- 4.8 The site does not lie in a coal mining reporting area. There is no coal mining risk.

Non-Coal Mining and Cavities

- 4.9 There are records of significant non-coal mining activities within 1000m of the site.
- 4.10 There are no records of non-coal mining cavities within 1000m of the site.
- 4.11 There are no records of natural cavities within 1000m of the site.

Ground Workings

- 4.12 A small quarry was present to the north northeast of the site (approximately 200m). This area has subsequently been redeveloped and the former quarry is not considered to present a risk to the site.

Hydrology

- 4.13 There is a watercourse on site, in the east. This is a potential receptor.
- 4.14 There are no records of a surface water abstraction licenses within 500m of the site.
- 4.15 The site is not located within a Flood Risk Zone. An assessment is included in a separate report, prepared by Enzygo.

Radon Risk Potential

- 4.16 The Groundsure Geo Insight report indicates that the site is not in a Radon Affected Area. Therefore, no radon protective measures are necessary.

Natural Hazards Finding

- 4.17 BGS information presented within the Groundsure GeoInsight report identifies the following ground conditions (see Table 5 below):

Table 5) Natural hazards on-site

Hazard	Risk Designation (Groundsure)
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Very Low
Landslide	Very Low
Running Sand	Low
Swelling / Shrinking Clay	Very Low

- 4.18 No significant ground subsidence hazards are identified.

Sensitive Land Uses

- 4.19 There are no designated ecological receptors identified on or adjacent to the site.
- 4.20 There are no listed buildings identified on site.

Environmental Sensitivity

- 4.21 Overall the site is currently considered to be of low to moderate environmental sensitivity due to the following:
- Fields (agricultural land use);
 - The site is underlain by a Secondary A Aquifer;
 - Site is not located within a Source Protection Zone;
 - No groundwater abstraction licenses within 1000m of the site; and
 - Surface watercourse on site.
- 4.22 The proposed end use of the site is residential and as such future sensitivity will be high for end users.

Current Industrial Land Uses

- 4.23 No new significant risks are identified.
- 4.24 There are no fuel stations within 500m of the site.
- 4.25 There are no records of National Grid High Voltage Underground Electricity Transmission Cables within 500m of the site.
- 4.26 There are no records of National Grid high pressure gas transmission pipelines within 500m of the site.

5.0 CONSULTATIONS

Regulatory Database

5.1 The following information has been obtained from a commercially available environmental database.

Table 6) Environmental permits, incidents and registers

Environmental Permits, Incidents and Registers	0 -250m	250-500m	Details
Site determined as contaminated land	0	0	Not applicable
Authorised industrial processes	0	0	Not applicable
Registered radioactive substances	0	0	Not applicable
Records of Part A (2) and Part B Activities	0	0	Not applicable
Enforcements, prohibitions or prosecutions	0	0	Not Applicable
Pollution Incidents	7	5	Nearest incidents are Category 2 (Significant) impacts to water, associated with sewage, to southeast. These are not considered to present a significant risk.
List 1 Dangerous Substance Inventory Sites	0	0	Not Applicable
List 2 Dangerous Substance Inventory Sites	0	0	Not Applicable
Consents issued under the Planning (Hazardous Substances) Act 1990	0	0	Not Applicable
Control of Major Accident Hazard (COMAH)/ Notification of Installations Handling Hazardous Substances (NIHHS) sites	0	0	Not Applicable
Records of Licensed Discharge Consents	6	8	Principally sewage and storm water overflows

5.2 No new risks are identified from the regulatory database.

Landfill Sites and Waste Treatment Sites

- 5.3 There are active and historic landfill records within 500m of the site; the active one operated by Suez Recycling 354m to south. These are not considered to present a significant risk to the site, given the distance, elevation and intervening ground conditions.
- 5.4 There are records of waste treatment, transfer or disposal sites within 500m of the site; again, in the area of operation by Suez. These are not considered to present a significant risk to the site, given the distance, elevation and intervening ground conditions.

6.0 PRELIMINARY CONCEPTUAL MODEL

Source	Location	Exposure Pathway	Potential Receptor	Probability of Exposure	Details
Human Health					
Asbestos, hydrocarbons and metals	On-site	Ingestion, dermal and inhalation	Construction Workers	Dismissed	Standard construction PPE will address risk under CDM
			Site users	Dismissed	No likely source
Asbestos, hydrocarbons and metals	Unforeseen contamination	Ingestion, dermal and inhalation	Construction Workers	Dismissed	Standard construction PPE will address risk under CDM
			Site users	Negligible	No significant source identified
Hydrocarbon and metals	Migration from off-site source	Ingestion, dermal and inhalation	Construction Workers	Dismissed	No significant sources identified
			Site users		
Ground Gas	Historic Landfills	Inhalation & Explosive	Construction Workers	Dismissed	No significant nearby source identified
			Site users		
	Made Ground		Construction Workers	Dismissed	No likely significant on-site source identified
			Site users		
Groundwater					
Hydrocarbon and metals	Potential spillage on site	Vertical Migration	Groundwater	Dismissed	Significant widespread impact to soil unlikely
Surface Water					
Hydrocarbon and metals	Potential spillage on site	Horizontal Migration	River Network	Dismissed	Significant widespread impact to soil unlikely
Environmental Receptors					
On-site contaminants		Ingestion dermal and inhalation	Ecology	Dismissed	No receptor
		Direct	Archaeology	Dismissed	No receptor
		Direct	Geology	Dismissed	No receptor
		Phytotoxic	Woodland	Dismissed	No receptor
		Phytotoxic	Crops	Dismissed	No receptor
		Ingestion dermal and inhalation	Livestock	Dismissed	No receptor
Building Services					
On site contaminants		Direct	Historic Buildings	Dismissed	No receptor
		Direct	Proposed Buildings	Dismissed	No source identified
		Permeate into pipework	Water Pipes	Dismissed	Water Authority Requirements to be followed

7.0 DISCUSSION AND RECOMMENDATIONS

Discussion

- 7.1 There is not considered to be a significant risk of contamination, given the history of the site.
- 7.2 If unforeseen contamination is encountered it is likely to be very limited in extent and readily addressed during development.
- 7.3 It is considered conventional foundations should be suitable for residential properties, founding within the natural undisturbed soils.
- 7.4 At this stage the soils should be assumed to be of medium shrinkability, in accordance with NHBC guidance.
- 7.5 Made Ground is not anticipated within the body of the site.
- 7.6 Soakaways are unlikely to be suitable. Testing is being carried out and will be reported separately.

