

Shaw Stephens
Consulting

**Dragon Packaging,
47-48 Clywedog Road North,
Wrexham Industrial Estate,
Wrexham LL13 9XN**

Proposed Commercial Extension

Phase 1 Site Investigation Report

For: FI Real Estate

Job Number:		0133
Report Reference:		0133-01
Issue Status / Revision:	Final	
Date:	September 2024	
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Previous Revisions and Date:		
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1.0 INTRODUCTION

SHAW STEPHENS CONSULTING is providing consultancy services to **FI REAL ESTATE** in connection with the proposed partial redevelopment of land located within the curtilage of Dragon Packing, No's. 47-48 Clywedog Road North, Wrexham Industrial Estate, Wrexham LL13.

It is proposed that the northern – southern elevations of an existing warehouse facility is to be partially redeveloped by the construction of 2nr steel framed extensions (warehouses) constructed of rain screen cladded elevation under pitch corrugated roofing material to match existing buildings. It is understood that both extensions will provide 1696m² of additional warehouse / floor space.

The proposed layout of the development is as annotated on the drawings contained herein.

The proposed development falls within the administrative jurisdiction of **WREXHAM COUNTY BOROUGH COUNCIL**.

This Phase I report was devised to generally comply with the relevant principles and requirements of a wide range of guidance including BS5930:1999 as amended 2007: *"Code of Practice for Site Investigations"*, BS10175: 2011 *"Investigation of Potentially Contaminated Sites - Code of Practice"*, and the DEFRA/Environment Agency Report CLR11 *"Model Procedures for the Management of Land Contamination"*.

This report should be read in conjunction with the Notes on Limitations, given in Appendix B.

2.0 PURPOSE & AIMS OF THE STUDY

The primary aim of the Phase I Desk Study was to assess whether the site is likely to be affected by contamination to an extent that it may pose a risk to human health and/or the built environment and/or the wider natural environment or is affected by any other natural or man-made features which may impact on the proposed redevelopment.

Specific tasks undertaken to achieve these objectives were as follows:

- Undertaking of a review of available historical mapping, environmental databases, and Environment Agency data
- Undertaking of a site walkover inspection
- Development of Preliminary Conceptual Model
- Development of a Phase 2 intrusive investigation strategy

3.0 SITE DATA

3.1 Site Location

The site is situated wholly within a commercial context, located within the curtilage of Dragon Packing, Nos. 47-48 Clywedog Road North, Wrexham Industrial Estate, Wrexham LL13 9XN as illustrated on the site location plans contained in Appendix A.

The **ORDNANCE SURVEY** coordinates for the approximate site centre are 337238, 349685. It stands at an approximate elevation of c.40maOD.

3.2 Site Description & Walkover Observations

The site was visited during July 2022 on completion of a review of all relevant historical and environmental mapping data (provided in Appendix D). Photographs taken at the time of the site visit are presented in Appendix E.

It was observed that the site comprises an irregular shaped parcel of land which extends to the approximate dimensions of c. 135m x 110m; its long axis being on a northwest – southeast alignment. It is bound to the east by public pavements extending long Clywedog Road North, and to the south by pavements extending along Clywedog Road South. Its western boundary is adjoined by commercial units associated with Silvergate Plastics, whilst its northern boundary overlooks parcels of open land fronting onto Redwither Lane.

Permanent structures occupying the study site comprise a rectangular shaped commercial depot, constructed of a combination of red brick / corrugated cladded elevations under pitched corrugated roofing materials together, with a brick-built electrical sub-station positioned along the western site boundary, and a small brick-built gas valve housing unit being along its eastern boundary.

The external surface topography across the site was seen to be sensibly flat with surface cover comprising a combination of hard paved surfaces to the east of the overall site with areas of landscaping forming the remainder.

Given that the site and land immediately adjoining the site are currently developed for mixed commercial land uses, it is assumed that buried services associated with these structures may underly the study site.

There was no visual evidence of the presence of native and/or non-native plant species within, or adjoining, the site boundary. Vehicle and pedestrian access can be made via its Clywedog Road North frontage to the east.

The information obtained from the visit is summarised in Table 1 hereunder.

Table 1: Summary of Walkover Observations

FEATURE		OBSERVATION
Current Use of Land		Commercial land
Topography / Surfaces		The external surface topography across the site was seen to be sensibly flat with surface cover comprising a combination of hard paved surfaces to the east of the overall site with areas of communal landscaping forming the remainder.
Dimensions		It extends to the approximate dimensions of c. 135m x 110m; its long axis being on a northwest – southeast alignment.
Access		Vehicle and pedestrian access can be made via its Clywedog Road North frontage to the east.
Buildings Adjacent to the Site		Commercial
Services		Given that the site land immediately adjoining's are currently developed for commercial land use, it is assumed that buried services associated with these structures may underly the study site.
Boundary	North	Open land
	South	Public pavements extending along Clywedog Road South
	East	Public pavements extending along Clywedog Road North
	West	Commercial units
Material storage		None observed
Waste disposal		None observed
Other potential contamination		Hydrocarbons associated with on site parking facilities Contaminants associated with on site electrical sub-station
Ecology*		There was no visual evidence of the presence of native and/or non-native plant species within, or adjoining, the site boundary.

**These comments on the ecology are for initial preliminary assessment only and are based on observations undertaken by a person who is a trained ecologist but who has not undertaken a comprehensive Phase I Habitat Survey or similar*

4.0 SITE HISTORY

The history of the site and its immediate surrounds was investigated by consultation with a range of archive resources. Geographical information, historical mapping and environmental data were primarily based on a GroundSure Environmental Report (Reference No. CMAPS-AAG-1050504-4165-150722, dated July 2022), presented in Appendix D.

A summary of the historical mapping data is given hereunder:

Table 2: Historical Map Review

YEAR	SCALE	ON SITE	ADJACENT TO SITE	<250M
1872	1:10,560	2nr ponds located in NW portion of the site A pond located in NE portion of the site	Undeveloped / vacant land	Much of the land surrounding the site is undeveloped / vacant land Ponds: c.45m E c.75m SW [adjacent Brook to the S, flowing W>E] c.80m NW c.90m SE c.100m E (2nr) c.130-180m SW (few) c.150m E (2nr) c.190m SE c.100m N: Redwither Brook c.110m N: Properties associated with "Little Erdas" [extending to the N]
1899 1898-1900 1912 1909-14 1938	1:2,500 1:10,560 1:2,500 1:10,560 1:10,560	No significant change	No significant change	c.40m N: Sunday School
1949 1961 1961 1960-64 1968	1:10,560 1:2,500 1:2,500 1:10,560 1:10,560	No information available for years between 1939 – 1945: Based on the information obtained from within the appended GroundSure reports much of the site appears to have been developed for the production of munitions associated with WWII. A mineral railway line runs along the NW border of the site, extending beyond the boundaries of the site	Much of the land to the E/S of the site developed for unspecified land uses. Based on the information obtained from within the appended GroundSure reports states that the surrounding environs were utilised for the production of the production of munitions associated with WWII etc.:	Much of the land within the surrounding area developed for unspecified land uses. Based on the information obtained from within the appended GroundSure reports states that the surrounding environs were utilised for the production of the production of munitions associated with WWII etc.:
1978 1979-82	1:2,500 1:10,000	Munition works no longer shown. Site redeveloped for commercial land uses Mineral railway line now recognised as "Dismantled Railway"	Munition works no longer shown. Adjoining land redeveloped for commercial land uses	Munition works no longer shown. surrounding land redeveloped for commercial land uses
1982 1982-85 1985	1:2,500 1:2,500 1:2,500	No significant change	E [N portion of the site]: Road later recognised as Clywedog Road North NW [S portion of the site]: Road later recognised as Clywedog Road South	c.250m E: Factory
1986 1986	1:2,500 1:2,500	N portion of the site: Unspecified properties and associated car park	No significant change	c.60m E: Electric Sub-Station c.80m E: Electric Sub-Station c.130m NE: Electric Sub-Station
1991 1991 1989-92 1992 1992 1993	1:2,500 1:2,500 1:2,500 1:2,500 1:10,000 1:2,500	No significant change	SW [N portion of the site]: Unspecified properties delineating Clywedog Road South to the SE NE [S portion of the site]:	c.80m W: Electric Sub-Station c.80m S: Electric Sub-Station c.115m S: Electric Sub-Station c.240m E: Electric Sub-Station

1993	1:2,500		Unspecified properties	
1994	1:2,500		delineating Clywedog Road	
1994	1:2,500		North to the NE	
2001	1:10,000			
2003	1:1,250		SW [S portion of the site]:	
2010	1:10,000		Unspecified properties	
2022	1:10,000		delineating Clywedog Road	
			East to the SW	

5.0 ENVIRONMENTAL SETTING

5.1 Documented Geology

The geology of the site was researched by reference to Wedd. C.C *et.al* (1927) 'The geology of the country around Wrexham: Explanation of one-inch geological sheet 121, new series (England and Wales), His Majesties Stationery Office, London. and the **BRITISH GEOLOGICAL SURVEY (BGS)** 1:50, 000 scale Sheet 121 Wrexham (1993), and 1:10, 000 scale (Solid and Drift Editions) geological mapping data.

These indicate the site is underlain by artificial made ground deposits of an unknown thickness and composition overlying natural drift deposits comprising impermeable diamicton (boulder clay) comprising gravel sand silt and clay deposits of glacial origin (*Pleistocene Epoch - Late Quaternary - Devensian Sub Age*).

The documented solid geology comprises the Salop Formation (*formerly the Enville Formation*) of the Warwickshire Group comprising red / brown argillaceous mudstone, and red-brown (mostly sublitharenite) sandstone containing beds of pebbly sandstone and conglomerates of the Upper Carboniferous Period (*Silesian Stage: Westphalian - Asturian Sub-stage*), Early-Permian Period (*Cisuralian Epoch*). The general dip of the solid geology within the surrounding area is not documented on the **BGS** solid mapping data.

The nearest geological line of weakness (fault) lies c.127m north of the study site.

The 'Indicative Atlas of Radon in England and Wales' (Miles. J.C.H *et.al*, 2007) Map 13 'Northern Welsh Marches and Liverpool, shows the site to be situated within an area where it is believed that between 1% and 3% of the properties within the area are affected by Radon and therefore no Radon Protection Measures will be required for new structures in contact with the ground.

Geological Information obtained from the GroundSure Environmental Report is presented in Appendix D, and summarised hereunder:

Table 3: Summary of Geological Data from GroundSure Report

GEOLOGY		
Data	Distance	Comments
Artificial Ground	On Site	Artificial ground and/or reworked ground deposits associated with the development of adjoining properties
Superficial Deposits / Drift Geology	On Site	Diamicton
Permeability of Drift Cover	Maximum Permeability	High
	Minimum Permeability	Low
Bedrock and Solid Geology	On Site	Salop Formation
Permeability of Bedrock: On Site	Maximum Permeability	Moderate
	Minimum Permeability	Low
Geological Lines of Weakness	On Site	No records
	<200m	127m N (fault)
Radon Affected Area	On Site	The site is in a Radon Affected Area, as between 1% and 3% of properties are above the Action Level
Radon Protection	On Site	No radon protective measures are necessary
MINING, GROUNDWORKINGS AND NATURAL CAVITIES		
Data	Distance	Comments
Natural cavities	<500m	No records
BritPits	<500m	No records
Surface ground workings	<250m	On Site: Unspecified Pit On Site: Unspecified Heap 28m NE: Unspecified Pit 64m S: Unspecified Heap 76m SE: Unspecified Heap 83m NE: Ponds 89m NE: Ponds 104m E: Unspecified Heap 125m SW: Unspecified Heap 132m SW: Unspecified Heap 143m S: Unspecified Heap 150m NE: Unspecified Pit 157-58m SW: Ponds 197m SW: Unspecified Heap 246m E: Unspecified Heap 247m NE: Ponds

Underground workings	<1000m	No records
Historical Mineral Planning Areas	<500m	No records
Non-coal mining	<1000m	No records
Mining cavities	<1000m	No records
Coal mining	On Site	The site is located within a coal mining area as defined by the Coal Authority
Brine areas	On Site	No records
Gypsum areas	On Site	No records
Tin mining	On Site	No records
Clay mining	On Site	No records
HAZARDS		
Data	Distance	Comments
Maximum shrink swell clays	On site	Very Low
Maximum running sands	On site	Negligible
Maximum compressible deposits	On site	Negligible
Maximum collapsible deposits	On site	Very Low
Maximum landslides	On site	Very Low
Maximum ground dissolution of soluble rocks	On site	Negligible

5.2 Historical Coal Mining

The appended environmental data, **BGS** mapping data **COAL AUTHORITY GAZETTEER** state that the site is located within a coal mining area. However, a site specific Coal Mining Report (refer to Appendix F for details) discounts any risk of the presence of shallow workings and no further action is therefore required in this respect.

5.3 Hydrology and Hydrogeology

Information on hydrology and hydrogeology obtained from a GroundSure Environmental Report is presented in Appendix D, and summarised hereunder:

Table 9: Summary of Hydrology and Hydrogeological Data from GroundSure Environmental Report

HYDROGEOLOGY AND HYDROLOGY		
Aquifer within Artificial Made Deposits	On site	Artificial Ground: Unproductive Aquifer: These are drift deposits with low permeability that have negligible significance for water supply or river base flow
Aquifer within Superficial Drift Deposits	On site	Diamicton: Secondary Undifferentiated Aquifer: Assigned where it is not possible to attribute either category A or B to a soil type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the soil type
Aquifer within Bedrock Deposits	On site	Salop Formation- Secondary A Aquifers: Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
Groundwater Abstraction Licenses	<1000m	No records
Surface Water Abstraction Licenses	<1000m	905m NE: Caparo Wire Ltd. Licence No: 24/67/7/0178
Potable Water Abstraction Licenses	<1000m	No records
Source Protection Zones	<500m	90m NW: Type 3 [Total catchment] 192m W: Type 3 [Total catchment]
Source Protection Zones (confined aquifer)	<500m	No records
Water Network (OS Mastermap)	<250m	On Site: Inland river not influenced by normal tidal action 82m SW: Lake, loch or reservoir 84m N: Inland river not influenced by normal tidal action 86m N: Inland river not influenced by normal tidal action 91m N: Inland river not influenced by normal tidal action 92m SW: Inland river not influenced by normal tidal action 128m NE: Inland river not influenced by normal tidal action 131m SW: Inland river not influenced by normal tidal action 150m NE: Inland river not influenced by normal tidal action 153-54m SE: Inland river not influenced by normal tidal action 159m N: Inland river not influenced by normal tidal action 199m E: Inland river not influenced by normal tidal action 202m NE: Inland river not influenced by normal tidal action 221m NW: Inland river not influenced by normal tidal action 223m NW: Inland river not influenced by normal tidal action 235m S: Inland river not influenced by normal tidal action
Surface water features	<250m	15nr records
WFD Surface water body catchments	On Site	On Site: River BD catchment. Operational catchment: Clywedog - Dee
WFD Surface water bodies	<250m	No records
WFD Groundwater bodies	<250m	On Site: Dee Permo-Triassic Sandstone. Overall rating: Poor [2019]
FLOODING		
Risk of Flooding from Rivers and	<50m	No records

Sea (RoFRaS)		
Historical Flood Events	<250m	No records
Flood Defences	<250m	No records
Areas Benefitting from Flood Defences	<250m	No records
Flood Storage Areas	<250m	No records
Flood Zone II	<50m	No records
Flood Zone III	<50m	No records
Surface water flooding: Highest risk	On Site	1 in 30 year, Greater than 1.0m
	<50m	1 in 30 year, Greater than 1.0m
Groundwater flooding: Highest risk	On Site	Low
	<50m	Low

For simplified interpretation, the geological succession underlying the site may be regarded as a series of discrete units in terms of their hydrogeological significance, as illustrated hereunder:

Table 10: Hydrogeological Interpretation

UNIT	PROPERTIES	HYDROGEOLOGICAL DESIGNATION
Made / Reworked Ground	Likely to be generally granular and permeable and will permit vertical and lateral transmission of groundwater.	Unproductive Aquifer
Diamicton	Assigned where it is not possible to attribute either category A or B to a soil type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the soil type	Secondary Undifferentiated Aquifer
Salop Formation	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers	Secondary A Aquifer

6.0 FURTHER ENVIRONMENTAL DATA

Environmental data was researched using several sources including Environment Agency Maps and GroundSure EnviroSight Report presented in Appendix D and is summarised hereunder in Table 6. This environmental data has been used to carry out a Preliminary Qualitative Risk Assessment (Tier 1) and formulate the preliminary conceptual model as discussed in Section 8.0 of this report.

Table 11: Summary of Environmental Data

POTENTIALLY CONTAMINATIVE USES IDENTIFIED FROM 1:10,000 SCALE MAPPING		
Data	Distance	Comments
Historical industrial land uses	<250m	On Site: Unspecified Heap [1964] On Site: Unspecified Pit [1977] On Site: Unspecified Commercial/Industrial [1964] 28m NE: Unspecified Pit [1977] 64m S: Unspecified Heap [1964] 76m SE: Unspecified Heap [1964] 104m E: Unspecified Heap [1964] 125m SW: Unspecified Heap [1964] 132m W: Unspecified Heap [1964] 132m E: Unspecified Heap [1977] 143m S: Unspecified Heap [1964] 150m NE: Unspecified Pit [1964-77] 184m E: Unspecified Works [1977-92] 196m NE: Unspecified Commercial/Industrial [1964] 197m SW: Unspecified Heap [1964] 246m E: Unspecified Heap [1977] 248m E: Unspecified Workshop [1977-92]
Historical tanks	<250m	No records
Historical energy features	<250m	59-60m SW: Electric Sub-Stations [1991-94] 61-62m W: Electric Sub-Station [1991-93] 64m W: Electric Sub-Station [1994] 65m SW: Electric Sub-Station [1993] 72m NE: Electric Sub-Station [1986-94] 77m NE: Electric Sub-Station [1993-94] 85m NE: Electric Sub-Station [1986-91] 117m S: Electric Sub-Station [1991-94] 132m NE: Electric Sub-Station [1986-94] 135m NE: Electric Sub-Station [1994] 189m S: Electric Sub-Station [1993-94] 213m S: Electric Sub-Station [1983-91] 221m S: Electric Sub-Station [1993-94] 233m SE: Electric Sub-Station [1994] 237m SE: Electric Sub-Station [1991-93]
Historical petrol stations	<250m	No records
Historical garages	<250m	No records
Historical military land	<250m	On Site: ROF Wrexham. Date of operation: c.1938-88. Activities: c.WW2: Produced cordite; Post WW2: Cordite production ceased in 1945 and the area was used as an industrial estate by the Welsh Development Agency to boost the local economy; Explosives Factory
Records of Current Industrial Land Use		
Data	Distance	Comments
Recent industrial land uses	<250m	On Site: Dragon Packaging Ltd [Packaging] 26m SW: Silvergate [Rubber, Silicones and Plastics] 55m E: Skanda [General Construction Supplies] 56m NE: Riello UPS Ltd [Electrical Equipment Repair and Servicing] 65m SW: Electric Sub-Station [Electrical Features] 68m S: Electric Sub-Station [Electrical Features] 71m SE: AST Plastic Containers UK [Packaging] 74m W: Electric Sub-Station [Electrical Features] 77m NE: Electric Sub-Station [Electrical Features] 89m NE: Electric Sub-Station [Electrical Features] 119m S: Electric Sub-Station [Electrical Features] 129m W: Applied Components Technology Ltd [Rubber, Silicones and Plastics] 148m SE: Décor-lam Ltd [Industrial Coatings and Finishings] 151m SW: Porviar Sciences [Rubber, Silicones and Plastics] 154m E: Etiquette Labels Ltd [Stationary, Stamps, Tags and Labels] 200m SW: Electric Sub-Station [Electrical Features] 201m E: Fleet Sauce [Vehicle Hire and Rental] 217m S: Electric Sub-Station [Electrical Features] 217m E: Broadway Leisure [Sports and Leisure Equipment Repair] 221m S: Electric Sub-Station [Electrical Features] 236m E: Zaviz International Ltd [Vehicle Repair, Testing and Servicing] 239m SE: Electric Sub-Station [Electrical Features]

		241m E: Business Print & Design [Published Goods]
Current or recent petrol stations	<250m	No records
Electricity cables	<250m	No records
Gas pipelines	<250m	No records
Sites determined as Contaminated Land	<250m	No records
Control of Major Accident Hazards (COMAH)	<250m	No records
Regulated explosive sites	<250m	No records
Hazardous substance storage/usage	<250m	No records
Historical licensed industrial activities (IPC)	<250m	No records
Licensed industrial activities (Part A(1))	<250m	No records
Licensed pollutant release (Part A(2)/B)	<250m	136m W: Applied Component Technology Ltd. Process: Di-isocyanate Processes. Current Permit – Part B
Radioactive Substance Authorisations	<250m	No records
Licensed Discharges to controlled waters	<250m	102m N: Unit 2 Little Erlas 112m N: Unit 2 Little Erlas 122m N: Unit 2 Little Erlas 182m E: Plot 6 Wrexham Industrial Estate
Pollutant release to surface waters (Red list)	<250m	No records
Pollutant release to public sewer	<250m	No records
List 1 Dangerous Substances	<250m	No records
List 2 Dangerous Substances	<250m	No records
Pollution Incidents (EA/NRW)	<250m	110m W: 9/7/2003. ID: 172217. Pollutant: Other Pollutant – Other 134m NE: 18/3/2022. ID: 64721. Pollutant: General Biodegradable Materials and Wastes – Food and Drink 150m E: 4/5/2001. ID: 4393. Pollutant: Specific Waste Materials – Other Specific Waste Material 203m E: 29/10/2015. ID: 1408258. Pollutant: General Biodegradable Materials and Wastes – Food and Drink 227m NE: 4/2/2016. ID: 1905523. Pollutant: Atmospheric Pollutants and Effects - Smoke
Pollution inventory substances	<250m	No records
Pollution inventory waste transfers	<250m	No records
Pollution inventory radioactive waste	<250m	No records
WASTE AND LANDFILL		
Data	Distance	Comments
Active or recent landfill	<500m	No records
Historical landfill (BGS records)	<500m	No records
Historical landfill (LA/mapping records)	<500m	No records
Historical landfill (EA/NRW records)	<500m	No records
Historical waste sites	<500m	No records
Licensed waste sites	<500m	No records
Waste exemptions	<500m	56m S: AST Plastic Containers UK LLP [Treating / Storing waste exemption] 251m NE: Specialist Building Products [Using waste exemption] 338m E: Lockwell Electrical [Storing waste exemption] 367m SW: Malpas Tractors (Wrexham) Ltd [Storing waste exemption]
ENVIRONMENTAL DESIGNATIONS		
Data	Distance	Comments
Sites of Special Scientific Interest (SSSI)	<500m	None
Conserved wetland sites (Ramsar sites)	<500m	None
Special Areas of Conservation (SAC)	<500m	None
Special Protection Areas (SPA)	<500m	None
National Nature Reserves (NNR)	<500m	None
Local Nature Reserves (LNR)	<500m	None
Designated Ancient Woodland	<500m	223m NW [Ancient Semi Natural Woodland] 433m SE [Ancient and Semi Natural Woodland] 436-37m NE [Restored Ancient Woodland Site]
Biosphere Reserves	<500m	None
Forest Parks	<500m	None
Marine Conservation Zones	<500m	None
Green Belt	<500m	None
Proposed Ramsar sites	<500m	None
Possible Special Areas of Conservation (PSAC)	<500m	None
Potential Special Protection Areas (pSPA)	<500m	None
Nitrate Sensitive Areas	<500m	None
Nitrate Vulnerable Zones	<500m	None

7.0 PREVIOUS SITE INVESTIGATIONS / REPORTS

Searches and consultations have established that no previous ground investigation works have been undertaken on this site.