Recommendations

- 7.7 A ground investigation should be undertaken to provide design information for future development works and assess land quality issues.
- 7.8 It is recommended that the ground investigation includes:
 - Trial pits and window sampler holes across the site to confirm ground conditions;
 - Installations and return monitoring visits to measure groundwater and ground gas are not anticipated to be required;
 - *In situ* and laboratory geotechnical and chemical testing of soils; and
 - Preparation of a suitable ground investigation report confirming soil properties and requirements for design of foundations and infrastructure.
- 7.9 As no significant contamination risks have been identified it is considered that any future investigation can be undertaken post-planning under a suitable worded Planning Condition.

Appendix 1 – Groundsure Reports



EmapSite

Masdar House, 1 Reading Road,
Eversley, RG27 0RP

Report Reference: EMS-481313_645769

Your Reference: EMS_481313_645769

Report Date 31 May 2018

Report Delivery Email - pdf
Method:

Geo Insight

Address: Henthorn Road, Clitheroe , BB7 3BY,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

Yours faithfully,

emapsite customer services team

Enc.
Groundsure Geo Insight

Address: Henthorn Road, Clitheroe , BB7 3BY,

Date: 31 May 2018

Reference: EMS-481313_645769

Client: EmapSite



Aerial Photograph Capture date: 08-Apr-2017

Grid Reference: 372936,440830

Site Size: 5.01ha

Contents Page

Contents Page.....	3
Overview of Findings.....	5
1:10,000 Scale Availability.....	8
Availability of 1:10,000 Scale Geology Mapping.....	9
1 Geology (1:10,000 scale).....	10
1.1 Artificial Ground map (1:10,000 scale).....	10
1. Geology 1:10,000 scale.....	11
1.1 Artificial Ground.....	11
1.2 Superficial Deposits and Landslips map (1:10,000 scale).....	12
1.2 Superficial Deposits and Landslips.....	13
1.2.1 Superficial Deposits/ Drift Geology.....	13
1.2.2 Landslip.....	13
1.3 Bedrock and linear features map (1:10,000 scale).....	14
1.3 Bedrock and linear features.....	15
1.3.1 Bedrock/ Solid Geology.....	15
1.3.2 Linear features.....	15
2 Geology 1:50,000 Scale.....	16
2.1 Artificial Ground map.....	16
2. Geology 1:50,000 scale.....	17
2.1 Artificial Ground.....	17
2.1.1 Artificial/ Made Ground	17
2.1.2 Permeability of Artificial Ground.....	17
2.2 Superficial Deposits and Landslips map (1:50,000 scale).....	18
2.2 Superficial Deposits and Landslips.....	19
2.2.1 Superficial Deposits/ Drift Geology.....	19
2.2.2 Permeability of Superficial Ground	19
2.2.3 Landslip.....	19
2.2.4 Landslip Permeability.....	19
2.3 Bedrock and linear features map (1:50,000 scale).....	20
2.3 Bedrock, Solid Geology & linear features.....	21
2.3.1 Bedrock/Solid Geology.....	21
2.3.2 Permeability of Bedrock Ground.....	21
2.3.3 Linear features.....	21
3 Radon Data.....	22
3.1 Radon Affected Areas.....	22
3.2 Radon Protection.....	22
4 Ground Workings map.....	23
4 Ground Workings.....	24
4.1 Historical Surface Ground Working Features derived from Historical Mapping.....	24
4.2 Historical Underground Working Features derived from Historical Mapping.....	24
4.3 Current Ground Workings.....	24
5 Mining, Extraction & Natural Cavities.....	26
5.1 Historical Mining.....	26
5.2 Coal Mining.....	26
5.3 Johnson Poole and Bloomer.....	26
5.4 Non-Coal Mining.....	26
5.5 Non-Coal Mining Cavities.....	27
5.6 Natural Cavities.....	27
5.7 Brine Extraction.....	27
5.8 Gypsum Extraction.....	27
5.9 Tin Mining.....	28
5.10 Clay Mining.....	28
6 Natural Ground Subsidence.....	29
6.1 Shrink-Swell Clay map.....	29
6.2 Landslides map.....	30
6.3 Ground Dissolution of Soluble Rocks map.....	31
6.4 Compressible Deposits map.....	32
6.5 Collapsible Deposits map.....	33
6.6 Running Sand map.....	34

6 Natural Ground Subsidence..... 35

 6.1 Shrink-Swell Clays.....35

 6.2 Landslides.....35

 6.3 Ground Dissolution of Soluble Rocks.....35

 6.4 Compressible Deposits.....36

 6.5 Collapsible Deposits.....36

 6.6 Running Sands.....36

7 Borehole Records..... 38

8 Estimated Background Soil Chemistry..... 39

9 Railways and Tunnels map..... 40

9 Railways and Tunnels..... 41

 9.1 Tunnels41

 9.2 Historical Railway and Tunnel Features41

 9.3 Historical Railways.....42

 9.4 Active Railways.....42

 9.5 Railway Projects.....42

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslide within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslide within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of linear features within 500m of the study site boundary?

Yes

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

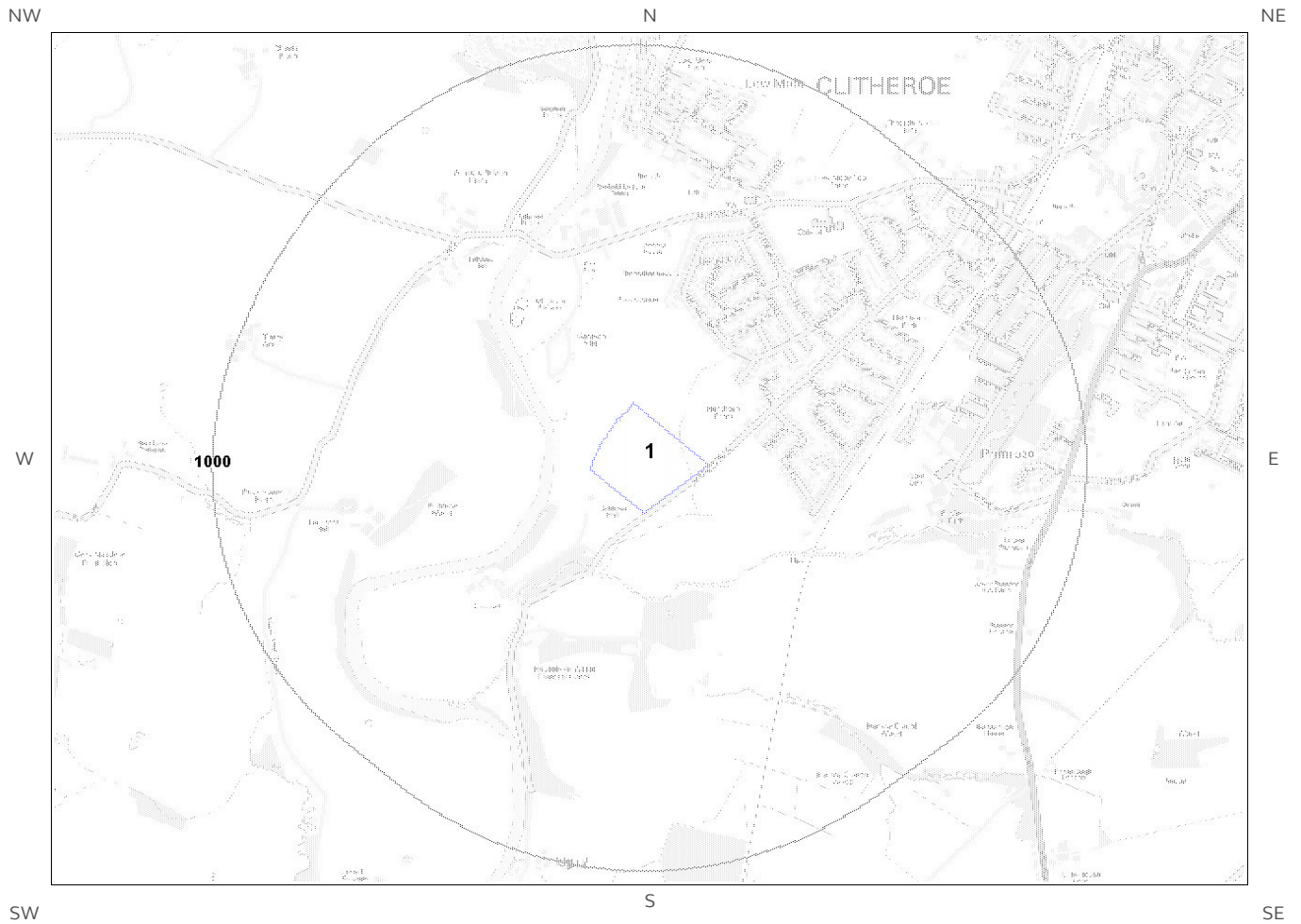
	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	7	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	0	0	1
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

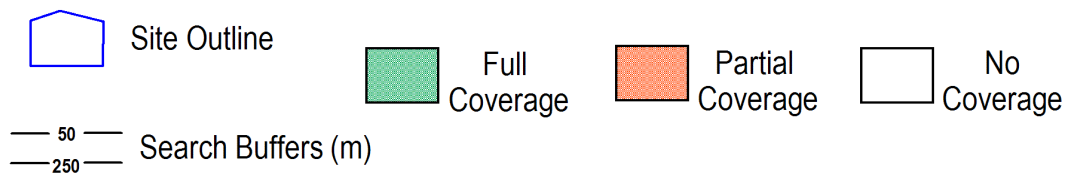
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Very Low				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Very Low				
6.4 Compressible Deposits	Negligible				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Very Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	0	0	0		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	3	2	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	0	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

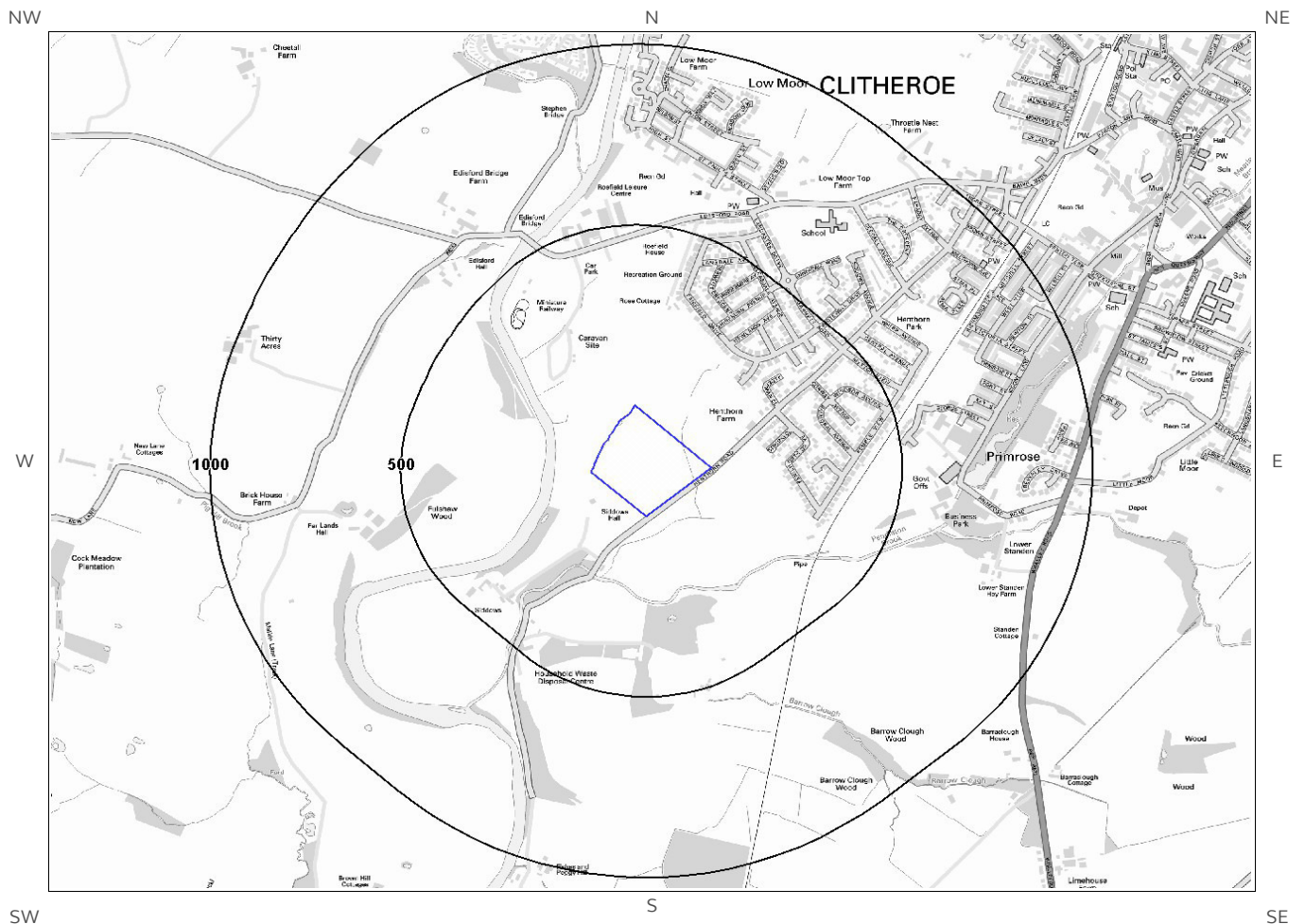
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