8.0 PRELIMINARY QUALITATIVE RISK ASSESSMENT (TIER 1)

8.1 Introduction

Based on the foregoing study, there is a low potential for the presence of contamination associated with the historic development of the site, demolition works, and previous land use, and hence a preliminary risk assessment was undertaken.

The risk assessment methodologies adopted by **SHAW STEPHENS CONSULTING** are based on current available guidance from several sources and are included in Appendix D.

The Tier 1 Risk Assessment and Preliminary Conceptual Model (PCM) were formulated using the information discussed above and based on the following assumptions:

- It is proposed that the northern – southern elevations of an existing warehouse facility is to be partially redeveloped by the construction of 2nr steel framed extensions (warehouses) constructed of rain screen cladded elevation under pitch corrugated roofing material to match existing buildings. It is understood that both extensions will provide 1696m² of additional warehouse / floor space.

The proposed layout of the development is as annotated on the drawings contained herein.

- Drinking water will be from a mains supply.

In constructing the Preliminary Conceptual Model (PCM), **SHAW STEPHENS CONSULTING** applied the guidance contained in CIRIA C552: 2001. This recommends use of a Risk Matrix which classifies risk based on the product of Probability of a source being present, and the Consequence of receptors being exposed to the source. Guidance tables setting out the classifications of probability and consequence together with a risk matrix are given in Tables 12 - 15 hereunder. In using this approach **SHAW STEPHENS CONSULTING** recommends actual intrusive investigation of any Risk Classification of “*Moderate*” or over.

Table 12: Matrix of consequences against probability to gain a risk classification [CIRIA C552, 2001]

		CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table 13: Classification Definitions (C552 CIRIA, 2001)

CLASSIFICATION	DEFINITION
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard. Or, there is evidence that server harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be server, or if any harm were to occur it is more likely that harm would be relatively mild. Investigation (if not undertaken already) is normally required to clarify the risk and to determine to potential liability. Some remedial works may be required in the longer term.
Moderate / Low	
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild
Very Low	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 server.

8.2 Preliminary Conceptual Model

The site had no significant history of potentially contaminative uses prior to 1938. From 1938 it formed part of a large munitions manufacturing factory, although the extent of the area covered by the factory makes it impossible to determine what specific uses this part of the site was put to – raw materials storage, manufacturing, product storage, administration etc. Following closure of the plant in the late 1940's, the site was redeveloped for commercial uses with no evidence of potentially contaminative activities being conducted. There may be a low risk of contamination being present as a legacy of the infilling of ponds, munitions manufacturing and site demolition works. It is recommended that the site be investigated for a broad spectrum of heavy metals, petroleum hydrocarbons, polyaromatic hydrocarbons, sulphates, pH, asbestos containing materials. By application of the risk assessment methodology outlined above, the following PCM was constructed.

Table 14: Preliminary Conceptual Model (PCM)

POLLUTANT LINKAGE	SOURCE	PATHWAY	RECEPTOR	PROBABILITY	CONSEQUENCE	RISK RATING
1	Broad spectrum of heavy metals, aggressive pH, hydrocarbons, PAH's in Made Ground associated with the development & redevelopment of the site & adjoining area	Soil and / or soil dust ingestion	Construction workers	Likely	Medium	Moderate
2	Asbestos containing materials (ACM) in made ground soils associated with the development & redevelopment of the site & adjoining area	Fibre Inhalation	Construction workers	Likely	Severe (ACM)	High
3	Inhalation of ground gases from onsite or offsite sources i.e. in-filled ground / ponds - made ground soils etc.	Inhalation	Future worker occupants	Unlikely	Medium	Moderate
4	pH & Sulphate attack on concrete	Future building	Future building	Likely	Mild	Moderate / Low
5	Organic contamination associated with historical rial lines, made ground deposits, on site electrical sub-station, remnants of explosive residues etc.	Direct contact with water mains	Potable water supply	Unlikely	Medium	Moderate
6	Explosive residues in soils associated with former land uses as a WWII munition filling	Explosion Ingestion	Construction workers Future worker occupants Existing building	Unlikely	Severe	Moderate

The contaminants of concern associated with those risks which require intrusive investigation were researched by reference to published industry profiles, and are summarised hereunder:

Table 15: Summary of Contaminants of Concern based on PCM

LINKAGE NO.	METALS	NON-METALS	ORGANICS	GASES	OTHERS
PL1, PL2 PL5,	Be, Cd, Cr (total and VI), Ni, Cu, Pb, Hg, Se	As, sulphates	TPHCWG, PAH's, BTEX, Volatiles (by PID), PCB's	-	pH Asbestos
PL3	-	-	-	CH ₄ , CO ₂ , H ₂ S	-
PL1, PL5	-	-	TPHCWG PAH's, BTEX, Volatiles (by PID), PCB's	-	-
PL6	Explosive residues	Explosive residues	Explosive residues	-	-
PL1-PL5	Be, Cd, Cr (total and VI), Ni, Cu, Pb, Hg, Se	As, sulphates	TPHCWG, BTEX, PAH's, Volatiles (by PID), PCB'S, Explosive residues	CH ₄ , CO ₂ , H ₂ S	pH Asbestos

8.3 Summary of Risks

The foregoing analysis identified a significant number of potential risks, and if present, these could adversely impact on human or environmental receptors. The site is known to be underlain by made ground deposits and the disturbance of these may present a risk to human health, and since no previous site investigations have been undertaken, an intrusive phase of investigation is recommended to determine whether the postulated pollutant linkages are actually present on site.

9.0 AIMS AND PROPOSED SCOPE OF PHASE II INTRUSIVE INVESTIGATION

Based on the findings above, it is recommended that an intrusive investigation be undertaken. The Phase II Intrusive Investigation should include for exploratory holes to be sunk through made ground into the underlying natural strata.

The primary objectives of ground investigations are to obtain enough data to reliably ascertain ground conditions on site, and to assess the validity of the potential pollution linkages identified within the Preliminary Conceptual Model above. Sufficient soil contamination data should be obtained to allow the Preliminary Conceptual Model to be tested and refined by the performance of a quantitative risk assessment. The ground investigation must also establish soil engineering properties in relation to the selection, design and construction of suitable foundations for the proposed development.

To achieve these objectives, using the guidance contained in BS10175: 2011 and R&D Technical Report P5-0066/TR: 2000, it is proposed that 6nr boreholes be sunk across the site by light dynamic sampling methods, each to a nominal depth of 5mbgl to assess shallow ground conditions.

It is further proposed that 3 of the boreholes be utilised for the installation of standpipes, thus enabling a programme of ground gas monitoring to be undertaken. To comply with CIRIA C665 for a “Low” risk site, it is proposed that gas monitoring is undertaken on 4nr occasions over, distributed over a period of 1-month.

The proposed scope of works is summarised in Table 16 hereunder:

Table 16: Proposed Scope of Works

RISK	METHOD OF ASSESSMENT
Is the superficial ground impacted by contamination to the extent it may present a risk to human health?	6nr light dynamic sampling boreholes to be sunk to a nominal depth of 5mbgl. The stratigraphy of the boreholes will be carefully logged and subsampled as appropriate. Broad spectrum contamination analyses will be performed on 1nr sub sample of recovered made ground from each borehole (6nr).
What are the geotechnical properties of the ground?	Standard Penetration Test's (SPT's) to be carried out at regular depth increments throughout the boreholes, with HSV tests to be carried out in cohesive strata on recovered soils A programme of soil engineering laboratory testing will be carried out. The in-situ tests and soil engineering test data will be used in formulating suitable foundation solutions.
Is the site affected by migrating gas from made ground underlying the site & historical in-filled ground etc.?	The evidence of the desk study is that there is a low risk of the site being contaminated by ground gases and therefore the boreholes will be utilised for the installation of gas / groundwater monitoring standpipes. CIRIA C665 recommends monitoring on 4nr occasions distributed over a period of 1 month
Does the site pose a risk to the underlying Secondary A Aquifer	Soil water samples will be recovered from the standpipes and will be analysed to the suite proposed in Table 11. If water does not accumulate in the standpipes, soil leachate analyses will be undertaken to the suite in Table 11. The results will be assessed against Drinking Water Standards and Environmental Quality Standards.

The layout of the proposed intrusive investigation and the positioning of gas – groundwater monitoring installations are as annotated on the ‘*Site Investigation Layout Plan*’ contained herein.

To ensure that no borehole position impacts on any buried service, the final positioning of the borehole will be determined following a review of ‘*Clients*’ buried service drawings.

Given that the development will comprise commercial end use, contamination data obtained as part of the above recommended Phase II intrusive investigation will be based on criteria contained in publication LQM/CIEH S4UL's for Human Health Risk Assessment (2015), applicable to the “*Commercial*” land use scenario. Given this document does not provide criteria for Lead contaminants, it is proposed that Lead results are compared to the C4SL published by DEFRA SP1010 Development of Category 4 Screening Levels for ‘*Commercial Land*’ use.

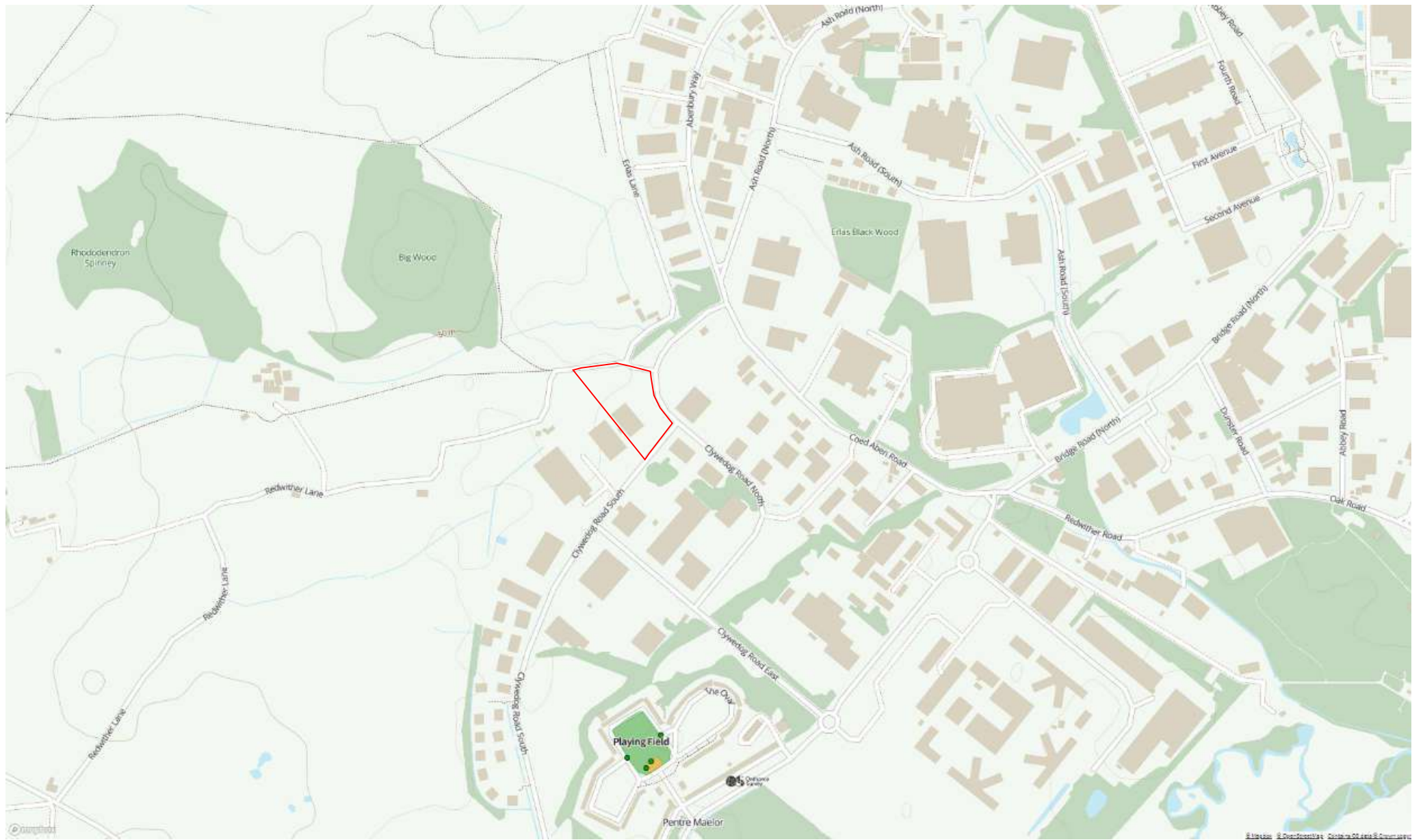
APPENDIX A: DRAWINGS

SITE LOCATION PLAN

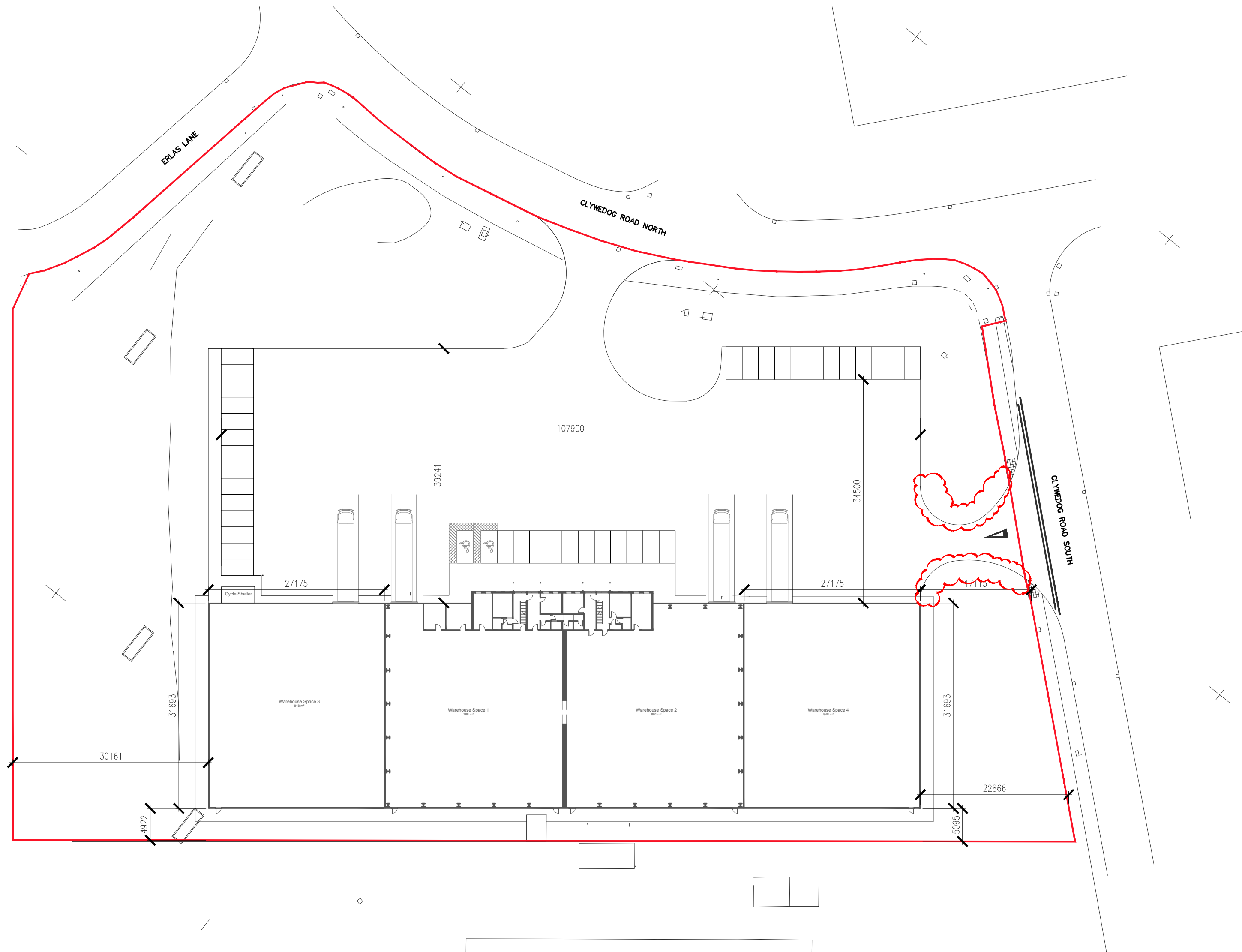
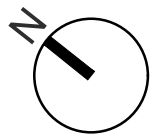
AERIAL PLATE

ARCHITECTURAL DRAWING

SITE INVESTIGATION LAYOUT PLAN







Proposed Site Plan

A	Initial Issue	PJ	01.08.22
B	Updated to reflect tree constraints plan	PJ	09.08.22
C	HGV egress updated, Cycle store added	PJ	18.08.22
D	Main access updated	PJ	24.08.22
E	Dimensions added	MM	15.12..22
F	Parking & yard area amended	PJ	19.04.23
G	Parking & yard area amended	MA	28.04.23
H	New entrance footway returns removed	JT	23.04.24

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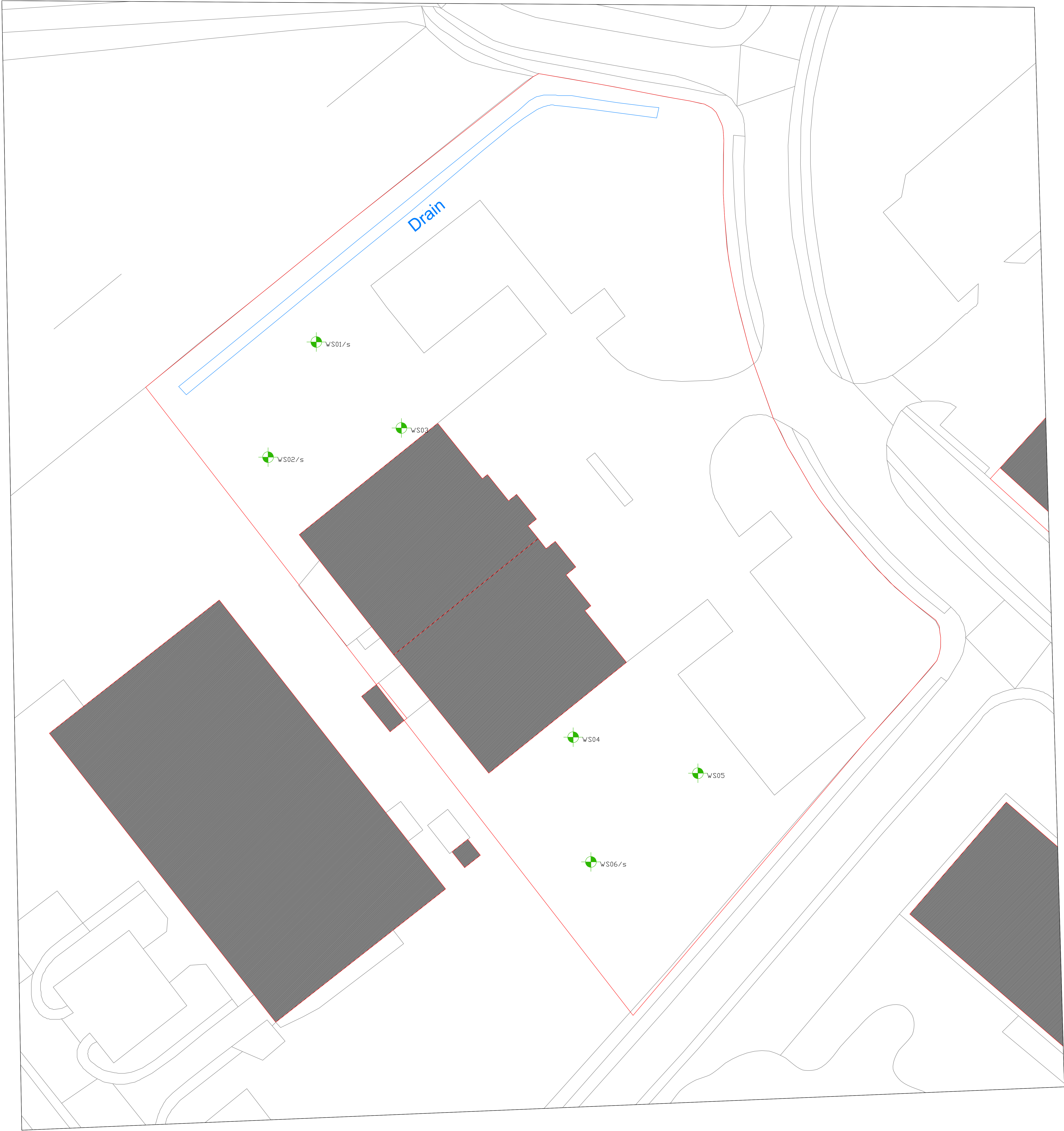
www.mcau.co.uk

Client
F.I.Real Estate Management

Project
**Dragon Packaging
Wrexham**

Description
Proposed Site Plan

Status Information		
Scale	Drawn By	Date
1:500@A2	PJ	Jul22
Job Number	Drawing Number	Revision
1211	02-002	H



APPENDIX B: NOTES ON LIMITATIONS

General

SHAW STEPHENS CONSULTING has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from **SHAW STEPHENS CONSULTING** and a charge may be levied against such approval.