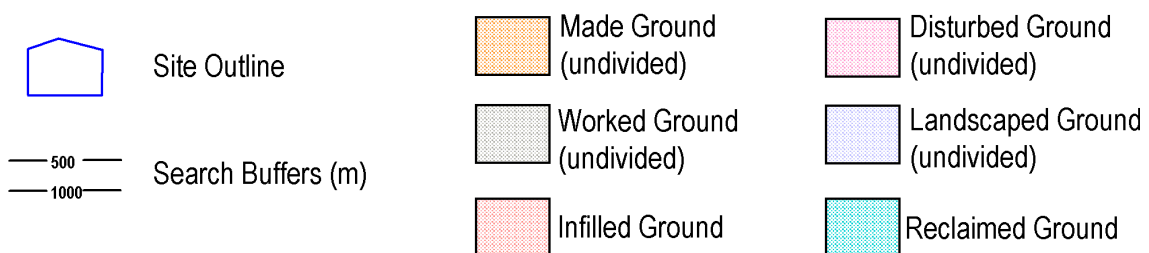
1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



1. Geology 1:10,000 scale

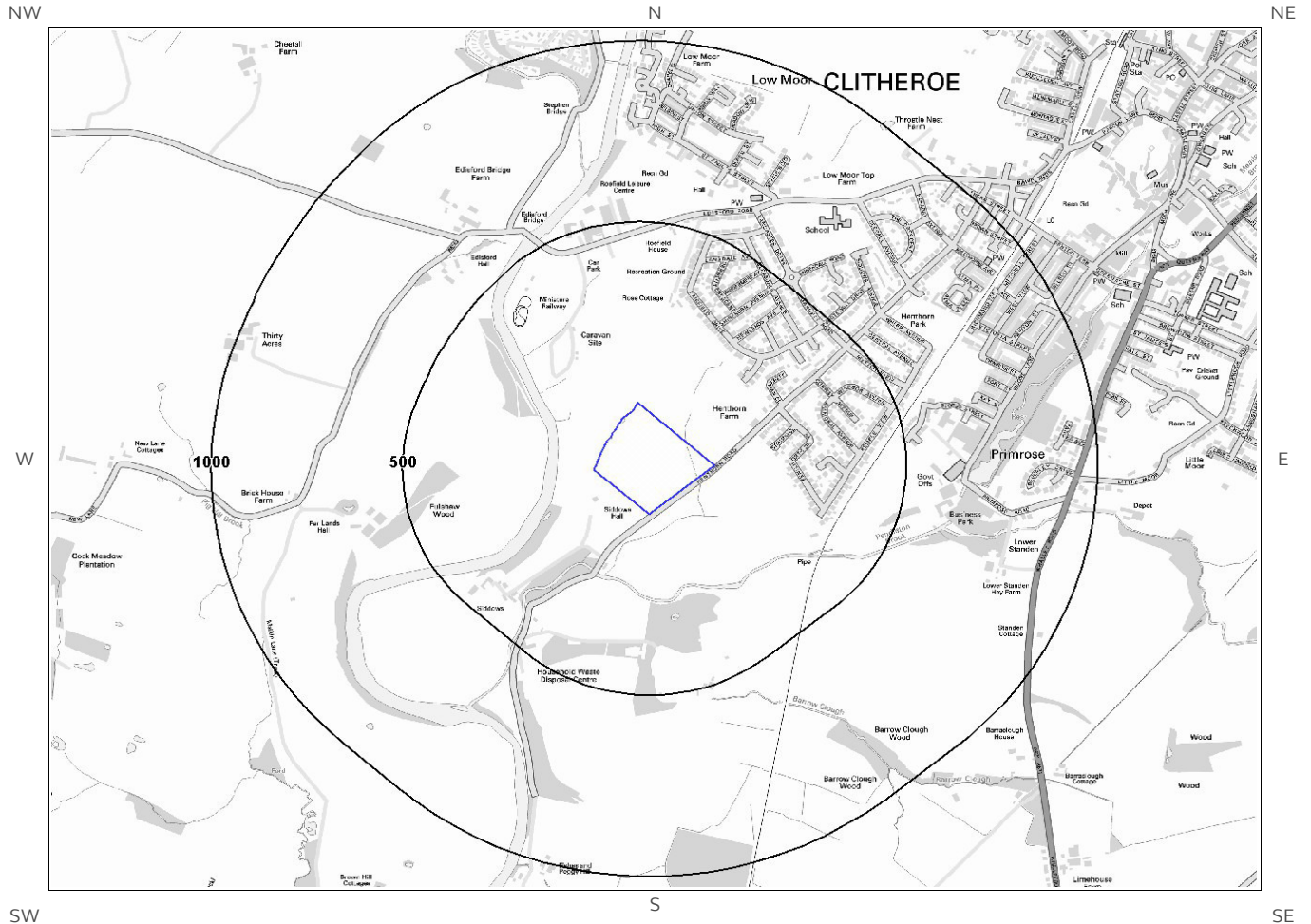
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

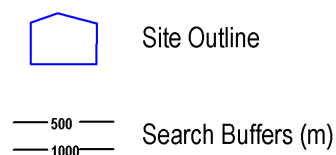
Database searched and no data found.

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

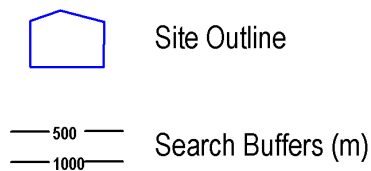
Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

A map of Clitheroe, Lancashire, showing a central point from which two concentric circles are drawn, representing distances of 500m and 1000m. A blue polygon highlights a specific area within the 500m radius. The map includes various landmarks such as Low Moor Farm, Clitheroe Town, and the River Ribblesdale. The map is oriented with North (N) at the top, South (S) at the bottom, East (E) to the right, and West (W) to the left. The map is labeled with 'CLITHEROE' in the top right corner.

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

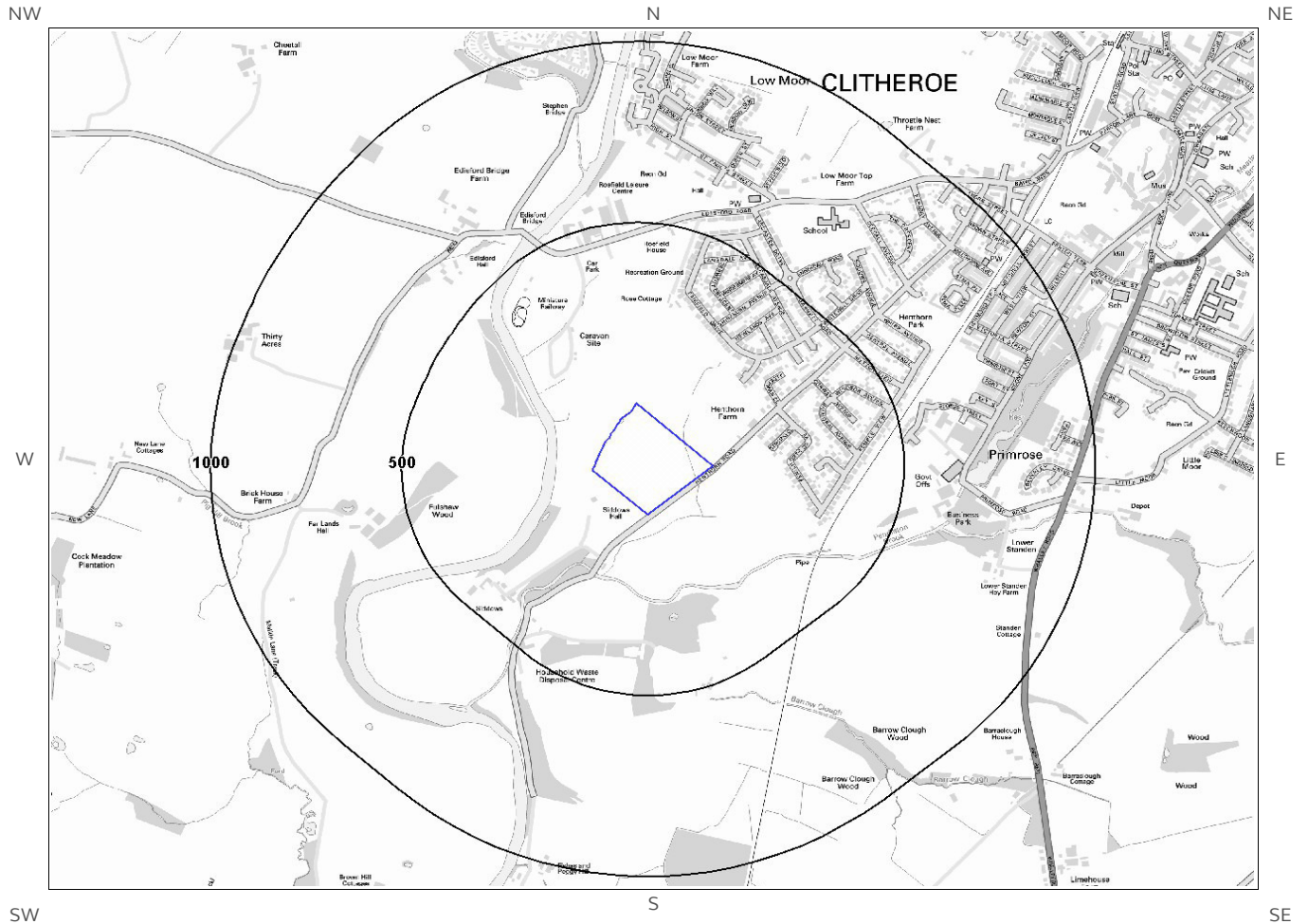
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

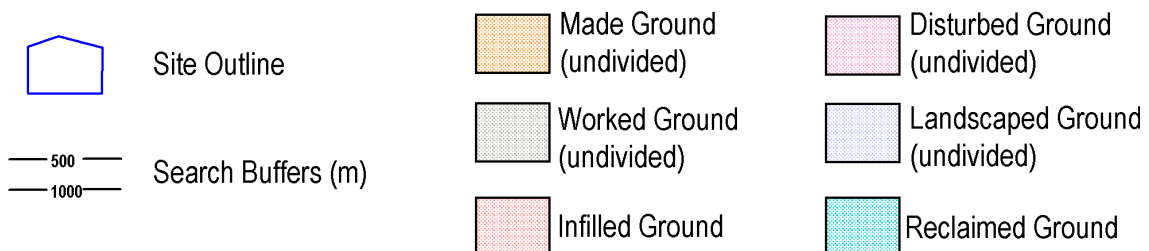
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 068