SHAW STEPHENS CONSULTING accepts no responsibility or liability for:

- The consequences of this document being used for any purpose or project other than for which it was commissioned and/or
- The consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, **SHAW STEPHENS CONSULTING** reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing enough information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, several important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the sites which have not been disclosed by this investigation, and which have therefore not been considered in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

APPENDIX C: CURRENT CONTAMINATED LAND GUIDANCE / LEGISLATION & RISK ASSESSMENT METHODOLOGIES

CURRENT CONTAMINATED LAND LEGISLATION / GUIDANCE & ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

LEGISLATION OVERVIEW

This report includes hazard identification and risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach". When considering the current use of land, Part IIA of the Environment Protection Act 1990 (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995, which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land.

Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:

Significant harm is being caused or there is a significant possibility of such harm being caused;

or

Pollution of controlled waters is being, or is likely to be, caused."

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

"the entry into controlled waters of **any** poisonous, noxious or polluting matter or **any** solid waste matter".

To assist in establishing if there is a "significant possibility of significant harm" there must be a "significant pollutant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of source-pathway-receptor is termed a "pollutant linkage or SPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations, especially DEFRA Circular 01/2006 Contaminated Land (this replaces DETR Circular 02/2000). Part IIA defines the duties of Local Authorities in dealing with it. Except for situations of very high pollution risk, Part IIA places contaminated land responsibility on the planning and redevelopment process. In situations where there is very high pollution risk direct action from the Local Authority is usually necessary. Planning Policy Statement 23 (PPS23) provides guidance on the planning process and requires that sites which have been developed shall not be capable of being determined "contaminated land" under Part IIA.

The criteria for assessing levels of pollutants and hence determining whether a site represents a hazard are based on a range of techniques, models, and guidance. Within this context it is relevant to note that Government objectives are:

- (a) to identify and remove unacceptable risks to human health and the environment;
- (b) to seek to bring damaged land back into beneficial use;
- (c) to seek to ensure that the cost burdens faced by individuals, companies and society are proportionate, manageable, and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

- (a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise; the contaminated land regime provides the regulatory mechanisms to achieve this;

- (b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

- (c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactorily assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of pollutants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the current and proposed end use of the site.

RISK ASSESSMENT METHODOLOGY

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby “risk” is defined as:

- “(a) The probability, or frequency, or occurrence of a defined hazard; and
- (b) The magnitude (including the seriousness) of the consequences.”

The UK’s approach to the assessment of environmental risk is set out in by the Department of the Environment (2000) publication “A Guide to Risk Assessment and Risk Management for Environmental Protection.” This established an iterative, systematic staged process which comprises:

- (a) Hazard identification
- (b) Hazard assessment
- (c) Risk estimation
- (d) Risk evaluation
- (e) Risk Assessment

At each stage during the investigation process the above steps are repeated as more detailed information becomes available for the site.

CLR11- ‘Model Procedures for the Management of Land Contamination’, a document published by the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) outlines a tiered approach to the assessment of risks posed by contaminated land, as summarised hereunder:

Tier 1: Preliminary Risk Assessment

A Preliminary Risk Assessment is usually undertaken as part of a desk study, outlines potential risks posed by potential contamination to all receptors by defining plausible “pollution linkages” and developing a preliminary conceptual model (PCM). The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present, and these elements being defined as:

- a contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- a pathway is the means by or through which a contaminant meets, or otherwise affects, the receptor
- a receptor (target) is an entity (human being, aquatic environment, flora, and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a “pollution linkage”. It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, i.e.

- if there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- if there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

The absence of one or more of each component (source, pathway, receptor) would prevent a pollutant linkage being established and there would be no significant environmental risk.

The PCM is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a PCM is formed. Based on the PCM, potential pollutant linkages can be assessed. If the PCM and hazard assessment indicate that a pollution linkage is not of significance, then no further assessment or action is required due to this linkage. For each significant and possible linkage, a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is usually termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the PCM and assess the level of risk from each pollutant linkage. Risk assessment will usually include Tier 2 Generic Quantitative Risk Assessment and / or, if necessary, a Tier 3 Detailed Quantitative Risk Assessment.

Tier 2: Generic Quantitative Risk Assessment (GQRA)

GQRA requires an intrusive investigation to characterise the site assisting in the re-assessment of the source-pathway receptor linkage. The conceptual model should be refined accordingly.

Upon completion of an intrusive investigation it must be decided whether Generic Assessment Criteria (GAC) are suitable for assessing the risk posed by potential contamination at the site. If GAC are deemed unacceptable for risk assessment purposes or cannot be developed a Tier 3 Detailed Quantitative Risk Assessment (DQRA) is required.

If GQRA reveals that unacceptable risks are not present, then no further action is required. If GQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is deemed not suitable not required, an Options Appraisal should be undertaken. If further risk assessment is required, the scope nature of further risk assessment must be decided – it is possible that a Tier 3 DQRA will be undertaken in this scenario.

Tier 3: Detailed Quantitative Risk Assessment (DQRA)

DQRA is used when pollutant linkages require further assessment. DQRA is often undertaken for pollutant linkages where GAC are unavailable or inappropriate for or more conservative than the actual circumstances of the site. Site specific data is used to create Site Specific Assessment Criteria (SSAC) and enable a more accurate assessment of the risks. Further investigation may or may not be required to formulate SSAC depending on the site-specific conditions and information already obtained.

If DQRA reveals that unacceptable risks are not present, then no further action is required. If DQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is deemed not suitable not required, an Options Appraisal should be undertaken. If further risk assessment is required, the scope and nature of further risk assessment must be decided at this point.

NOTE: A Tier 1 Preliminary Risk Assessment is undertaken as part of a Desk Study Report and a Preliminary Conceptual Model is developed for all pollutant linkages. However, the methodologies for assessing the risks to human health, risks to controlled waters and risk posed by ground gas using quantitative techniques vary considerably, therefore GQRA and DQRA for human health, controlled waters and ground gas must be undertaken separately. The risk assessment methodologies where quantitative assessment is used for risks to human health, risks to controlled waters and risks posed by ground gas, if relevant, are described hereunder.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO HUMAN HEALTH

Background

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the EA published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. These reports (CLR7-10) together with associated “SGV” documents have since been withdrawn (August 2008) and the following documents have been published as revised guidance to the CLEA assessment:

Environment Agency : 2008: Updated Technical Background to the CLEA model Science Report SC050021/SR3

Environment Agency : 2008: Human Health Toxicological Assessment of Contaminants in Soil SC050021/SR2

Additional guidance on statistical assessment replacing CLR 7 is provided in:

CL:AIRE :2008 Guidance on Comparing Data with a Critical Concentration

Other guidance/software used in spatial / statistical assessment is provided in:

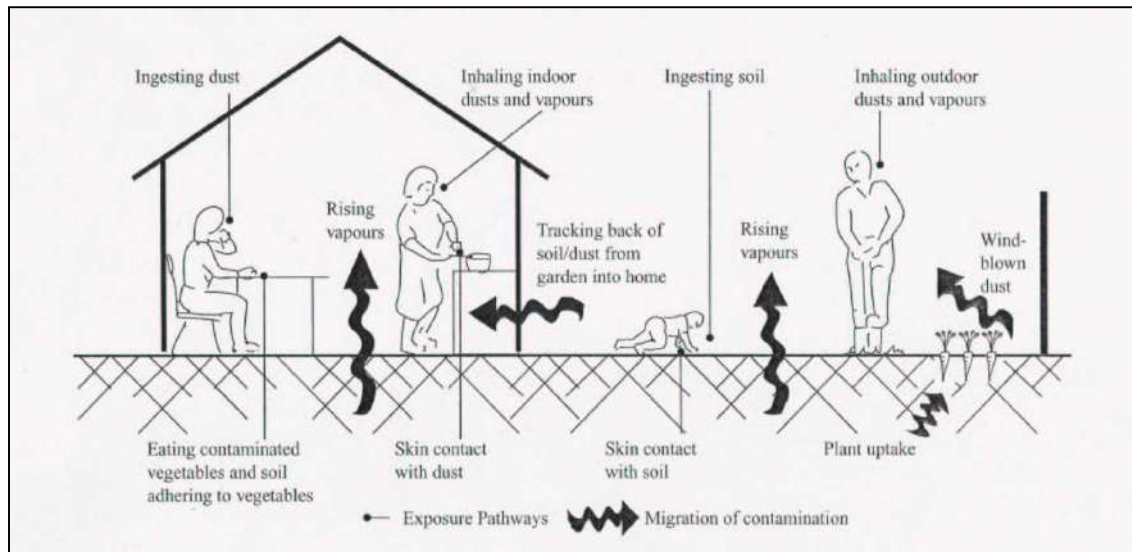
USEPA 2006: Data Quality Assessment: Statistical Methods for Practitioners

Spatial Analysis and Decision Assistance (SADA) – The University of Tennessee

A different approach to the statistical appraisal of data is required depending on whether the assessment of risk is to assess whether land is Contaminated Land in accordance with regulations, or whether the assessment is to determine whether the site is suitable for new development in according with Planning guidance. This is discussed further in CL:AIRE :2008 “Guidance on Comparing Data with a Critical Concentration”.

A program for the derivation of GAC’s based on the above guidance is provided by the Environment Agency and is entitled “CLEA Software Version 1.04”.

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathway. Ten human exposure pathways are covered in the CLEA model as presented below:



Ingestion

- ingestion of outdoor soil
- ingestion of indoor dust
- ingestion of home grown produce
- ingestion of soil attached to home grown produce

Dermal Contact

- dermal contact with outdoor soil
- dermal contact with indoor dust

Inhalation

- inhalation of outdoor dust
- inhalation of indoor dust
- inhalation of outdoor soil vapour
- inhalation of indoor soil vapour

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g. certain organic compounds can pass through plastic water pipes into drinking water supply.

Where contaminated water is present at a depth less than 2.00mbgl and there is a potential risk of inhalation of vapours (only when volatile compounds are present) the risk from inhalation of vapours from soil water will be assessed using a UK compliant version of BP Risc v4.02.

The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle 'default' land use types and makes a series of 'default' assumptions about human exposure frequency, duration and critical human target groups for each land use considered:

- residential
- allotments
- commercial / industrial land use

The above land use categories defined in the CLEA are detailed below:

Residential: This generic scenario assumes a typical residential property consisting of a two-storey house built on a ground-bearing slab with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden area.

Allotments: This generic scenario assumes a plot of open space (about 250 m²), commonly made available by the local authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than a hectare. The tenants are assumed to be parents or grandparents and that young children make occasional

accompanied visits to the plot.

Commercial/Industrial: There are many kinds of workplace and work-related activities. This generic scenario assumes a typical commercial or light industrial property consisting of a three-storey building at which employees spend most time indoors and are involved in office based or relatively light physical work.

Human Health Risk Assessment Methodology

Assessment of risk for the protection of human health is undertaken using the methodology as outlined previously, and summarised hereunder:

Tier 1 Preliminary Risk Assessment

Tier 2 Generic Quantitative Risk Assessment

Tier 3 Detailed Quantitative Risk Assessment

The Tier 1 Preliminary Risk Assessment is undertaken as part of the desk study report and includes the development of a Preliminary Conceptual Model. Tier 2 and Tier 3 Quantitative Risk Assessments are undertaken to develop and refine the Preliminary Conceptual Model aiding a more detailed assessment of the risk posed by contaminants revealed by site investigation and soil / soil water chemical analyses.

The methods used by SHAW STEPHENS CONSULTING LTD to derive assessment criteria, to statistically analyse chemical data and to compare chemical data to the derived assessment criteria are discussed hereunder.

Derivation of Generic Assessment Criteria (GAC) and Site-Specific Assessment Criteria (SSAC)

GAC's are derived based on the proposed land use and the associated applicable exposure pathways. It should be noted that there are difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and the GAC value does not necessarily equate to the level for "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) to determine whether land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and a scientific judgement on what constitutes an 'unacceptable' risk. The primary purpose of the CLEA derived GAC's are as 'minimal risk thresholds' for the assessment of human health risks in relation to land use.

Minimal risk thresholds calculated using generic input parameters for each of the above land uses are termed Generic Assessment Criteria (GAC) and are used for Generic Quantitative Risk Assessment (GQRA). However, further assessment may be required taking into consideration site specific factors such as the way the land is used, the soil type, the building characteristics and the exact nature of the receptor, to determine whether there is a significant possibility of risk to human health to site users. Such an assessment is known as a Detailed Quantitative Risk Assessment (DQRA) and the resultant threshold concentrations are known as Site Specific Assessment Criteria (SSAC). Such assessments should be conducted with the agreement of the local authority (or the Environment Agency) since it is the authority that determines whether land is Contaminated Land or whether Planning Permission for a new development may be granted.

For the purposes of this report, assessment criteria have been derived in accordance with current guidance based on the conceptual model for the proposed land use using the CLEA v1.04 software. These criteria are not intended to indicate whether the site may be contaminated land, nor do they replace any published soil guideline values. However, the values are intended to provide guidance for the local authority on whether the site may be considered uncontaminated. If, based on the site's proposed future use, the site would be considered by the local authority to be uncontaminated and therefore, on the basis of soil concentrations, fit for purpose, then no further risk assessment based on soil concentrations and the risk to human health would be necessary. However, should these criteria be exceeded, or the conceptual site model vary from the model used in the risk assessment to derive these values then the risk assessment should be updated accordingly.

For contaminants routinely analysed where inhalation is a significant pathway (naphthalene, phenanthrene, Aromatic EC5-EC7, Aromatic EC7-EC8, Aromatic EC8-EC10, Aromatic EC10-EC12, Aromatic EC12-EC16, Aliphatic EC5-EC6, Aliphatic EC8-EC10, Aliphatic EC10-EC12, Aliphatic EC12-EC16), plots of the GAC as a function of Soil Organic Matter (SOM) are used to determine if they pose a potential risk to human health, which are presented hereunder. Where there is an exceedance further assessment may be undertaken.

Statistical Assessment of Soil Contamination Data & Comparison of Contamination Data to Threshold Values

In any site investigation only a small fraction of the soil on the site is analysed. Therefore, the mean derived from the contamination data for a contaminant may not be the same as the true mean for the contaminant distribution on the site. To improve the reliability of any assessment a statistical analysis is undertaken in line with the CL:AIRE document "Guidance on Comparing Soil Contamination Data with a Critical Concentration".

Statistical assessment of soil data is undertaken using programs based on the guidance in the CL:AIRE document or the USEPA software ProUCL v4.0.

Where the number of results in a dataset is less than four, a statistical assessment is not undertaken, and the assessment is performed by comparison of the maximum value(s) with a Health Criteria Value (HCV), such as Generic Assessment Criteria value(s).

For the Planning situation, the regulator needs to check whether the concentration of contaminants is low compared to the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is lower than the HCV.

For the Part IIA scenario the regulator needs to determine whether the concentration of contaminants is greater than the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is higher than the HCV. However, the regulator may proceed with determination if there is just a 51% probability, “on the balance of probabilities”.

The Outlier Test used in the statistical assessment may not be able identify separate populations if numerous populations are present. To ensure that this is not the case a spatial assessment of the data will be undertaken using SADA.

If the screening levels are exceeded, then more sophisticated quantitative risk assessment or remedial action may be undertaken. The benefits of undertaking a quantitative risk assessment must be weighed against the likelihood that it will bring about cost savings in the proposed remediation.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO CONTROLLED WATER

Definition of Controlled Waters

The term ‘controlled waters’ is defined in Section 104 of the Water Resources Act 1991 as:

“Territorial Waters...which extend seawards for three miles..., coastal waters..., inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata.”

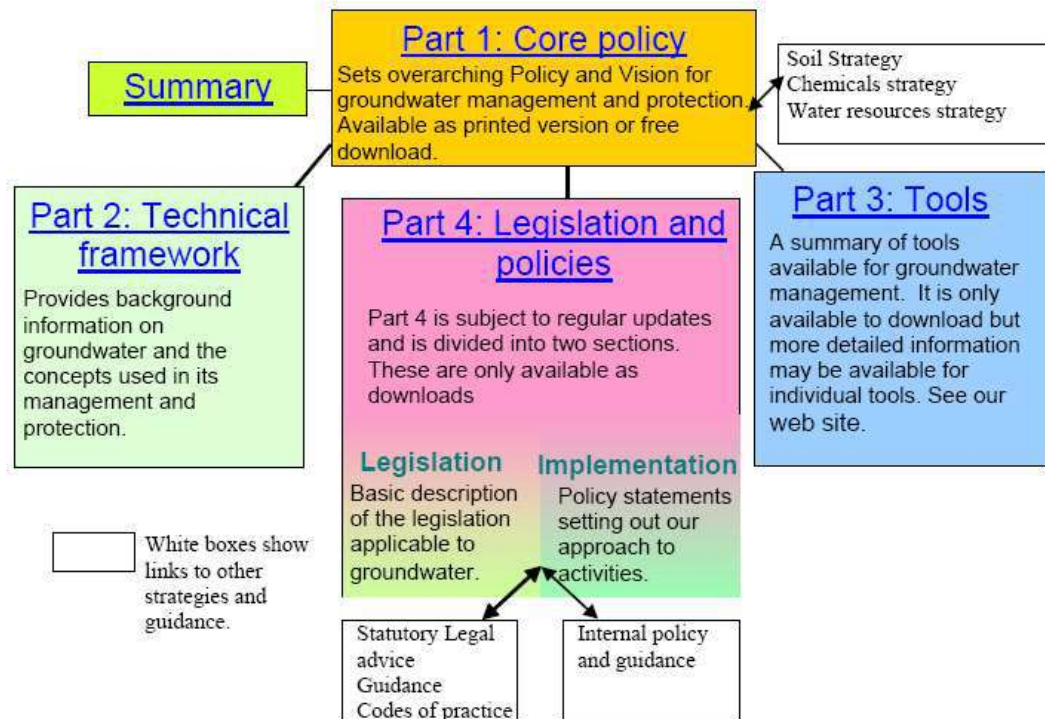
Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

Environment Agency Guidance

Legislation and guidance surrounding the protection of controlled waters in the UK is abundant and can be complex. The Environment Agency’s overall position on groundwater is “To protect and manage groundwater resources for present and future generation in ways that are appropriate for the risks that we identify” (Groundwater Protection : Policy and Practice GP3, 2006). In brief, the core objectives of the existing legislation serve to enforce this position.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document was influential as it provided a focus for key developments such as Source Protection Zones (SPZs) and Groundwater Vulnerability Maps. The Policy was then revised in 1998, since which there have been substantial changes in legislation, driven by Europe. Key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991. Further to legislative changes, gaps identified in the 1998 PPPG required addressing. These changes are reflected in the forthcoming Environment Agency Policy document entitled Groundwater Protection : Policy and Practice (GP3), a draft version of which was available for public consultation (Parts 1 to 3) ending July 2006 with Part 4 issued in March 2008. Part 4 includes a section on key groundwater legislation and the Environment Agency’s interpretation of it.