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

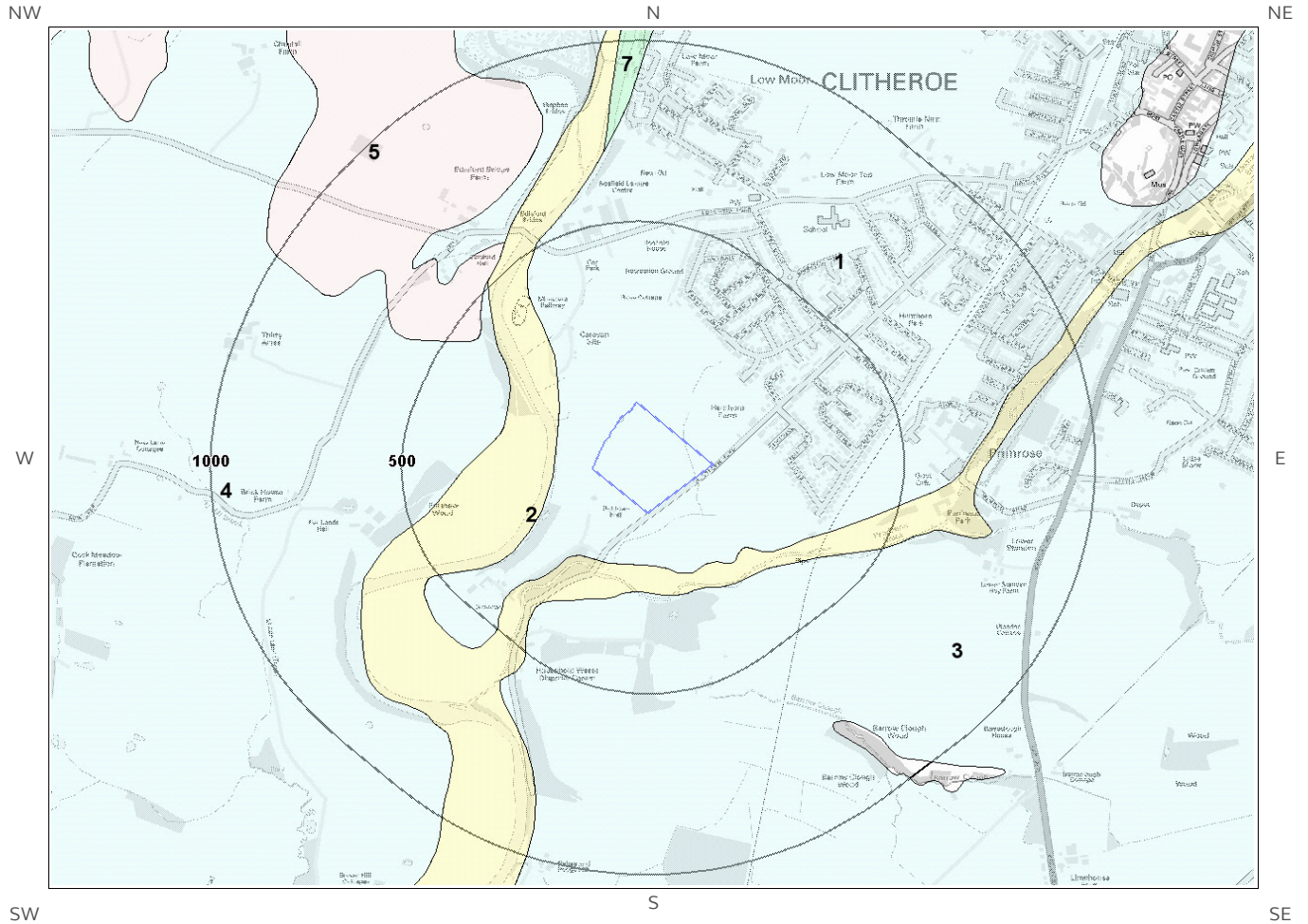
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

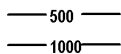
2.2 Superficial Deposits and Landslips map (1:50,000 scale)



© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



Site Outline



Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
2	102.0	W	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	218.0	S	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
4	257.0	W	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
5	434.0	NW	GLLDD-XCZ	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN	CLAY AND SILT

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

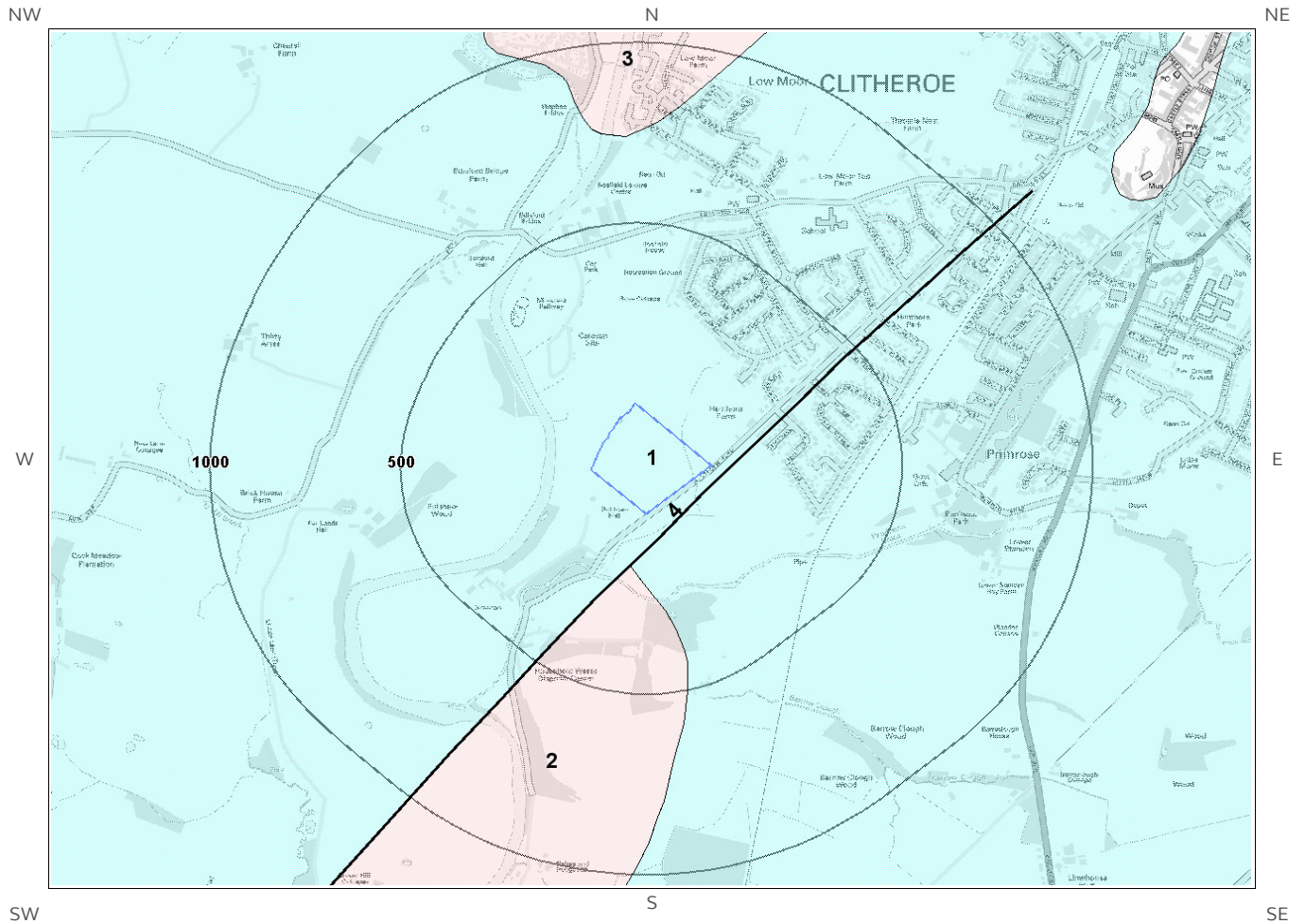
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

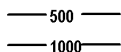
2.3 Bedrock and linear features map (1:50,000 scale)



© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



Site Outline



Search Buffers (m)

2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 068

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	CLHOM-MDST	CLITHEROE LIMESTONE FORMATION AND HODDER MUDSTONE FORMATION (UNDIFFERENTIATED) - MUDSTONE	WISEAN
2	149.0	S	PRMT-STMD	PERMIAN ROCKS AND TRIASSIC ROCKS (UNDIFFERENTIATED) - SANDSTONE AND MUDSTONE	-

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Low

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? Yes

ID	Distance	Direction	Category Description	Feature Description
4	38.0	SE	FAULT	Fault, inferred

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

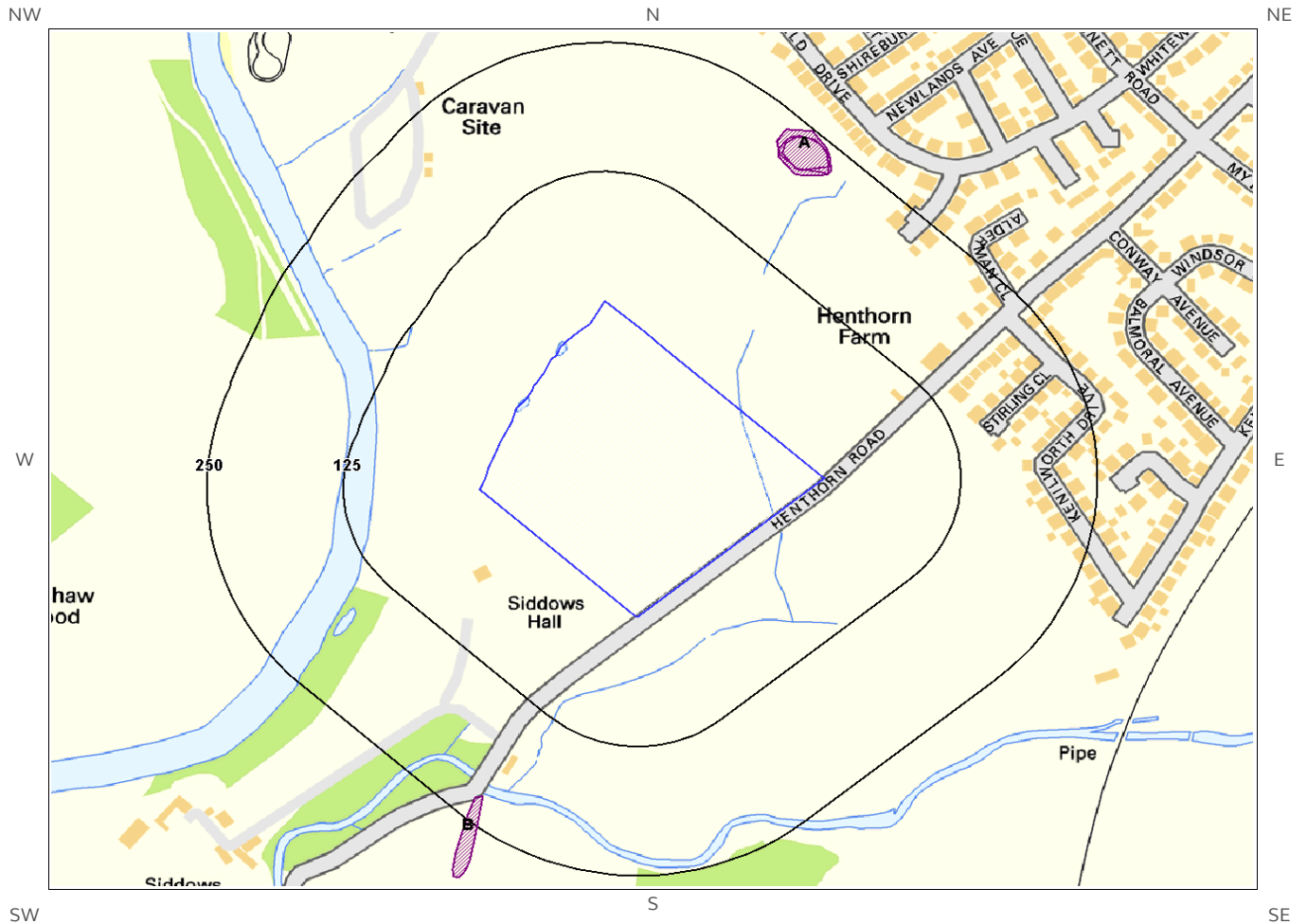
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection

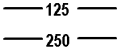
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.