The following gives a breakdown of the structure of the document (taken from the Environment Agency GP3 draft consultation document, 2006)



Controlled Water Risk Assessment Methodology

The risk posed to controlled water is assessed by SHAW STEPHENS CONSULTING LTD. in accordance with current guidance as outlined hereunder.

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. The general approach for Groundwater Protection is detailed further in Part 3 of GP3.

When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four levels of assessment as described below:

Level 1 considers whether contaminant concentrations in "pore water" in contaminated soil are enough to impact on the receptor, ignoring dilution, dispersion, and attenuation along the pathway. The "pore water" concentration is determined from: measured "pore water" concentrations or perched water quality

- ii) soil leaching tests
- iii) theoretical calculations based on soil/water partitioning equations

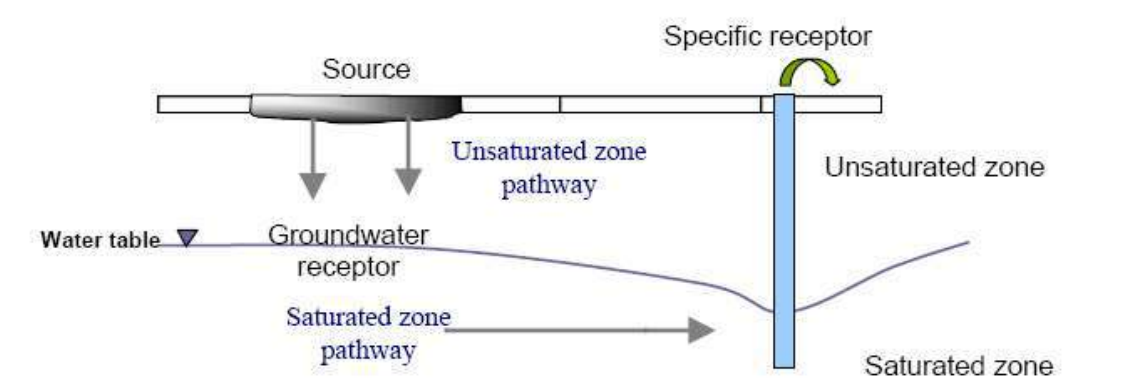
Level 2 considers dilution by the receiving groundwater or surface water body and whether this is enough to reduce contaminant concentrations to acceptable levels. The remedial target is defined as the target concentration multiplied by a dilution factor (DF).

Levels 3 and 4 consider whether natural attenuation (including dispersion, retardation, and degradation) of the contaminant as it moves through the unsaturated and saturated zones to the receptor are enough to reduce contaminant concentrations to acceptable levels. The remedial target is defined as target concentration multiplied by a dilution factor (DF) and attenuation factor (AF). In Level 3 simple analytical models are used to calculate the significance of attenuation. The Environment Agency has released a "Remedial targets worksheet v3.1" to carry out basic calculations using a conservative approach up to Level 3 using basic principles assuming a simple migration of contaminants from the source zone into the aquifer receptor. Level 4 assessment uses more sophisticated numerical models and allows for the introduction of additional geological horizons and is used mainly to determine whether soil contaminants will reach their target within a specified timeframe. Use of such software should only be used once agreement has been obtained from the Environment Agency.

Three main stages apply to any risk assessment of controlled waters, these are:

1. Risk Screening (Tier 1 Preliminary Risk Assessment): The understanding of the Conceptual Site Model (CSM) is the key to

assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example, if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment. An example of a basic CSM is given below (taken from the Environment Agency GP3 draft consultation document, 2006):



2. Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Level 1): When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

- Water Supply (Water Quality) Regulations 2000
- The Private Water Supplies Regulations 1991
- Environmental Quality Standards for surface waters based on The EC Dangerous Substances Directive (76/464/EEC and Daughter Directives)
- The Surface Waters(Abstraction for Drinking Water Classification) Regulations 1996
- World Health Organisation Drinking Water Standards 2004

Should the Level 1 assessment indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

- To devise suitable remedial solutions
- To carry out more investigation, sampling, and analysis
- To conduct a site specific Detailed Quantitative Risk Assessment (DQRA) to determine if the materials are suitable for their proposed use, or devise site specific clean-up level

3. Detailed Quantitative Risk Assessment (EA Remedial Targets Methodology Levels 2 to 4): The decision to carry out a DQRA will be dependant on the extent and implications of the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the previous levels of assessment. The conceptual model will be sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment, the remainder having been screened out.

Additional site-specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

Remediation criteria, if derived, will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or compliance point. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED BY GROUND GAS

Origin of Ground and Landfill Gases
 When carrying out a ground gas risk assessment, the origin or source of the gases is important as potential risks will vary depending on the source. This Appendix relates to the risk of the two main ground gases of concern; methane and carbon dioxide and does not apply to other ground gases (e.g. radon or vapours from hydrocarbon spills). Methane and carbon dioxide are major constituents of landfill gas but can also occur from a variety of anthropogenic and natural sources, as summarised in Table 5 below:

Gas	Source	Comments
Landfill Gas	Anaerobic decomposition of degradable waste within landfill sites. Typically,	Composition varies over time, particularly in early stages.

Gas	Source	Comments
	60% methane and 40% carbon dioxide during methanogenic phase.	Contains a range of minor constituents (particularly carbon monoxide and hydrogen sulphide).
Landfill Associated Gases	- Anaerobic degradation of leachate external to the site; - Degassing of dissolved gases in groundwater; - Evolution of gases following interaction between leachate and groundwater	Can result in secondary (external) production of methane or carbon dioxide.
Made Ground	Anaerobic degradation of organic components	Very variable depending on source
Sewer Gas, Cess Pits	Anaerobic degradation of organic components of sewage producing methane and carbon dioxide.	Often characterised by hydrogen sulphide odour.
Mains Gas	Leakage from underground pipework or storage tanks. Mainly methane but often contains higher alkanes.	An odourise is added to permit detection of leaks. Typically, 90% CH ₄ , but 1 to 27% C ₂ -C ₄ alkanes, May also contain other trace gases e.g. CO, helium and CO ₂ (from degradation of CH ₄ in the ground).
Other Anthropogenic Sources	- Degradation of leaked or spilled hydrocarbons or other industrial chemicals; - Anaerobic degradation of organic contaminants in groundwaters (e.g. silage liquor); - Reactions between monitoring well construction components and environment; - Burial grounds/cemeteries.	Hydrocarbon spillages often have an 'oily' odour. Fuel spillages common – Petrol or Diesel and can contain a wide range of VOC's. Can degrade to produce methane / carbon dioxide.
Alluvium / Marsh / Peat Gas	Anaerobic microbial degradation of organic material (usually waterlogged vegetation / peat). Often associated with the presence of alluvial deposits or dredging's.	
Geogenic Gas	Natural seepages of carbon dioxide and hydrocarbon gases derived from geologic sources such as coal seams and deep oil / gas source formations. Can be present in solution in groundwaters.	Methane most common but can contain carbon dioxide and higher alkanes.
Mine Gases	Various types. Most common is "fire damp" with high methane, produced by the desorption of gas trapped in coal. "Black damp" (Scythe gas) with high carbon dioxide and denser than air. "White damp" is high in carbon monoxide.	Methane most common. Can contain higher alkanes, carbon dioxide and carbon monoxide. Often low in oxygen.
Natural Shallow Ground Gas	Various types - high carbon dioxide formed by subsurface aerobic activity leading to depleted oxygen and elevated carbon dioxide; - chemical degradation of rocks (e.g. carbonates) producing carbon dioxide; - carbon dioxide production in root zone of soils by plants.	Gases can be emitted from ground under falling barometric pressure conditions.

Table 5. Potential Sources of Ground Gases

This Appendix does not provide guidance for the assessment of risk when other gases are present due to 'Other Sources' from the above table (particularly organic compounds such as BTEX and VOC's or for the risk from radon or hydrogen sulphide).

To determine the origin of the gas a range of factors must be considered together, including;

1. Proximity of likely sources
2. Ground conditions (geology, hydrogeology, anthropogenic pathways etc)
3. Properties of gases present including:
 - Chemical composition
 - Physical properties
 - Ratios of components e.g. methane : carbon dioxide
4. Timeframe of activities such as infilling periods, capping works, installation of gas control systems etc

Identification of the originating source may be problematic given that there may be more than one source present and trace gas analysis may be required. Identification of the sources of the gases encountered during monitoring is usually carried out through a process of eliminating the most unlikely potential sources (given the site setting) and selecting those which are most likely.

Hazards Associated with Presence of Methane

Methane gas is combustible and potentially explosive. When the concentration of methane in air is between the limits of 5.0%v/v and 15.0%v/v an explosive mixture is formed. The Lower Explosive Limit (LEL) of methane is 5.0%v/v, which is equivalent to 100% LEL. The 15.0%v/v limit is known as the Upper Explosive Limit (UEL), but concentrations above this level cannot be assumed to represent safe concentrations. Further, the LEL and UEL will vary (up and down) depending upon the proportion of other gases (including oxygen). However, the fact that methane is a colourless, odourless gas means that there is no simple indicator of the presence of the gas until such a time as explosive limits are reached, and an incident occurs. Methane is lighter than air and has a low toxicity. However, at high concentrations it can result in asphyxiation due to oxygen displacement.

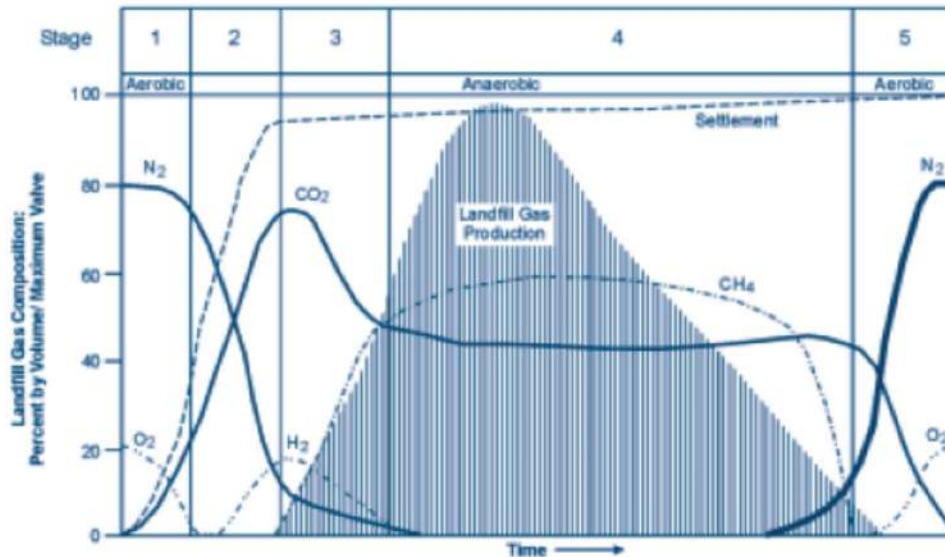
Hazards Associated with Presence of Carbon Dioxide

Carbon dioxide is a colourless, odourless gas, which, although non-flammable, is both toxic and an asphyxiant. As carbon dioxide is

denser than air, it will collect in low points and depressions. The UK Health & Safety Executive (HSE) has published information relating to concentrations of carbon dioxide that humans may be exposed to, which uses concentrations contained in the Control of Substances Hazardous to Health Regulations 2002 (as amended). These are the Long-Term Occupational Exposure Limit (LTOEL, 8-hour period) and the Short-Term Occupational Exposure Limit (STOEL, 15-minute period), which are 0.5% and 1.5% carbon dioxide, respectively.

Parameters Influencing the Rate of Ground Gas Production

The figure below is taken from EA guidance document LFTGN 03 illustrates typical ground gas generation curves from biodegradable materials:



The production of methane and carbon dioxide at a landfill site may be expected to be considerable and ongoing. Concentrations of methane will eventually decrease, followed by concentrations of carbon dioxide, but the duration and rate of gas production can vary markedly between sites. Five distinct phases of gas production occur during the process which are, in order of event as marked above, as follows:

1. An aerobic phase involving oxygen depletion and temperature increase through aerobic respiration;
2. The establishment of anaerobic conditions and the evolution of carbon dioxide and hydrogen through acidogenic activity;
3. Commencement of methanogenic activity; the establishment of populations of methanogenic bacteria;
4. A phase of stable methanogenic activity, which may go on for many tens of years;
5. A phase of decreasing methanogenic activity, representing depletion of the organic material and a return to aerobic conditions.

The time scale for the return to the normal ground gas concentrations will be highly variable, depending upon the types and quantities of materials present. In addition, the optimum parameters influencing the rate of decomposition and ground gas production within the ground at a site are as follows:

High water content with adequate rainfall and water infiltration to provide moisture content between approximately 20 to 26%;
 Conditions that either are or are very close to anaerobic;
 High proportion of biodegradable materials;
 A pH between 6.5 and 8.5, ideally verging slightly on the acidic between pH 6 to 7;
 Temperature between 25°C and 55°C;
 The ratio of the biochemical and chemical oxygen demands (BOD:COD);
 High permeability;
 Small particle size, as finer subsurface materials possess a greater surface area to provide a growing 'face' for the micro-organisms, but high fines levels reduces permeability and reduces decomposition rate.

For this reason, it is vital that sources of methane and carbon dioxide are identified prior to the commencement of any work on a construction site, and that the ground gas regime is characterised at the worst temporal conditions a site may experience. From this, a risk assessment is carried out to identify the risk at the site from ground gases so that suitable protection measures can be designed and incorporated into a development to prevent a dangerous build-up of gas occurring.

Factors Influencing the Migration and Behaviour of Ground Gases

There are many factors that influence the migration of ground gases which can affect the risk from a gassing source:

driving force – pressure differential along a pathway, diffusion and dissolved in solution;

meteorological conditions – short term and seasonal conditions including atmospheric pressure changes (e.g. rapidly falling pressure causes gas to expand increasing emission rates), rainfall, frozen ground and thawing, temperature;
geological and groundwater conditions – these can have the overriding influence on the direction/pathways and quantity of migrating gas;
anthropogenic influences – man-made pathways include mine shafts, service runs/drains, foundation piles, underground voids/pits/basements, foundation/building design/construction

Current Guidance

Previous versions of Building Regulations Approved Document C provided statutory guidance stating that consideration should be given to appropriate action and / or specific solutions in situations where methane concentration exceeded 1%v/v or carbon dioxide concentrations exceeded 5%v/v. The latest Building Regulations Approved Document C (DoE 2004) no longer endorses this approach and recommends the use of a risk-based approach to interpreting a gas monitoring survey. This is in line with current EA guidance for landfill gas (LFTGN 03, 2004) which recommends the use of a structured risk-based approach like that outlined in CLR 11. On this basis, recent guidance has been produced in 2006 and 2007 with the aim of providing up to date advice in relation to residential and commercial development. The guidance does not address issues associated with gas derived from landfills, for this refer to “Guidance on the Management of Landfill Gas” (Environment Agency 2004) for an overview.

Recent guidance relevant to gas assessments for residential and commercial development includes;

Wilson et al. (CIRIA C665, December 2007) “Assessing Risks Posed by Hazardous Ground Gases for Buildings.”

This document provides up to date advice on all aspects of ground gas risk assessment such as investigation, monitoring programmes, data collection and interpretation. The guidance presents separate methodologies for the characterisation of:

All development types except low rise housing with gardens (Situation A)

Low rise housing with gardens (Situation B)

Boyle and Witherington (NHBC / RSK Group, Report 10627-R01(04) January 2007) “Guidance on the Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present.”

This document presents the “Traffic Lights System” detailed below and is relevant only for low rise properties (e.g. bungalows and town houses) that have a ventilated sub-floor void (i.e. Situation B as described in CIRIA C665).

British Standard (BS 8485, December 2007) “Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments”

This document provides an overview of gas characterisation and assessment. The Standard is intended to be used by designers of gas protection measures and regulators involved in the assessment of design solutions.

Further guidance, Wilson, and Card (CIEH) “Ground Gas Handbook for Designers and Regulators” providing practical guidance on ground gas assessments and the design and evaluation of protection measures, is expected to be published in March 2009.

Each of these documents continues to highlight the importance of, and give further guidance towards, carrying out a tiered risk-based decision-making process in accord with government policy on dealing with contamination from historic or natural sources and highlight the importance of the Conceptual Model in site characterisation.

Ground Gas Risk Assessment Methodology

Assessment of risk posed by ground gas is undertaken using the methodology as outlined previously, and summarised hereunder:

Tier 1 Preliminary Risk Assessment

Tier 2 Generic Quantitative Risk Assessment

Tier 3 Detailed Quantitative Risk Assessment

The methodology used in each of the above assessments with concern to ground gas is discussed hereunder.

Tier 1 Preliminary Risk Assessment

All potential sources of methane and carbon dioxide are identified in the Preliminary Conceptual Model and the generation potential determined. The background information discussed earlier is referred to in order to determine the potential for a source to generate ground gas.

CIRIA C665 provides idealised monitoring frequency / period dependant upon generation potential of gas source and sensitivity of the proposed land use as below:

Idealised Frequency and Period of Monitoring (after Table 5.5a and 5.5b, CIRIA C665)

		Generation Potential of Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity	Low (Commercial)	4/1	6/2	6/3	12/6	12/12

Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
High (Residential with Gardens)	6/3	9/6	12/6	24/12	24/24

Notes

1. First number is the number of readings and the second is the minimum period in months (e.g. 6/2 – six sets of readings over two months).
2. At least two sets of readings must be at low (preferably under 1,000 mb) and falling pressure.

The monitoring programme is decided using the above table prior to the intrusive site investigation. However, if the intrusive investigation reveals that the potential source is better or worse than anticipated the monitoring programme should be modified accordingly. For example, if the made ground contains no evidence of organic material and comprises entirely granular brick fill, the potential for that made ground to generate ground gas is reduced considerably.

Tier 2 Generic Quantitative Risk Assessment

Generic Quantitative Risk Assessment is undertaken upon completion of the required gas monitoring period.

All three current guidance documents propose that both ground gas concentrations and flow rates are used to calculate the limiting gas well gas volume flow rates for methane and carbon dioxide, based on the ground gas conditions monitored for during the worse-case temporal conditions. This limiting gas well volume flow rate is termed the Gas Screening Value (GSV, note that this was termed borehole gas volume flow), and is calculated as follows:

$$\text{GSV (l/hr)} = \frac{[\text{gas well gas concentration (\%v/v)}] \times [\text{gas well flow rate (l/hr)}]}{100}$$

GSV's are compared to typical max concentrations and limiting gas screening values derived for either Situation A - All development except low rise housing with gardens, or Situation B low rise housing with gardens (NHBC Traffic Light System). Table 8.5 from CIRIA C665 is used for comparison of gas screening values for "Situation A Developments" and is presented hereunder:

Characteristic Situation (CIRIA R149)	Comparable Partners in Technology gas Regime (see Box 8.2)	Risk Classification	Gas Screening Value (CH ₄ or CO ₂) (l/hr) ¹	Additional Factors	Typical Source of Generation
1	A	Very low risk	<0.07	Typically, methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" made ground
2	B	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to characteristic Situation 3	Natural soil, high peat/organic content. "Typical" made ground
3	C	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70		Recent landfill site

Table 8.5 from CIRIA C665 Modified Wilson and Card Classification

Table 8.7 is used for comparison of gas screening values for "Situation B Developments" and is presented hereunder:

Traffic Light	Methane ¹		Carbon Dioxide ²	
	Typical max concentration ³ (% by volume)	Gas screening value ^{2,4} (litres/hour)	Typical max concentration ³ (% by volume)	Gas screening value ^{2,4} (litres/hour)
Green				
Amber 1	1	0.13	5	0.78

	5	0.63	10	1.60
Amber 2				
	20	1.60	30	3.10
Red				
Notes: 1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter will be the decoder as to what Traffic Light is allocated; 2. Borehole Gas Volume Flow Rate, in litres per hour as defined in Wilson and Card (1999), is the borehole flow rate multiplied by the concentration in the air stream of the gas being considered; 3. The Typical Maximum Concentration can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so; 4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment considering site-specific conditions.				

Table 8.7 from CIRIA C665 - NHBC Traffic light system for 150 mm void

Dependant on the outcome of the assessment of risk posed by ground gas it is determined whether gas protection measures are required for the proposed development, and or whether a detailed quantitative risk assessment is required for the site.

Selection & Design of Protective Measures

Table 8.6 and Box 8.4 of CIRIA C665 contain information on the detailed design of protection measures and were initially intended for the purposes of determining then level of protection measures a development requires. These tables and related text include some useful information on the design of gas protection measures, however BS8485:2007, which supersedes the guidance included within CIRIA C665, is used for selection of gas protection measures.

BS8485: 2007 uses a scoring system dependant on the Characteristic Situation / NHBC Traffic Light and proposed end use of the site. The scoring system is summarised in BS8485:2007 Table 2 as presented hereunder:

Characteristic situation, CS	gas	NHBC traffic light	Required gas protection			
			Non-managed property e.g. private housing	Public building (a)	Commercial buildings	Industrial buildings (b)
1		Green	0	0	0	0
2		Amber 1	3	3	2	1 (c)
3		Amber 2	4	3	2	2
4		Red	6 (d)	5(d)	4	3
5				6(e)	5	4
6					7	6
NOTE Traffic light indications are taken from NHBC Report no.:10627-RO1 (04) and are mainly applicable to low-rise residential housing ¹ . These are for comparative purposes but the boundaries between the traffic light indications and CS values do not coincide.						
a) Public buildings include, for example, managed apartments, schools, and hospitals.						
b) Industrial buildings are generally open and well ventilated. However, areas such as office pods might require a separate assessment and may be classified as commercial buildings and require a different scope of gas protection to the main building.						
c) Maximum methane concentration 20% otherwise consider and increase to CS3.						
d) Residential building on higher traffic light/CS sites is not recommended unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.						
e) Consideration of issues such as ease of evacuation and how false alarms will be handled are needed when completing the design specification of any gas protection scheme						
¹ The NHBC guidance and CIRIA C665 guidance refers to low rise housing (which is up to three storeys without lifts) that is constructed with a 150mm ventilated sub-floor void.						

BS8485:2007 Table 2 Required gas protection by characteristic gas situation and type of building

Once a score is assigned, a combination of protection systems / elements is chosen from BS8485:2007 Table 3 shown below:

PROTECTION ELEMENT/SYSTEM	SCORE	COMMENTS
a) Venting/dilution (See Annex A BS8485)		
Passive sub floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)A	Very good performance	2.5
	Good performance	1
		Ventilation performance in accordance with Annex A (BS8485) If passive ventilation is poor this is generally unacceptable, and some form of active system will be required.

Subfloor ventilation with active abstraction/pressurization (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)A	2.5	There must be robust management systems in place to ensure the continued maintenance of any ventilation system. Active ventilation can always be designed to meet good performance. Mechanically assisted systems come in two forms: extraction and positive pressurization.
Ventilated car park (basement or undercroft)	4	
b) Barriers		
Floor slabs		It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum. Breaches in floor slabs such as joints must be effectively sealed against gas ingress in order to maintain these performances.
Block and beam floor slab	0	
Reinforced concrete ground bearing slab	0.5	
Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into slab	1.5	
Reinforced concrete cast in situ suspended floor slab with minimal service penetrations and water bars around all slab penetrations and at joints	1.5	
Fully tanked basement	2	
c) Membranes		
Taped and sealed membrane to reasonable levels of workmanship/in line with current good practice with validation B,C	0.5	The performance of membranes is heavily dependent on the quality of design of the installation, resistance to damage after installation, and the integrity of joints.
Proprietary gas resistant membrane to reasonable levels of workmanship /in line with good practice under independent inspection (CQA)B,C	1	
Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under CQA with integrity testing and independent validation	2	
d) Monitoring and detection (not applicable to non-managed property, or in isolation)		
Intermittent monitoring using handheld equipment	0.5	Where fitted, permanent monitoring systems ought to be installed in the underfloor venting/dilution system in the first instance but can also be provided within the occupied space as a fail safe.
Permanent monitoring and alarm system A	2	
Installed in the underfloor venting/dilution system		
Installed in the building	1	
e) Pathway Intervention		
Pathway intervention	-	This can consist of site protection measures for off-site or on-site sources (see Annex A, BS8485)
NOTE In practice the choice of materials might well rely on factors such as construction method and the risk of damage after installation. It is important to ensure that the chosen combination gives an appropriate level of protection		
It is possible to test ventilation systems by installing monitoring probes for post installation validation. If a 1 200g DPM material is to function as a gas barrier it should be installed according to BRE 212 /BRE 414 being taped and sealed to all penetrations Polymeric Materials> 1200 g (proportional to thickness) but their physical properties mean that they are more robust and resistant to damage.		

BS8485:2007 Table 3 Solution Scores

Where the gas situation is 4 or more (and for NHBC Red situations) the site requires a comprehensive risk assessment to confirm the scope of protection measures. These are higher risk sites and reliance on Table 2 and 3 alone is not enough.

For a site which is impacted by migratory gases from an off-site source, the development may be protected by imposing pathway intervention methods, which if successfully validated, could also remove the need for further analysis. It is essential that the gas regime in these circumstances has been fully characterised and that the only source impacting the site is located off site and that the pathway is clearly defined and its interception equally proven before construction commences. Pathway intervention methods may include vertical membrane installations, venting trenches, rows of stone columns, activated trenches and various proprietary systems. These systems are particularly relevant to domestic housing where there is limited scope for foundation type solutions.

CURRENT GUIDANCE ON REMEDIATION

When risk assessment of the site has been completed and it indicates that remedial works are required, the main guidance in managing this process is set out in the DEFRA/EA publication CLR11 (2004) "Model Procedures for the Management of Land Contamination." The stages of managing remediation are as follows:

- Options Appraisal and develop Remediation Strategy;
- Develop Implementation Plan and Verification Plan;
- Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

APPENDIX D: COMMERCIAL ENVIRONMENTAL DATA

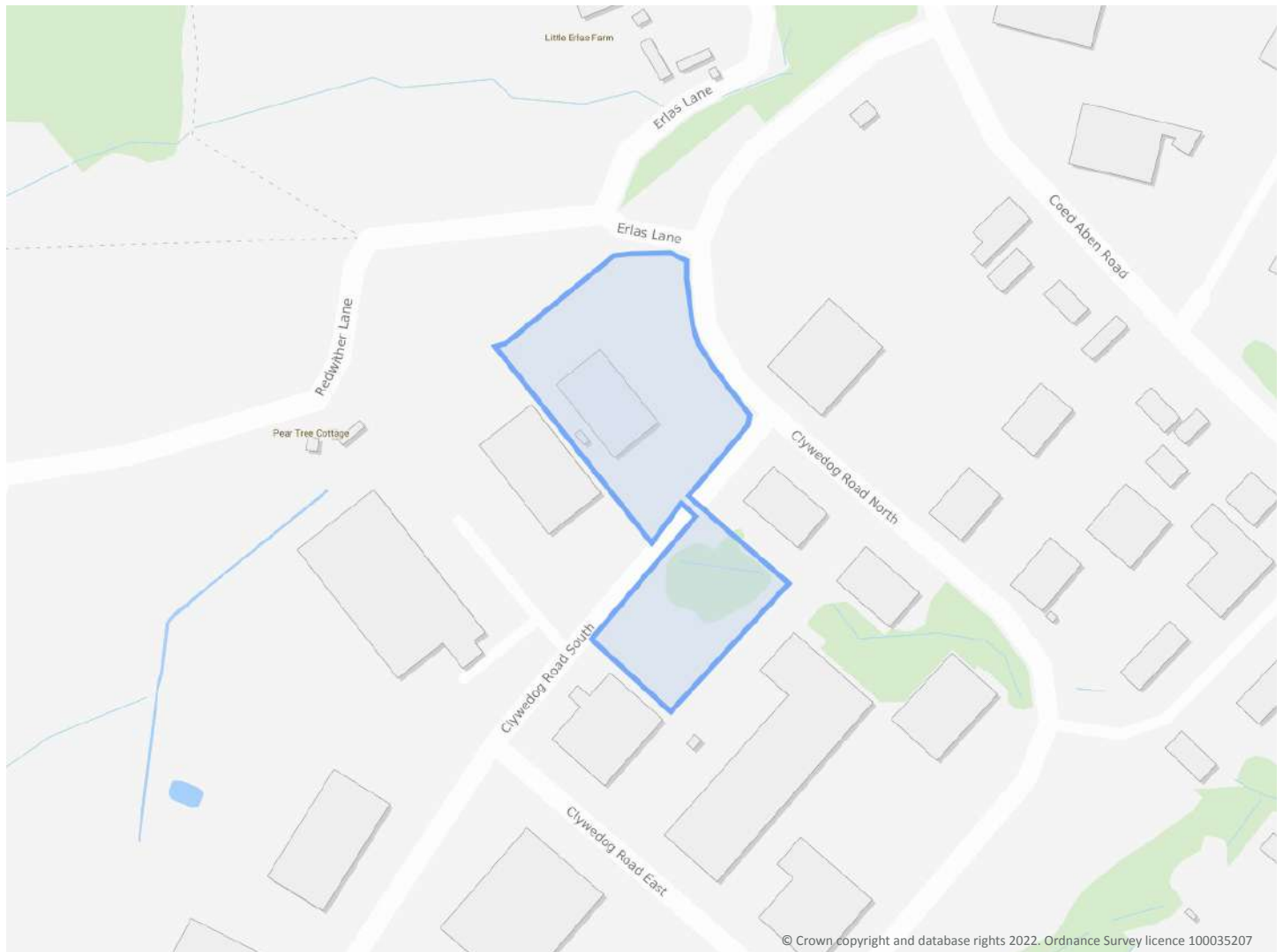
Unit 68 Clywedog Road East, Wrexham Industrial Estate, LL13 9XN

Order Details

Date: 15/07/2022
Your ref: CMAPS-AAG-1050504-4165-150722
Our Ref: CMAPS-AAG-1050504-4165-150722EDRGEO

Site Details

Location: 337257 349631
Area: 2.08 ha
Authority: [Wrexham - Wrexham County Borough Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

p.13

groundsure.com/insightuserguide

Contact us with any questions at:

info@groundsure.com

08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	Historical industrial land uses	3	1	15	16	-
16	1.2	Historical tanks	0	0	0	6	-
16	1.3	Historical energy features	0	0	20	27	-
18	1.4	Historical petrol stations	0	0	0	0	-
19	1.5	Historical garages	0	0	0	0	-
19	1.6	Historical military land	1	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
20	2.1	Historical industrial land uses	3	1	16	19	-
22	2.2	Historical tanks	0	0	0	20	-
23	2.3	Historical energy features	0	0	33	57	-
26	2.4	Historical petrol stations	0	0	0	0	-
27	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
28	3.1	Active or recent landfill	0	0	0	0	-
28	3.2	Historical landfill (BGS records)	0	0	0	0	-
29	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
29	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
29	3.5	Historical waste sites	0	0	0	0	-
29	3.6	Licensed waste sites	0	0	0	0	-
29	3.7	Waste exemptions	0	0	3	3	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
31	4.1	Recent industrial land uses	1	1	21	-	-
33	4.2	Current or recent petrol stations	0	0	0	0	-
33	4.3	Electricity cables	0	0	0	0	-
33	4.4	Gas pipelines	0	0	0	0	-
33	4.5	Sites determined as Contaminated Land	0	0	0	0	-



34	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
34	4.7	Regulated explosive sites	0	0	0	0	-
34	4.8	Hazardous substance storage/usage	0	0	0	0	-
34	4.9	<u>Historical licensed industrial activities (IPC)</u>	0	0	0	4	-
35	4.10	<u>Licensed industrial activities (Part A(1))</u>	0	0	0	15	-
38	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	1	2	-
39	4.12	Radioactive Substance Authorisations	0	0	0	0	-
39	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	5	0	-
40	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
40	4.15	Pollutant release to public sewer	0	0	0	0	-
40	4.16	List 1 Dangerous Substances	0	0	0	0	-
40	4.17	List 2 Dangerous Substances	0	0	0	0	-
40	4.18	<u>Pollution Incidents (EA/NRW)</u>	0	0	5	12	-
42	4.19	Pollution inventory substances	0	0	0	0	-
43	4.20	Pollution inventory waste transfers	0	0	0	0	-
43	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
44	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
46	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
48	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
49	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
49	5.5	Groundwater vulnerability- local information	None (within 0m)				
50	5.6	<u>Groundwater abstractions</u>	0	0	0	0	11
53	5.7	<u>Surface water abstractions</u>	0	0	0	0	1
53	5.8	Potable abstractions	0	0	0	0	0
54	5.9	<u>Source Protection Zones</u>	0	0	2	0	-
54	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
55	6.1	<u>Water Network (OS MasterMap)</u>	4	0	19	-	-



57	6.2	<u>Surface water features</u>	1	1	13	-	-
58	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
58	6.4	<u>WFD Surface water bodies</u>	0	0	0	-	-
58	6.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
60	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
60	7.2	Historical Flood Events	0	0	0	-	-
60	7.3	Flood Defences	0	0	0	-	-
61	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
61	7.5	Flood Storage Areas	0	0	0	-	-
62	7.6	Flood Zone 2	None (within 50m)				
62	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
63	8.1	<u>Surface water flooding</u>	1 in 30 year, Greater than 1.0m (within 50m)				
Page	Section	Groundwater flooding					
65	9.1	<u>Groundwater flooding</u>	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
66	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
67	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
67	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
67	10.4	Special Protection Areas (SPA)	0	0	0	0	0
67	10.5	National Nature Reserves (NNR)	0	0	0	0	0
68	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
68	10.7	<u>Designated Ancient Woodland</u>	0	0	2	2	21
69	10.8	Biosphere Reserves	0	0	0	0	0
69	10.9	Forest Parks	0	0	0	0	0
69	10.10	Marine Conservation Zones	0	0	0	0	0
70	10.11	Green Belt	0	0	0	0	0
70	10.12	Proposed Ramsar sites	0	0	0	0	0

70	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
70	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
70	10.15	Nitrate Sensitive Areas	0	0	0	0	0
71	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
72	<u>10.17</u>	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
73	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
74	11.1	World Heritage Sites	0	0	0	-	-
74	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
74	11.3	National Parks	0	0	0	-	-
74	11.4	Listed Buildings	0	0	0	-	-
75	11.5	Conservation Areas	0	0	0	-	-
75	11.6	Scheduled Ancient Monuments	0	0	0	-	-
75	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
76	<u>12.1</u>	<u>Agricultural Land Classification</u>	Grade 3a (within 250m)				
77	12.2	Open Access Land	0	0	0	-	-
77	12.3	Tree Felling Licences	0	0	0	-	-
77	12.4	Environmental Stewardship Schemes	0	0	0	-	-
77	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
78	13.1	Priority Habitat Inventory	0	0	0	-	-
78	13.2	Habitat Networks	0	0	0	-	-
78	13.3	Open Mosaic Habitat	0	0	0	-	-
78	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
79	<u>14.1</u>	<u>10k Availability</u>	Identified (within 500m)				
80	<u>14.2</u>	<u>Artificial and made ground (10k)</u>	1	0	3	2	-
82	<u>14.3</u>	<u>Superficial geology (10k)</u>	1	0	2	2	-

83	14.4	Landslip (10k)	0	0	0	0	-
84	14.5	<u>Bedrock geology (10k)</u>	1	0	3	0	-
85	14.6	<u>Bedrock faults and other linear features (10k)</u>	0	0	2	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
86	15.1	<u>50k Availability</u>	Identified (within 500m)				
87	15.2	<u>Artificial and made ground (50k)</u>	1	0	1	1	-
88	15.3	<u>Artificial ground permeability (50k)</u>	1	0	-	-	-
89	15.4	<u>Superficial geology (50k)</u>	1	0	1	1	-
90	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
90	15.6	Landslip (50k)	0	0	0	0	-
90	15.7	Landslip permeability (50k)	None (within 50m)				
91	15.8	<u>Bedrock geology (50k)</u>	1	0	1	0	-
92	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
92	15.10	<u>Bedrock faults and other linear features (50k)</u>	0	0	1	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
93	16.1	<u>BGS Boreholes</u>	0	0	14	-	-
Page	Section	Natural ground subsidence					
95	17.1	<u>Shrink swell clays</u>	Very low (within 50m)				
96	17.2	<u>Running sands</u>	Very low (within 50m)				
98	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
99	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
100	17.5	<u>Landslides</u>	Very low (within 50m)				
101	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
103	18.1	Natural cavities	0	0	0	0	-
104	18.2	BritPits	0	0	0	0	-
104	18.3	<u>Surface ground workings</u>	2	1	19	-	-
105	18.4	Underground workings	0	0	0	0	0
105	18.5	Historical Mineral Planning Areas	0	0	0	0	-



105	18.6	Non-coal mining	0	0	0	0	0
106	18.7	Mining cavities	0	0	0	0	0
106	18.8	JPB mining areas	None (within 0m)				
106	18.9	<u>Coal mining</u>	Identified (within 0m)				
106	18.10	Brine areas	None (within 0m)				
107	18.11	Gypsum areas	None (within 0m)				
107	18.12	Tin mining	None (within 0m)				
107	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
108	19.1	<u>Radon</u>	Between 1% and 3% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
109	20.1	<u>BGS Estimated Background Soil Chemistry</u>	2	0	-	-	-
109	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
109	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
110	21.1	Underground railways (London)	0	0	0	-	-
110	21.2	Underground railways (Non-London)	0	0	0	-	-
110	21.3	Railway tunnels	0	0	0	-	-
110	21.4	Historical railway and tunnel features	0	0	0	-	-
110	21.5	Royal Mail tunnels	0	0	0	-	-
111	21.6	Historical railways	0	0	0	-	-
111	21.7	Railways	0	0	0	-	-
111	21.8	Crossrail 1	0	0	0	0	-
111	21.9	Crossrail 2	0	0	0	0	-
111	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 10/04/2020

Site Area: 2.08ha



Recent site history - 2017 aerial photograph



Capture Date: 07/05/2017

Site Area: 2.08ha



Recent site history - 2009 aerial photograph



Capture Date: 01/06/2009

Site Area: 2.08ha



Recent site history - 2003 aerial photograph



Capture Date: 04/08/2003

Site Area: 2.08ha

Recent site history - 2000 aerial photograph

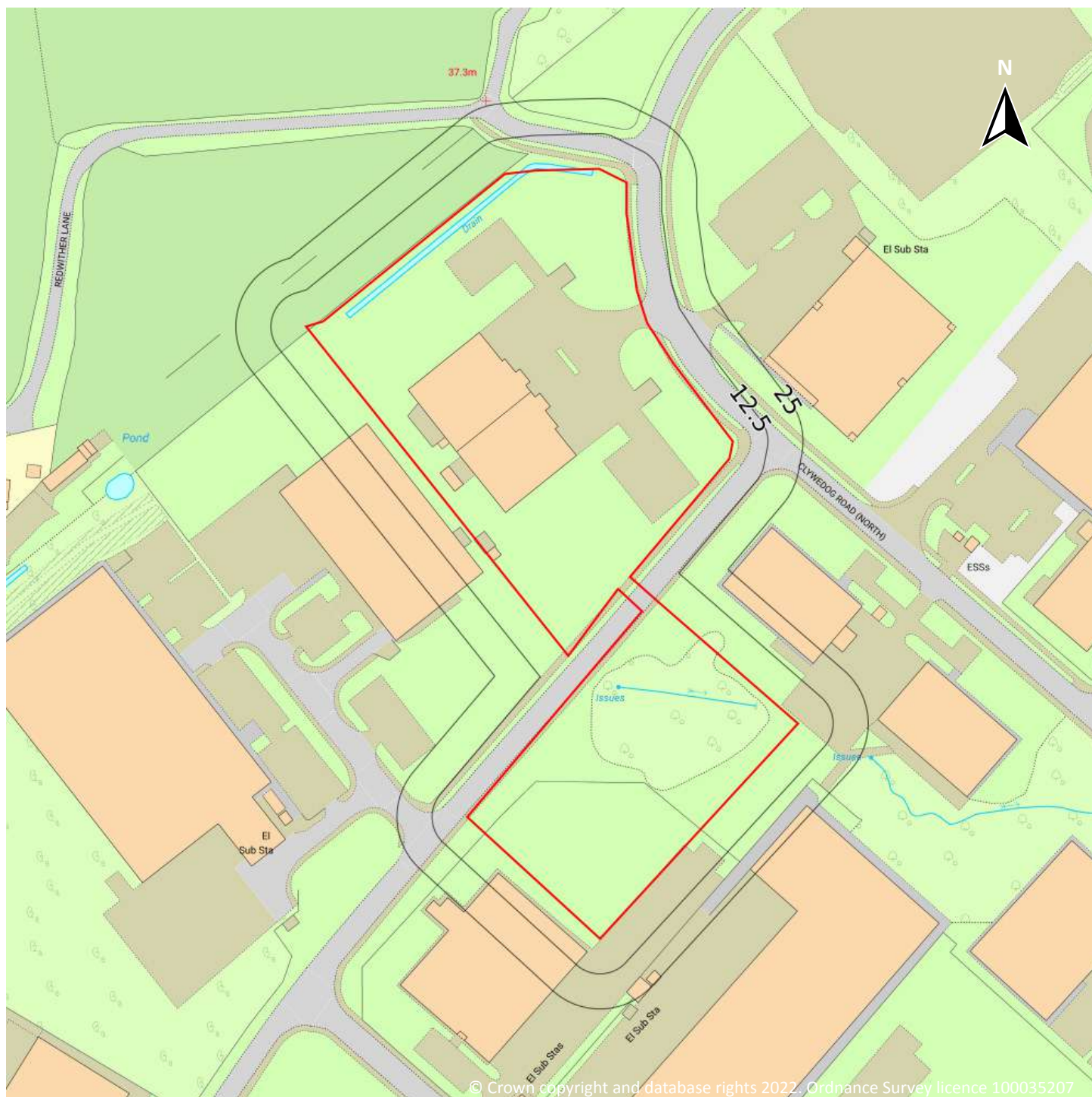


Capture Date: 04/09/2000

Site Area: 2.08ha



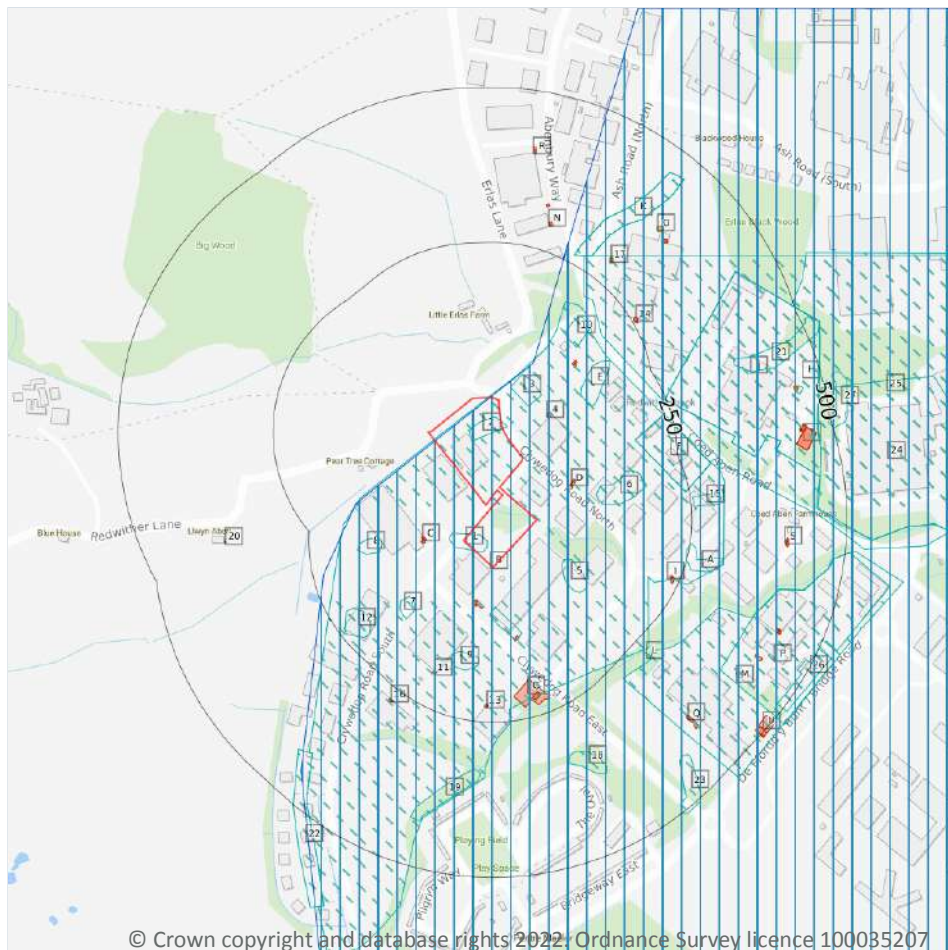
OS MasterMap site plan



Site Area: 2.08ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical military land