-  Site Outline
-  Search Buffers (m)
-  Historic Surface Ground Workings
-  Historic Underground Workings
-  Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1A	206.0	NE	373088 441129	Unspecified Pit	1930
2A	206.0	NE	373088 441129	Unspecified Pit	1910
3A	206.0	NE	373088 441129	Unspecified Pit	1938
4A	210.0	NE	373091 441130	Unspecified Pit	1950
5A	211.0	NE	373088 441135	Unspecified Old Quarry	1911
6B	224.0	SW	372780 440470	Unspecified Heap	1930
7B	224.0	SW	372780 440470	Unspecified Heap	1938

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

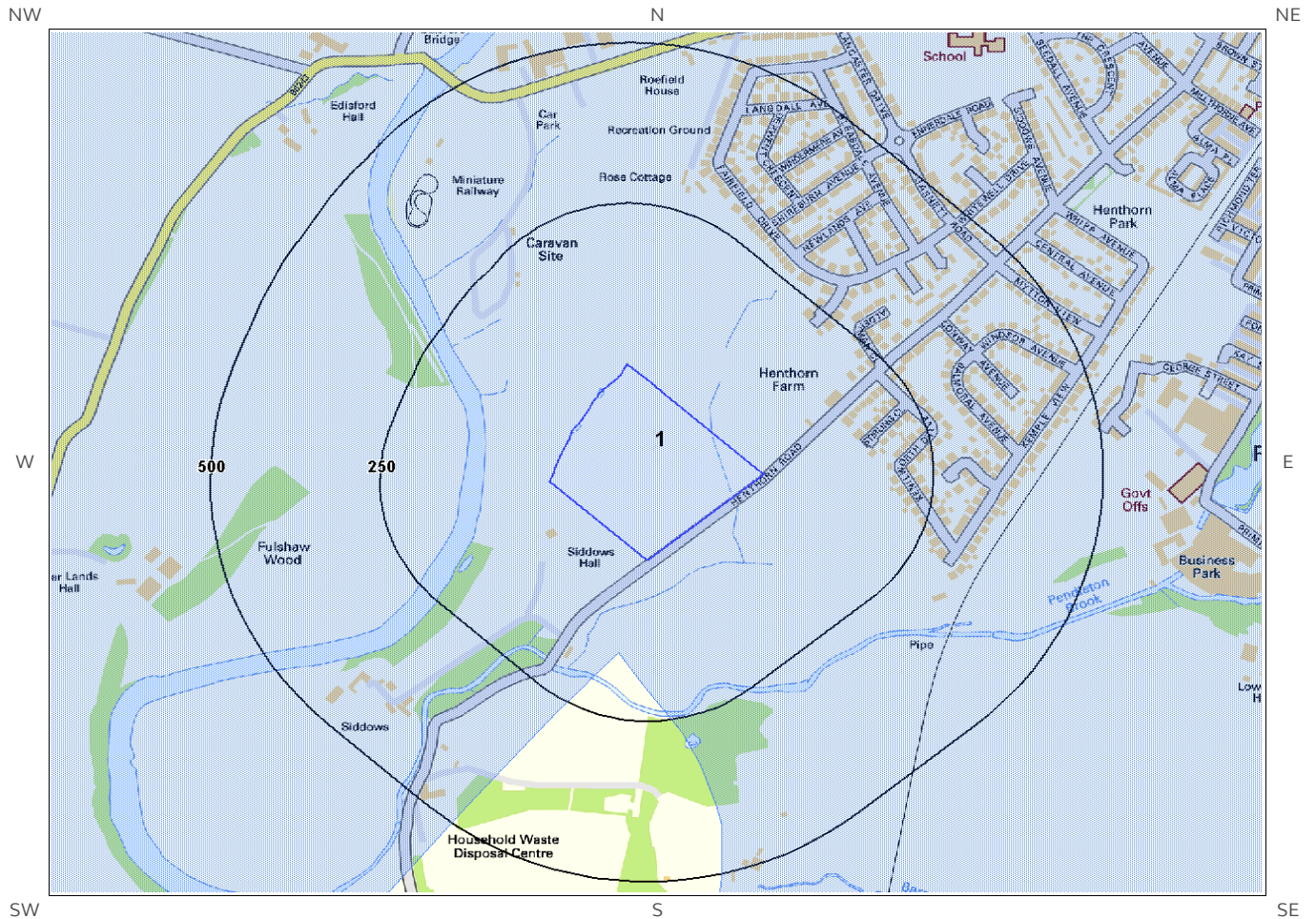
4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? No

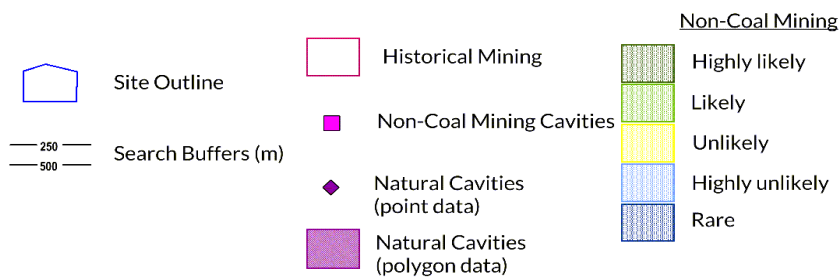
Database searched and no data found.

5 Mining, Extraction & Natural Cavities map



**Mining, Extraction and
Natural Cavities Legend**

© Crown copyright and database rights 2018.
Ordnance Survey license 100035207.



5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	686.0	S	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.