1.1 Historical industrial land uses

Records within 500m

35

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
1	On site	Unspecified Heap	1964	802670



ID	Location	Land use	Dates present	Group ID
2	On site	Unspecified Pit	1977	838781
B	On site	Unspecified Commercial/Industrial	1964	796409
3	28m NE	Unspecified Pit	1977	838782
B	64m S	Unspecified Heap	1964	802667
5	76m SE	Unspecified Heap	1964	802668
6	104m E	Unspecified Heap	1964	802664
7	125m SW	Unspecified Heap	1964	802671
8	132m W	Unspecified Heap	1964	802672
E	132m E	Unspecified Heap	1977	802669
9	143m S	Unspecified Heap	1964	802655
10	150m NE	Unspecified Pit	1964 - 1977	958785
F	184m E	Unspecified Works	1977	920631
F	184m E	Unspecified Works	1992	981460
H	196m NE	Unspecified Commercial/Industrial	1964	883869
12	197m SW	Unspecified Heap	1964	802673
A	246m E	Unspecified Heap	1977	802666
J	248m E	Unspecified Workshop	1977	880838
J	248m E	Unspecified Workshop	1992	910726
15	253m E	Unspecified Heap	1977	802665
K	265m NE	Railway Sidings	1960	846514
K	265m NE	Railway Sidings	1968	904588
M	275m SE	Unspecified Works	1992	963484
L	280m SE	Unspecified Tank	1909 - 1938	959968
18	325m SE	Unspecified Heap	1992	802654
19	326m S	Unspecified Heap	1992	802644
21	373m NE	Unspecified Heap	1964	802661
P	379m SE	Unspecified Works	1964 - 1977	846472
22	418m SW	Cuttings	1964 - 1977	845808



ID	Location	Land use	Dates present	Group ID
23	431m SE	Unspecified Heap	1964	802653
24	451m E	Unspecified Commercial/Industrial	1992	872439
H	452m E	Unspecified Tank	1977	823835
25	454m E	Unspecified Commercial/Industrial	1977	938680
26	485m SE	Unspecified Works	1977	867757
27	496m E	Unspecified Ground Workings	1977	799057

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

6

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
L	274m SE	Unspecified Tank	1912	109626
17	285m NE	Unspecified Tank	1983 - 1994	139106
20	371m SW	Unspecified Tank	1912	109625
O	375m NE	Unspecified Tank	1990 - 1999	127088
H	452m E	Unspecified Tank	1976 - 1991	136008
H	452m E	Unspecified Tank	1993 - 1994	122268

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

47

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or



succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
B	59m SW	Electricity Substation	1994	60153
B	60m SW	Electricity Substations	1991	59838
C	61m W	Electricity Substation	1991	64454
C	62m W	Electricity Substation	1993	60155
C	64m W	Electricity Substation	1994	65477
B	65m SW	Electricity Substation	1993	60154
4	72m NE	Electricity Substation	1986 - 1994	71605
D	77m NE	Electricity Substation	1993 - 1994	64380
D	85m NE	Electricity Substation	1986 - 1991	82090
B	117m S	Electricity Substation	1991 - 1994	68487
E	132m NE	Electricity Substation	1986 - 1991	66636
E	132m NE	Electricity Substation	1993	74816
E	135m NE	Electricity Substation	1994	70920
G	189m S	Electricity Substation	1993 - 1994	76224
11	193m SW	Electricity Substation	1993 - 1994	81637
G	213m S	Electricity Substation	1983 - 1991	72990
13	221m S	Electricity Substation	1993 - 1994	63902
I	233m SE	Electricity Substation	1994	60159
I	237m SE	Electricity Substation	1993	60162
I	237m SE	Electricity Substation	1991	60160
14	252m NE	Electricity Substation	1983 - 1993	65266
16	269m SW	Electricity Substation	1993 - 1994	80594
N	291m N	Electricity Substation	1982 - 1999	70616
N	319m N	Electricity Substation	1994 - 1999	71781
O	366m NE	Electricity Substation	1994 - 1999	75792
O	367m NE	Electricity Substation	1990	77142

ID	Location	Land use	Dates present	Group ID
Q	391m SE	Electricity Substation	1986 - 1991	78167
R	400m N	Electricity Substation	1994 - 1999	78390
S	403m E	Electricity Substation	1991	83005
S	403m E	Electricity Substation	1994	65274
S	404m E	Electricity Substation	1993	60161
R	405m N	Electricity Substation	1982 - 1990	69300
Q	410m SE	Electricity Substation	1993 - 1994	76517
M	414m SE	Electricity Substation	1976 - 1982	71251
P	425m SE	Electricity Substation	1991	75544
P	425m SE	Electricity Substation	1986	84796
P	428m SE	Electricity Substation	1983	71373
P	429m SE	Electricity Substation	1993	72316
P	429m SE	Electricity Substation	1994	76187
T	437m E	Electricity Substation	1994	79821
T	437m E	Electricity Substation	1993	83489
T	449m E	Electricity Substation	1991	67417
T	449m E	Electricity Substation	1982	71539
T	449m E	Electricity Substation	1986	73651
T	450m E	Electricity Substation	1976 - 1983	82436
U	486m SE	Electricity Substation	1983	81565
U	490m SE	Electricity Substation	1976 - 1986	77249

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.



This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

1

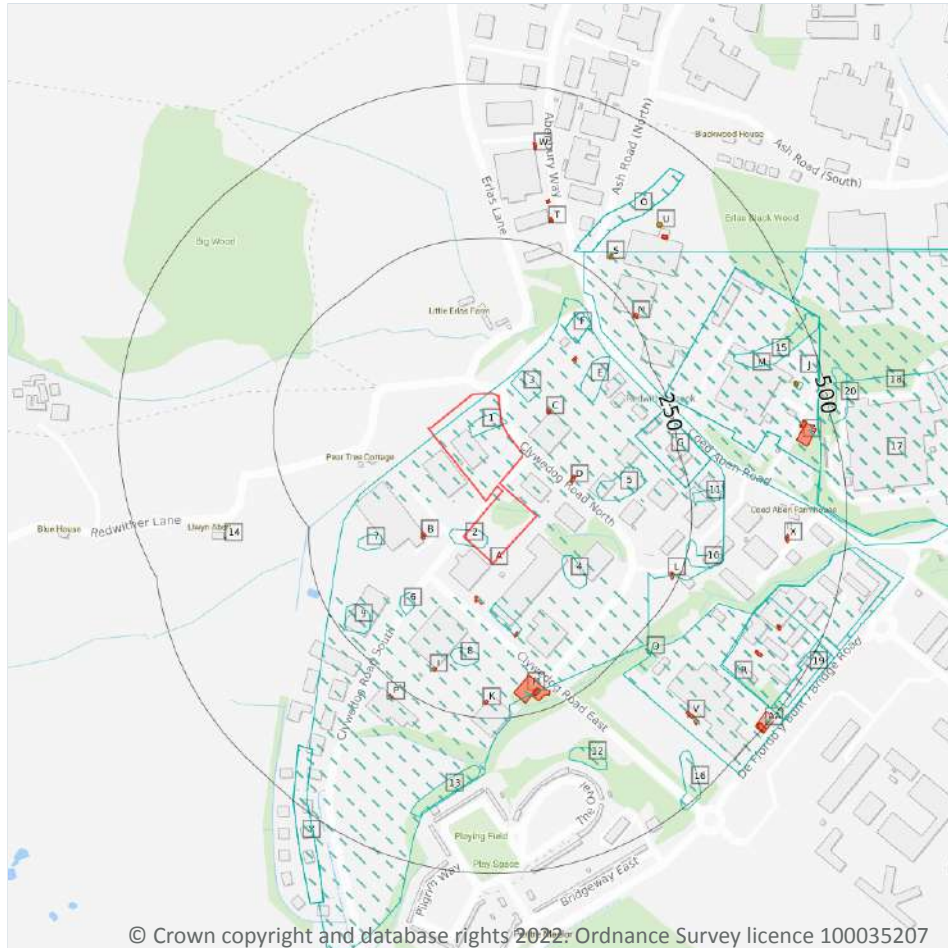
Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

Features are displayed on the Past land use map on **page 14**

ID	Location	Site Name	Date of Operation	Activities
A	On site	ROF Wrexham	c.1938 - 1988	c. WW2: Produced cordite;; post WW2: Cordite production ceased in 1945 an the area was used as an industrial estate by the Welsh Development Agency to boost the local economy; Explosives Factory

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

2.1 Historical industrial land uses

Records within 500m

39

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 20**

ID	Location	Land Use	Date	Group ID
1	On site	Unspecified Pit	1977	838781
2	On site	Unspecified Heap	1964	802670
A	On site	Unspecified Commercial/Industrial	1964	796409

ID	Location	Land Use	Date	Group ID
3	28m NE	Unspecified Pit	1977	838782
A	64m S	Unspecified Heap	1964	802667
4	76m SE	Unspecified Heap	1964	802668
5	104m E	Unspecified Heap	1964	802664
6	125m SW	Unspecified Heap	1964	802671
7	132m W	Unspecified Heap	1964	802672
E	132m E	Unspecified Heap	1977	802669
8	143m S	Unspecified Heap	1964	802655
F	150m NE	Unspecified Pit	1977	958785
F	150m NE	Unspecified Pit	1964	958785
G	184m E	Unspecified Works	1977	920631
G	184m E	Unspecified Works	1992	981460
J	196m NE	Unspecified Commercial/Industrial	1964	883869
9	197m SW	Unspecified Heap	1964	802673
10	246m E	Unspecified Heap	1977	802666
M	248m E	Unspecified Workshop	1977	880838
M	248m E	Unspecified Workshop	1992	910726
11	253m E	Unspecified Heap	1977	802665
O	265m NE	Railway Sidings	1960	846514
O	265m NE	Railway Sidings	1968	904588
R	275m SE	Unspecified Works	1992	963484
Q	280m SE	Unspecified Tank	1909	959968
Q	280m SE	Unspecified Tank	1938	959968
12	325m SE	Unspecified Heap	1992	802654
13	326m S	Unspecified Heap	1992	802644
15	373m NE	Unspecified Heap	1964	802661
R	379m SE	Unspecified Works	1964	846472
R	382m SE	Unspecified Works	1977	846472

ID	Location	Land Use	Date	Group ID
Y	418m SW	Cuttings	1977	845808
Y	418m SW	Cuttings	1964	845808
16	431m SE	Unspecified Heap	1964	802653
17	451m E	Unspecified Commercial/Industrial	1992	872439
J	452m E	Unspecified Tank	1977	823835
18	454m E	Unspecified Commercial/Industrial	1977	938680
19	485m SE	Unspecified Works	1977	867757
20	496m E	Unspecified Ground Workings	1977	799057

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

20

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 20**

ID	Location	Land Use	Date	Group ID
Q	274m SE	Unspecified Tank	1912	109626
S	285m NE	Unspecified Tank	1986	139106
S	285m NE	Unspecified Tank	1991	139106
S	286m NE	Unspecified Tank	1993	139106
S	286m NE	Unspecified Tank	1994	139106
S	286m NE	Unspecified Tank	1983	139106
14	371m SW	Unspecified Tank	1912	109625
U	375m NE	Unspecified Tank	1994	127088
U	375m NE	Unspecified Tank	1999	127088
U	375m NE	Unspecified Tank	1995	127088
U	375m NE	Unspecified Tank	1995	127088
U	375m NE	Unspecified Tank	1990	127088



ID	Location	Land Use	Date	Group ID
U	375m NE	Unspecified Tank	1990	127088
J	452m E	Unspecified Tank	1982	136008
J	452m E	Unspecified Tank	1986	136008
J	452m E	Unspecified Tank	1991	136008
J	452m E	Unspecified Tank	1993	122268
J	452m E	Unspecified Tank	1994	122268
J	453m E	Unspecified Tank	1976	136008
J	453m E	Unspecified Tank	1983	136008

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m

90

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 20**

ID	Location	Land Use	Date	Group ID
A	59m SW	Electricity Substation	1994	60153
A	60m SW	Electricity Substations	1991	59838
B	61m W	Electricity Substation	1991	64454
B	62m W	Electricity Substation	1993	60155
B	64m W	Electricity Substation	1994	65477
A	65m SW	Electricity Substation	1993	60154
C	72m NE	Electricity Substation	1993	71605
C	72m NE	Electricity Substation	1994	71605
C	74m NE	Electricity Substation	1986	71605
C	74m NE	Electricity Substation	1991	71605
D	77m NE	Electricity Substation	1993	64380
D	77m NE	Electricity Substation	1994	64380



ID	Location	Land Use	Date	Group ID
D	85m NE	Electricity Substation	1986	82090
D	85m NE	Electricity Substation	1991	82090
A	117m S	Electricity Substation	1991	68487
A	119m S	Electricity Substation	1993	68487
A	119m S	Electricity Substation	1994	68487
E	132m NE	Electricity Substation	1986	66636
E	132m NE	Electricity Substation	1991	66636
E	132m NE	Electricity Substation	1993	74816
E	135m NE	Electricity Substation	1994	70920
H	189m S	Electricity Substation	1993	76224
H	189m S	Electricity Substation	1994	76224
I	193m SW	Electricity Substation	1993	81637
I	193m SW	Electricity Substation	1994	81637
H	213m S	Electricity Substation	1986	72990
H	213m S	Electricity Substation	1991	72990
H	214m S	Electricity Substation	1983	72990
K	221m S	Electricity Substation	1993	63902
K	221m S	Electricity Substation	1994	63902
L	233m SE	Electricity Substation	1994	60159
L	237m SE	Electricity Substation	1993	60162
L	237m SE	Electricity Substation	1991	60160
N	252m NE	Electricity Substation	1986	65266
N	252m NE	Electricity Substation	1991	65266
N	253m NE	Electricity Substation	1993	65266
N	254m NE	Electricity Substation	1983	65266
P	269m SW	Electricity Substation	1993	80594
P	269m SW	Electricity Substation	1994	80594
T	291m N	Electricity Substation	1994	70616

ID	Location	Land Use	Date	Group ID
T	291m N	Electricity Substation	1999	70616
T	291m N	Electricity Substation	1995	70616
T	291m N	Electricity Substation	1995	70616
T	293m N	Electricity Substation	1982	70616
T	293m N	Electricity Substation	1988	70616
T	293m N	Electricity Substation	1990	70616
T	293m N	Electricity Substation	1990	70616
T	319m N	Electricity Substation	1994	71781
T	319m N	Electricity Substation	1999	71781
T	319m N	Electricity Substation	1995	71781
T	319m N	Electricity Substation	1995	71781
U	366m NE	Electricity Substation	1994	75792
U	366m NE	Electricity Substation	1999	75792
U	366m NE	Electricity Substation	1995	75792
U	366m NE	Electricity Substation	1995	75792
U	367m NE	Electricity Substation	1990	77142
U	367m NE	Electricity Substation	1990	77142
V	391m SE	Electricity Substation	1986	78167
V	391m SE	Electricity Substation	1991	78167
W	400m N	Electricity Substation	1994	78390
W	400m N	Electricity Substation	1999	78390
W	400m N	Electricity Substation	1995	78390
W	400m N	Electricity Substation	1995	78390
X	403m E	Electricity Substation	1991	83005
X	403m E	Electricity Substation	1994	65274
X	404m E	Electricity Substation	1993	60161
W	405m N	Electricity Substation	1982	69300
W	405m N	Electricity Substation	1988	69300

ID	Location	Land Use	Date	Group ID
W	405m N	Electricity Substation	1990	69300
W	405m N	Electricity Substation	1990	69300
V	410m SE	Electricity Substation	1993	76517
V	410m SE	Electricity Substation	1994	76517
R	414m SE	Electricity Substation	1982	71251
R	416m SE	Electricity Substation	1976	71251
R	425m SE	Electricity Substation	1986	84796
R	425m SE	Electricity Substation	1991	75544
R	428m SE	Electricity Substation	1983	71373
R	429m SE	Electricity Substation	1993	72316
R	429m SE	Electricity Substation	1994	76187
Z	437m E	Electricity Substation	1993	83489
Z	437m E	Electricity Substation	1994	79821
Z	449m E	Electricity Substation	1982	71539
Z	449m E	Electricity Substation	1986	73651
Z	449m E	Electricity Substation	1991	67417
Z	450m E	Electricity Substation	1976	82436
Z	450m E	Electricity Substation	1983	82436
AA	486m SE	Electricity Substation	1983	81565
AA	490m SE	Electricity Substation	1982	77249
AA	490m SE	Electricity Substation	1986	77249
AA	491m SE	Electricity Substation	1976	77249

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.



This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.



3.3 Historical landfill (LA/mapping records)

Records within 500m**0**

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m**0**

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m**0**

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m**0**

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m**6**

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

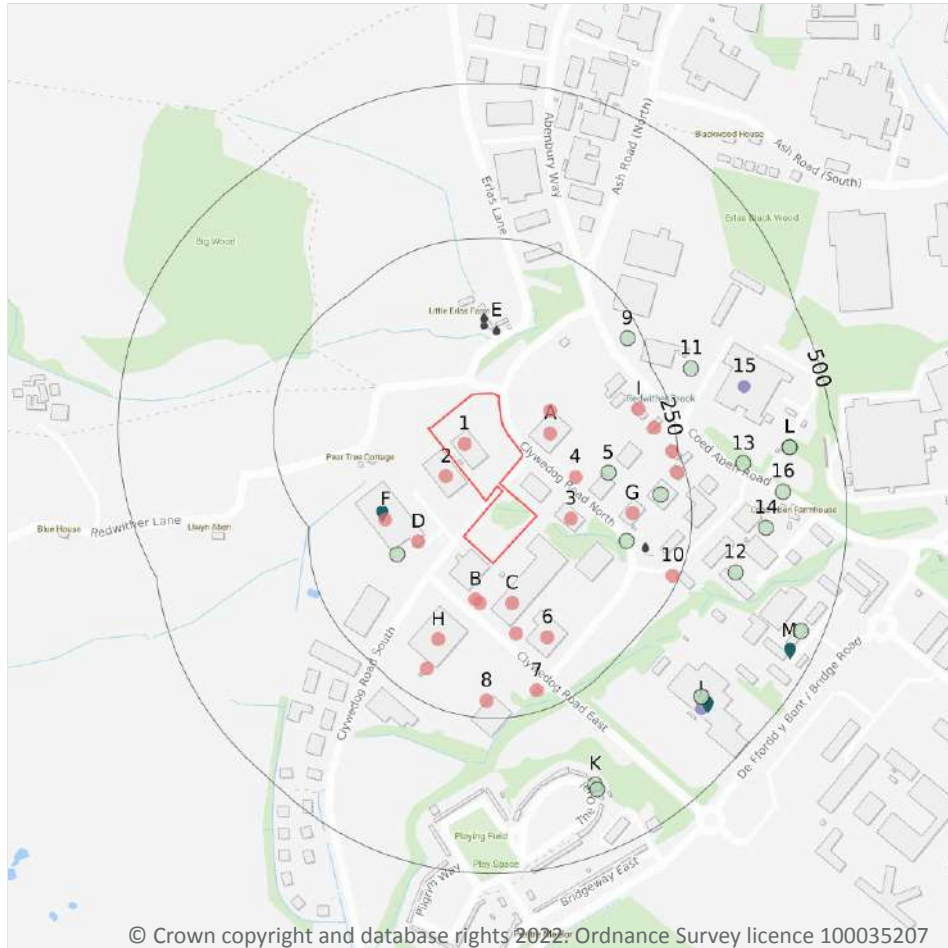
Features are displayed on the Waste and landfill map on **page 28**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	56m S	AST Plastic Containers UK LLP, A S T Plastic Containers UK, Unit 70, Clywedog Road East, Wrexham Industrial Estate, Wrexham, Wreccsam, LL13 9XE	NRW-WME053945	Treating waste exemption	Waste Exemption - Agricultural and Non-Agricultural	Cleaning, washing, spraying or coating relevant waste
A	56m S	AST Plastic Containers UK LLP, A S T Plastic Containers UK, Unit 70, Clywedog Road East, Wrexham Industrial Estate, Wrexham, Wreccsam, LL13 9XE	NRW-WME053945	Storing waste exemption	Waste Exemption - Agricultural and Non-Agricultural	Storage of waste in a secure place
A	56m S	AST Plastic Containers UK LLP, A S T Plastic Containers UK, Unit 70, Clywedog Road East, Wrexham Industrial Estate, Wrexham, Wreccsam, LL13 9XE	NRW-WME053945	Treating waste exemption	Waste Exemption - Agricultural and Non-Agricultural	Preparatory treatments (baling, sorting, shredding etc)
1	251m NE	Specialist Building Products T/A Ecodek, Ecodek, Unit 13, Abenbury Way, Wrexham Industrial Estate, Wrexham, Wreccsam, LL13 9UZ	NRW-WME068549	Using waste exemption	Waste Exemption - Agricultural and Non-Agricultural	Use of waste to manufacture finished goods
2	338m E	LOCKWELL ELECTRICAL, Lockwell Lectrics Ltd, Unit 100, Coed Aben Road, Wrexham Industrial Estate, Wrexham, Wreccsam, LL13 9UH	NRW-WME049814	Storing waste exemption	Not on a farm	Storage of waste in a secure place
3	367m SW	Malpas Tractors (Wrexham) Ltd, Malpas Tractors (Wrexham) Ltd, Clywedog Road South, Wrexham, Wrexham, Wreccsam, LL13 9XS	NRW-WME072727	Storing waste exemption	Not on a farm	Storage of waste in secure containers

This data is sourced from the Environment Agency and Natural Resources Wales.



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- Historical licensed industrial activities
- Part A(1) industrial activities
- Licensed pollutant release (Part A(2)/B)
- Licensed Discharges to controlled waters
- Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m

23

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Company	Address	Activity	Category
1	On site	Dragon Packaging Ltd	Unit 47 and 48, Clywedog Road North, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XN	Packaging	Industrial Products
2	26m SW	Silvergate	Unit 53, Clywedog Road South, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XS	Rubber, Silicones and Plastics	Industrial Products

ID	Location	Company	Address	Activity	Category
3	55m E	Skanda	Unit 67, Clywedog Road North, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XN	General Construction Supplies	Industrial Products
A	56m NE	Riello U P S Ltd	Unit 50, Clywedog Road North, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XN	Electrical Equipment Repair and Servicing	Repair and Servicing
B	65m SW	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
B	68m S	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
C	71m SE	A S T Plastic Containers UK	Unit 70, Clywedog Road East, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XE	Packaging	Industrial Products
D	74m W	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
A	77m NE	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
4	89m NE	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
C	119m S	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
F	129m W	Applied Component s Technology Ltd	Unit 54, Clywedog Road South, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XS	Rubber, Silicones and Plastics	Industrial Products
6	148m SE	Decor-lam Ltd	Unit 71, Clywedog Road East, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XE	Industrial Coatings and Finishings	Industrial Products
H	151m SW	Porviar Sciences	Unit 73, Clywedog Road South, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XS	Rubber, Silicones and Plastics	Industrial Products
G	154m E	Etiquette Labels Ltd	Unit 51, Clywedog Road North, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9XN	Stationery, Stamps, Tags and Labels	Industrial Products
H	200m SW	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
I	201m E	Fleet Sauce	Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH	Vehicle Hire and Rental	Hire Services
7	217m S	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
I	217m E	Broadway Leisure	Unit 2a, Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH	Sports and Leisure Equipment Repair	Repair and Servicing



ID	Location	Company	Address	Activity	Category
8	221m S	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
I	236m E	Zaviz International Ltd	Empire Scaffolding, Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH	Vehicle Repair, Testing and Servicing	Repair and Servicing
10	239m SE	Electricity Sub Station	Clwyd, LL13	Electrical Features	Infrastructure and Facilities
I	241m E	Business Print & Design	Millwood House, Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH	Published Goods	Industrial Products

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	0
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Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0
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High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0
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High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0
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Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m

0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m

0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m

0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m

4

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Details	
15	374m E	Operator: Stadex Industries Ltd Address: Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UL Process: Di-isocyanate Processes Permit Number: BF1220	Original Permit Number: IPCAPP Date Approved: 8-6-1999 Effective Date: 9-6-1999 Status: Revoked
J	405m SE	Operator: Hydro Aluminium Deeside Ltd Address: Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9SQ Process: Non-ferrous Metals Permit Number: AS4117	Original Permit Number: IPCAIRAPP Date Approved: 4-12-1995 Effective Date: 8-12-1995 Status: Superseded By Variation

ID	Location	Details	
J	405m SE	Operator: Hydro Aluminium Deeside Ltd Address: Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9SQ Process: Non-ferrous Metals Permit Number: AX6443	Original Permit Number: IPCMAJVAR Date Approved: 1-5-1997 Effective Date: 1-5-1997 Status: Superseded By Variation
J	405m SE	Operator: Hydro Aluminium Deeside Ltd Address: Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9SQ Process: Non-ferrous Metals Permit Number: BD8312	Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Revoked - Now Ippc

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m

15

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Details	
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY => 5T Permit Number: BK3638IF Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 15/03/2002 Effective Date: 15/03/2002 Last date noted as effective: 17/11/2015 Status: SUPERCEDED
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY >4T/D LEAD/CADMIUM OR 20T/D OTHERS Permit Number: BK3638IF Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 15/03/2002 Effective Date: 15/03/2002 Last date noted as effective: 17/11/2015 Status: SUPERCEDED
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY => 5T Permit Number: BP3934LJ Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 14/07/2009 Effective Date: 14/07/2009 Last date noted as effective: 17/11/2015 Status: SUPERCEDED



ID	Location	Details	
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY >4T/D LEAD/CADMIUM OR 20T/D OTHERS Permit Number: BP3934LJ Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 14/07/2009 Effective Date: 14/07/2009 Last date noted as effective: 17/11/2015 Status: SUPERCEDED
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY => 5T Permit Number: FP3836WE Original Permit Number: BK3638IF	EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 17/11/2015 Status: DETERMINATION
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM PROCESSING EA/EPR/BK3638IF/V002 Process: NON-FERROUS METALS; MELTING WITH CAPACITY >4T/D LEAD/CADMIUM OR 20T/D OTHERS Permit Number: FP3836WE Original Permit Number: BK3638IF	EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 17/11/2015 Status: DETERMINATION
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: NON-FERROUS METALS; MELTING WITH CAPACITY => 5T Permit Number: HP3338VH Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 20/06/2014 Effective Date: 20/06/2014 Last date noted as effective: 17/11/2015 Status: EFFECTIVE
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: NON-FERROUS METALS; MELTING WITH CAPACITY >4T/D LEAD/CADMIUM OR 20T/D OTHERS Permit Number: HP3338VH Original Permit Number: BK3638IF	EPR Reference: - Issue Date: 20/06/2014 Effective Date: 20/06/2014 Last date noted as effective: 17/11/2015 Status: EFFECTIVE
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: - Process: NON-FERROUS METALS; MELTING WITH CAPACITY >4T/D LEAD/CADMIUM OR 20T/D OTHERS Permit Number: BK3638 Original Permit Number: BK3638	EPR Reference: - Issue Date: 15/03/2002 Effective Date: 15/03/2002 Last date noted as effective: 01/10/2004 Status: SUPERSEDED BY PAS

ID	Location	Details	
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: - Permit Number: BK3638IF Original Permit Number: HP3338VH	EPR Reference: - Issue Date: 20/06/2014 Effective Date: 20/06/2014 Last date noted as effective: 01/12/2016 Status: EFFECTIVE
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: - Process: NON-FERROUS METALS; MELTING WITH CAPACITY => 5T Permit Number: BK3638 Original Permit Number: BK3638	EPR Reference: - Issue Date: 15/03/2002 Effective Date: 15/03/2002 Last date noted as effective: 01/10/2004 Status: SUPERSEDED BY PAS
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: MELTING, INCLUDING MAKING ALLOYS, OF NON-FERROUS METALS, INCLUDING RECOVERED PRO... Permit Number: BK3638IF Original Permit Number: HP3338VH	EPR Reference: - Issue Date: 20/07/2017 Effective Date: 20/07/2017 Last date noted as effective: 01/04/2018 Status: EFFECTIVE
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: MELTING, INCLUDING MAKING ALLOYS, OF NON-FERROUS METALS, INCLUDING RECOVERED PRO... Permit Number: BK3638IF Original Permit Number: HP3338VH	EPR Reference: - Issue Date: 20/07/2017 Effective Date: 20/07/2017 Last date noted as effective: 01/04/2018 Status: EFFECTIVE
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: MELTING, INCLUDING MAKING ALLOYS OF, NON-FERROUS METALS, INCLUDING RECOVERED PRODUCTS AND THE OPERATION OF NON-FERROUS METAL FOUNDRIES WHERE THE PLANT HAS A MELTING CAPACITY OF MORE THAN 4 TONNES PER DAY FOR LEAD OR CADMIUM OR 20 TONNES PER DAY FOR ALL OTHER METALS Permit Number: BK3638IF Original Permit Number: HP3338VH	EPR Reference: - Issue Date: 21/10/2020 Effective Date: 21/10/2020 Last date noted as effective: 01/01/2022 Status: EFFECTIVE



ID	Location	Details	
J	405m SE	Operator: HYDRO ALUMINIUM DEESIDE LTD Installation Name: WREXHAM ALUMINIUM WORKS EPR/BK3638IF Process: MELTING, INCLUDING MAKING ALLOYS OF, NON-FERROUS METALS, INCLUDING RECOVERED PRODUCTS AND THE OPERATION OF NON-FERROUS METAL FOUNDRIES WHERE ANY FURNACE (OTHER THAN A VACUUM FURNACE), BATH OR OTHER HOLDING VESSEL USED IN THE PLANT FOR MELTING HAS A DESIGNED HOLDING CAPACITY OF 5 OR MORE TONNES Permit Number: BK3638IF Original Permit Number: HP3338VH	EPR Reference: - Issue Date: 21/10/2020 Effective Date: 21/10/2020 Last date noted as effective: 01/01/2022 Status: EFFECTIVE

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

3

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Address	Details	
F	136m W	Applied Component Technology Ltd, 54 Clywedog Road South, Wrexham Industrial Estate, Wrexham, LL13 9XS	Process: Di-isocyanate Processes Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.
J	408m SE	Hydro Aluminium Deeside Ltd, Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9SQ	Process: Non-ferrous Metal Foundry Processes Status: Historical Permit Permit Type: Part B	Enforcement: Enforcement Notified Date of enforcement: 30/03/2006 Comment: Wood processing
M	461m SE	Williams Services & Steve Williams Transport, Unit 11 Bridge Way Centre, Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9QS	Process: Waste Oil Burner 0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.

This data is sourced from Local Authority records.



4.12 Radioactive Substance Authorisations

Records within 500m

0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m

5

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991. Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Address	Details	
E	102m N	Unit 2, LITTLE ERLAS, ERLAS LANE, Abenbury, Wrexham, LL13 OPE	Effluent Type: - Permit Number: CG0337201 Permit Version: 1 Receiving Water: REDWITHER BROOK	Status: Effective Issue date: 22/04/1993 Effective Date: 22/04/1993 Revocation Date: -
E	112m N	Unit 2, LITTLE ERLAS, ERLAS LANE, Abenbury, Wrexham, LL13 OPE	Effluent Type: - Permit Number: CG0337202 Permit Version: 1 Receiving Water: REDWITHER BROOK	Status: Effective Issue date: 22/04/1993 Effective Date: 22/04/1993 Revocation Date: -
E	122m N	Unit 2, LITTLE ERLAS, ERLAS LANE, Abenbury, Wrexham, LL13 OPE	Effluent Type: - Permit Number: CG0337203 Permit Version: 1 Receiving Water: REDWITHER BROOK	Status: Effective Issue date: 22/04/1993 Effective Date: 22/04/1993 Revocation Date: -
G	182m E	PLOT 6 WREXHAM IND EST, CLYWEDOG ROAD	Effluent Type: UNSPECIFIED Permit Number: CM0207401 Permit Version: 1 Receiving Water: STREAM NR REDWITHER BROOK	Status: REVOKED - UNSPECIFIED Issue date: 01/01/1901 Effective Date: 01/01/1901 Revocation Date: 28/01/1990
G	182m E	PLOT 6 WREXHAM IND EST, CLYWEDOG ROAD	Effluent Type: UNSPECIFIED Permit Number: CM0207401 Permit Version: 2 Receiving Water: STREAM NR REDWITHER BROOK	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 29/01/1990 Effective Date: 29/01/1990 Revocation Date: 06/05/1993

This data is sourced from the Environment Agency and Natural Resources Wales.



4.14 Pollutant release to surface waters (Red List)

Records within 500m**0**

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m**0**

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m**0**

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m**0**

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m**17**

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 31**

ID	Location	Details	
D	110m W	Incident Date: 09/07/2003 Incident Identification: 172217 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
5	134m NE	Incident Date: 18/03/2002 Incident Identification: 64721 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Food and Drink	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
G	150m E	Incident Date: 04/05/2001 Incident Identification: 4393 Pollutant: Specific Waste Materials Pollutant Description: Other Specific Waste Material	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
I	203m E	Incident Date: 29/10/2015 Incident Identification: 1384243 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Food and Drink	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
9	227m NE	Incident Date: 04/02/2016 Incident Identification: 1408258 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Food and Drink	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
11	305m NE	Incident Date: 19/08/2019 Incident Identification: 1905523 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 2 (Significant) Land Impact: No Details Air Impact: Category 2 (Significant)
12	332m E	Incident Date: 01/06/2001 Incident Identification: 7295 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
13	343m E	Incident Date: 13/07/2004 Incident Identification: 250782 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Food and Drink	Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
14	370m E	Incident Date: 08/08/2002 Incident Identification: 98530 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
J	391m SE	Incident Date: 08/05/2002 Incident Identification: 77311 Pollutant: Other Pollutant Pollutant Description: Noise	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)



ID	Location	Details	
J	391m SE	Incident Date: 08/05/2002 Incident Identification: 77311 Pollutant: Other Pollutant Pollutant Description: Noise	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
K	392m SE	Incident Date: 17/08/2001 Incident Identification: 25045 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
16	399m E	Incident Date: 03/10/2002 Incident Identification: 112354 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
K	401m SE	Incident Date: 02/07/2013 Incident Identification: 1127929 Pollutant: Other Pollutant Pollutant Description: Noise	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
L	422m E	Incident Date: 19/01/2006 Incident Identification: 371865 Pollutant: Organic Chemicals/Products Pollutant Description: Other Organic Chemical or Product	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
L	422m E	Incident Date: 19/01/2006 Incident Identification: 371865 Pollutant: Organic Chemicals/Products Pollutant Description: Pesticides and Biocides	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
M	464m SE	Incident Date: 16/07/2014 Incident Identification: 1256528 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory radioactive waste

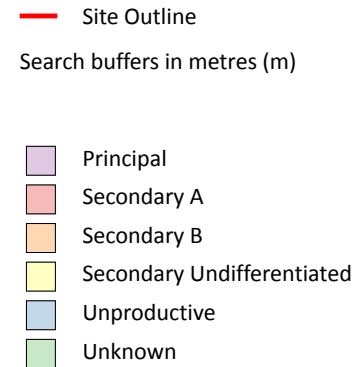
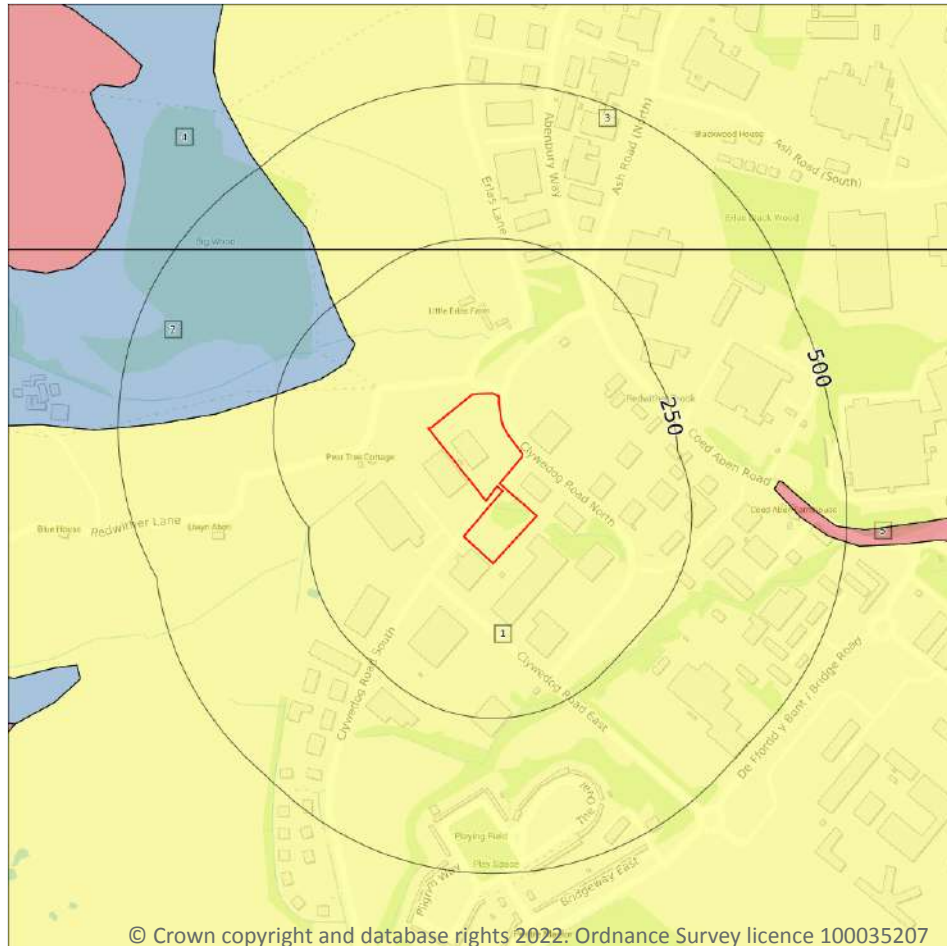
Records within 500m

0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer



5.1 Superficial aquifer

Records within 500m

5

Aquifer status of groundwater held within superficial geology.

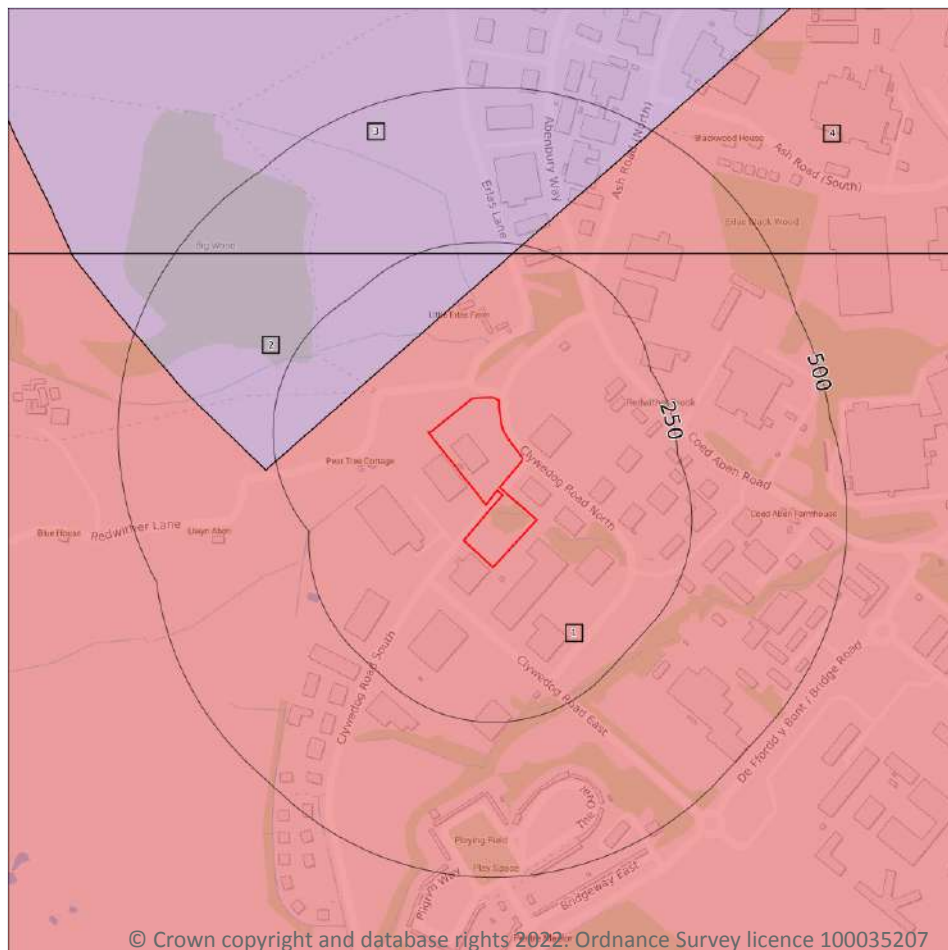
Features are displayed on the Hydrogeology map on **page 44**

ID	Location	Designation	Description
1	On site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	169m NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

ID	Location	Designation	Description
3	232m N	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	341m NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	386m E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive

5.2 Bedrock aquifer

Records within 500m

4

Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 46**

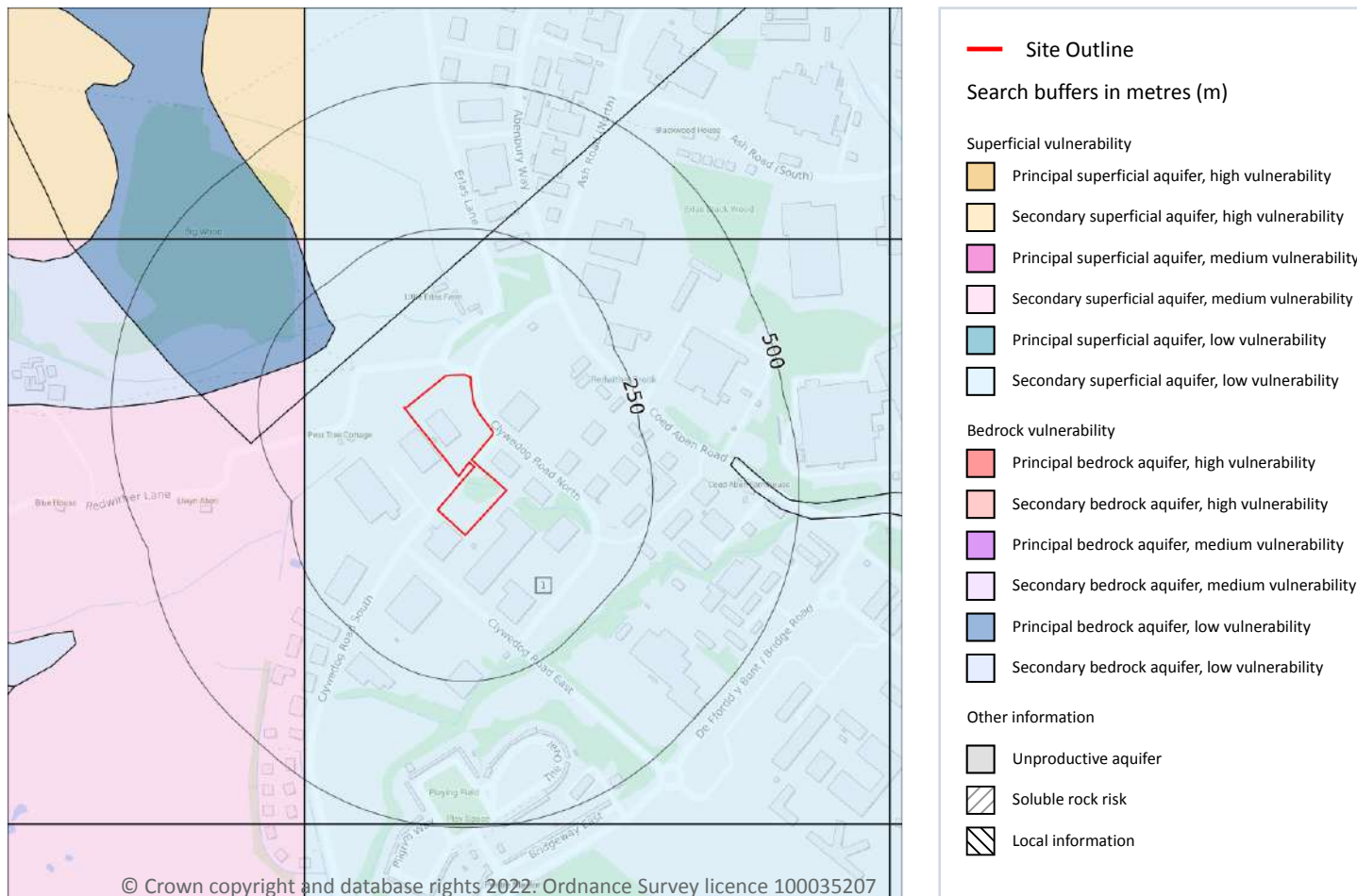
ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	127m NW	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

ID	Location	Designation	Description
3	232m N	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
4	234m N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Groundwater vulnerability



5.3 Groundwater vulnerability

Records within 50m

1

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 48**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300- 550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: >10m Patchiness value: >90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site

0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

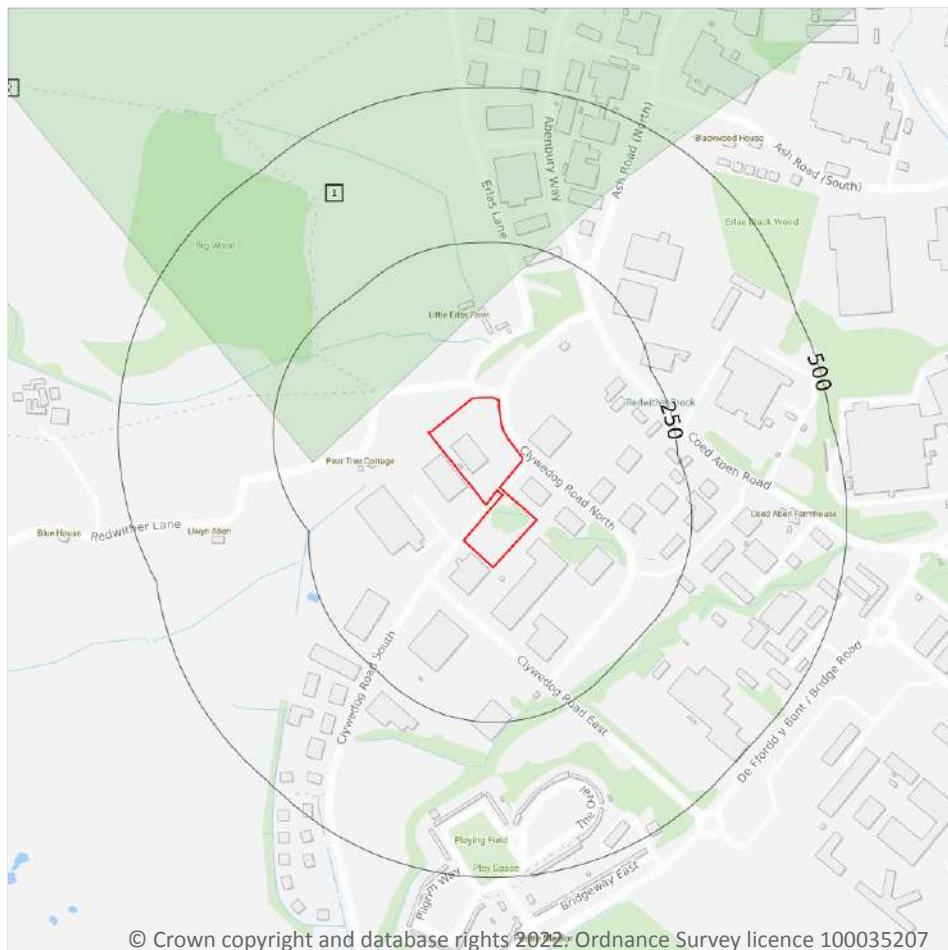
Records on site

0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



- Site Outline
- Search buffers in metres (m)
- Source Protection Zone 1
Inner catchment
- Source Protection Zone 2
Outer catchment
- Source Protection Zone 3
Total catchment
- Source Protection Zone 4
Zone of Special Interest
- Source Protection Zone 1c
Inner catchment - confined aquifer
- Source Protection Zone 2c
Outer catchment - confined aquifer
- Source Protection Zone 3c
Total catchment - confined aquifer
- Drinking water abstraction licences
Polygon features
- Drinking water abstraction licences
Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m

11

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 50**

ID	Location	Details	
-	1016m SE	Status: Historical Licence No: 24/67/7/0213 Details: Process water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA., OB1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338240 Northing: 349090	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 10/09/1998 Expiry Date: 10/09/2001 Issue No: 100 Version Start Date: 10/09/1998 Version End Date: -
-	1016m SE	Status: Historical Licence No: 24/67/7/0222 Details: Process Water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA., OB1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338240 Northing: 349090	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 10/09/2001 Expiry Date: 31/03/2012 Issue No: 1 Version Start Date: 10/09/2001 Version End Date: -
-	1016m SE	Status: Historical Licence No: WA/067/0007/006 Details: Process Water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA., OB1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338240 Northing: 349090	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 01/04/2012 Expiry Date: 31/03/2022 Issue No: 1 Version Start Date: 01/04/2012 Version End Date: -
-	1054m SE	Status: Historical Licence No: 24/67/7/0213 Details: Process water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA. BOREHOLE AW1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338190 Northing: 348940	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 10/09/1998 Expiry Date: 10/09/2001 Issue No: 100 Version Start Date: 10/09/1998 Version End Date: -
-	1054m SE	Status: Historical Licence No: 24/67/7/0222 Details: Process Water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA. BOREHOLE AW1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338190 Northing: 348940	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 10/09/2001 Expiry Date: 31/03/2012 Issue No: 1 Version Start Date: 10/09/2001 Version End Date: -



ID	Location	Details	
-	1054m SE	Status: Historical Licence No: WA/067/0007/006 Details: Process Water Direct Source: EAW Groundwater Point: 144M DEEP, 150MM DIA. BOREHOLE AW1 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338190 Northing: 348940	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 01/04/2012 Expiry Date: 31/03/2022 Issue No: 1 Version Start Date: 01/04/2012 Version End Date: -
-	1054m SE	Status: Active Licence No: WA/067/0007/006 Details: Process Water - Medium Direct Source: Underground strata Point: - Data Type: Point Name: - Easting: 338190 Northing: 348940	Annual Volume (m ³): 131,400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: Oct 2 2016 12:00AM Expiry Date: Mar 30 2027 12:00AM Issue No: - Version Start Date: - Version End Date: -
-	1078m E	Status: Historical Licence No: WA/067/0007/006 Details: Process Water Direct Source: EAW Groundwater Point: SPECTRUM BUSINESS PARK BOREHOLE AW2 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338350 Northing: 349180	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 01/04/2012 Expiry Date: 31/03/2022 Issue No: 1 Version Start Date: 01/04/2012 Version End Date: -
-	1084m E	Status: Historical Licence No: 24/67/7/0213 Details: Process water Direct Source: EAW Groundwater Point: 144 M DEEP, 200MM DIA BH AW2 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338360 Northing: 349190	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 10/09/1998 Expiry Date: 10/09/2001 Issue No: 100 Version Start Date: 10/09/1998 Version End Date: -
-	1084m E	Status: Historical Licence No: 24/67/7/0222 Details: Process Water Direct Source: EAW Groundwater Point: 144 M DEEP, 200MM DIA BH AW2 Data Type: Point Name: Calypso Soft Drinks Ltd Easting: 338360 Northing: 349190	Annual Volume (m ³): 131400 Max Daily Volume (m ³): 600 Original Application No: - Original Start Date: 10/09/2001 Expiry Date: 31/03/2012 Issue No: 1 Version Start Date: 10/09/2001 Version End Date: -

ID	Location	Details	
-	1623m NE	Status: Historical Licence No: 24/67/9/0130 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: WELL Data Type: Point Name: Taylor Easting: 337980 Northing: 351230	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 14/06/1968 Expiry Date: - Issue No: 100 Version Start Date: 14/06/1968 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m

1

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 50**

ID	Location	Details	
-	905m NE	Status: Historical Licence No: 24/67/7/0178 Details: Non-Evaporative Cooling Direct Source: EAW Surface Water Point: TRIBUTARY OF REDWITHER BROOK Data Type: Point Name: Caparo Wire Ltd Easting: 337810 Northing: 350500	Annual Volume (m ³): 9955.74 Max Daily Volume (m ³): 27.276 Original Application No: - Original Start Date: 12/05/1972 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2007 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m

0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.



5.9 Source Protection Zones

Records within 500m**2**

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination. Features are displayed on the Abstractions and Source Protection Zones map on **page 50**

ID	Location	Type	Description
1	90m NW	3	Total catchment
2	192m W	3	Total catchment

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

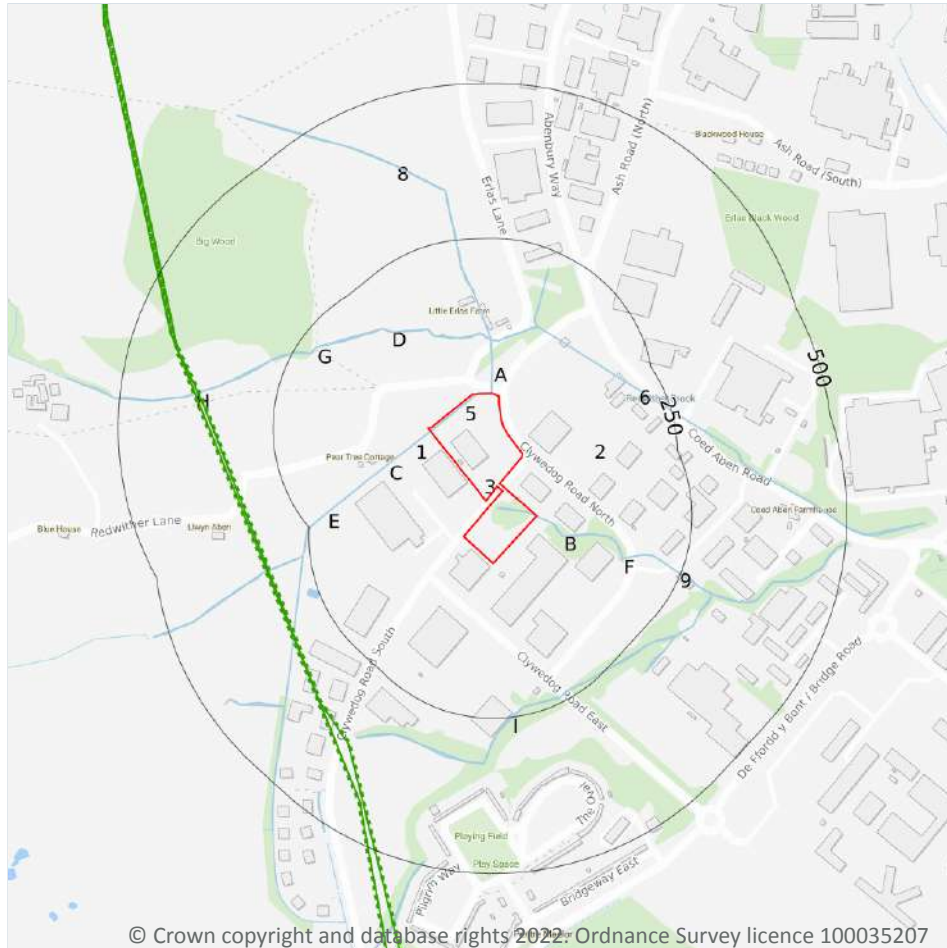
Records within 500m**0**

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.



6 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)
- ... WFD River, canal and surface water transfer water bodies
- WFD Lake water bodies
- WFD Transitional and coastal water bodies
- WFD Surface water body catchments boundaries
- WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m

23

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 55**

ID	Location	Type of water feature	Ground level	Permanence	Name
1	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
5	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	On site	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
B	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	82m SW	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	84m N	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	Redwither Brook
A	84m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Redwither Brook
A	86m N	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
A	86m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Redwither Brook
D	91m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Redwither Brook
C	92m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
6	128m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Redwither Brook
A	128m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	131m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-



ID	Location	Type of water feature	Ground level	Permanence	Name
A	150m NE	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
F	153m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
F	154m SE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
8	159m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
9	199m E	Inland river not influenced by normal tidal action.	Not provided	Watercourse contains water year round (in normal circumstances)	-
A	202m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
G	221m NW	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	Redwither Brook
H	223m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Redwither Brook
I	235m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m

15

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 55**

This data is sourced from the Ordnance Survey.



6.3 WFD Surface water body catchments

Records on site	1
------------------------	----------

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 55**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
3	On site	River WB catchment	Clywedog - Dee to Gwenfro	GB111067052110	Clywedog - Dee	Dee

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	1
---------------------------	----------

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site.

Features are displayed on the Hydrology map on **page 55**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
-	1033m S	River	Clywedog - Dee to Gwenfro	GB111067052110	Moderate	Fail	Moderate	2016

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	1
------------------------	----------

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 55**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
2	On site	Dee Permo-Triassic Sandstone	GB41101G202400	Poor	Poor	Good	2019

This data is sourced from the Environment Agency and Natural Resources Wales.



7 River and coastal flooding

7.1 Risk of flooding from rivers and the sea

Records within 50m

0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m

0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m

0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.



7.4 Areas Benefiting from Flood Defences

Records within 250m

0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 Flood Storage Areas

Records within 250m

0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.



River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m

0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m

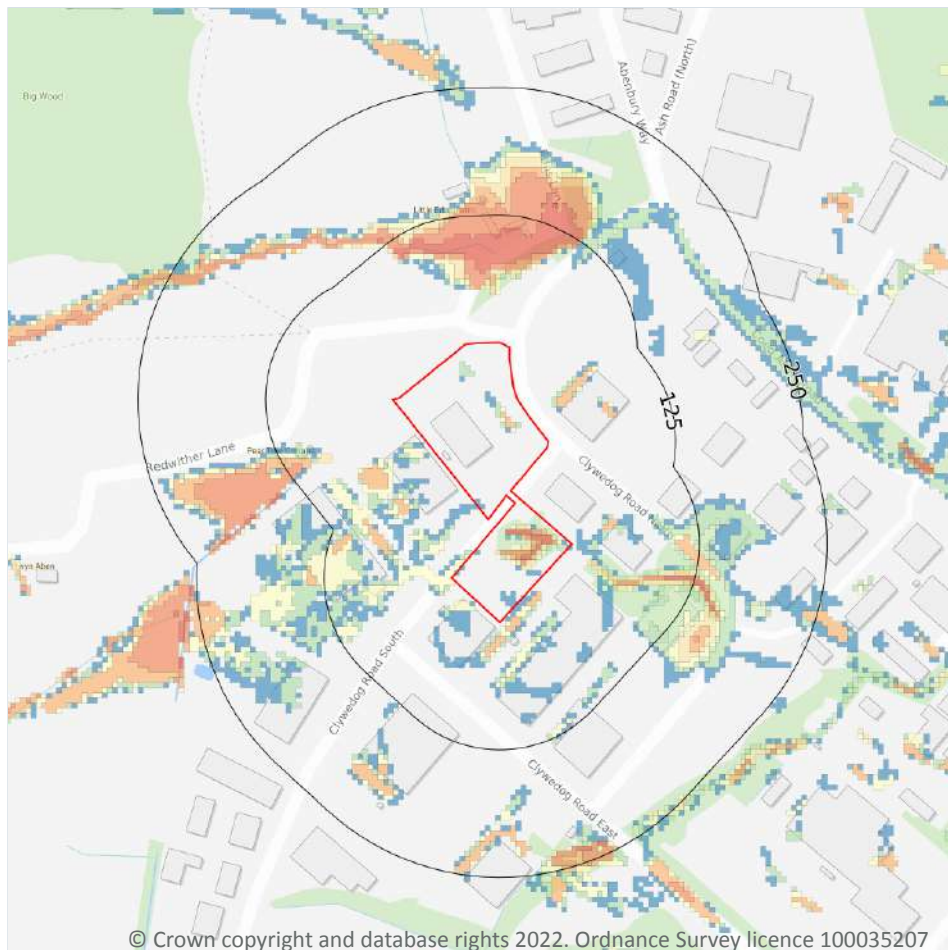
0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.



8 Surface water flooding



— Site Outline

Search buffers in metres (m)

1 in 1000 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site

1 in 30 year, Greater than 1.0m

Highest risk within 50m

1 in 30 year, Greater than 1.0m

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 63**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

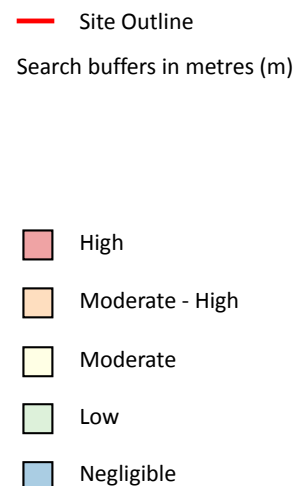
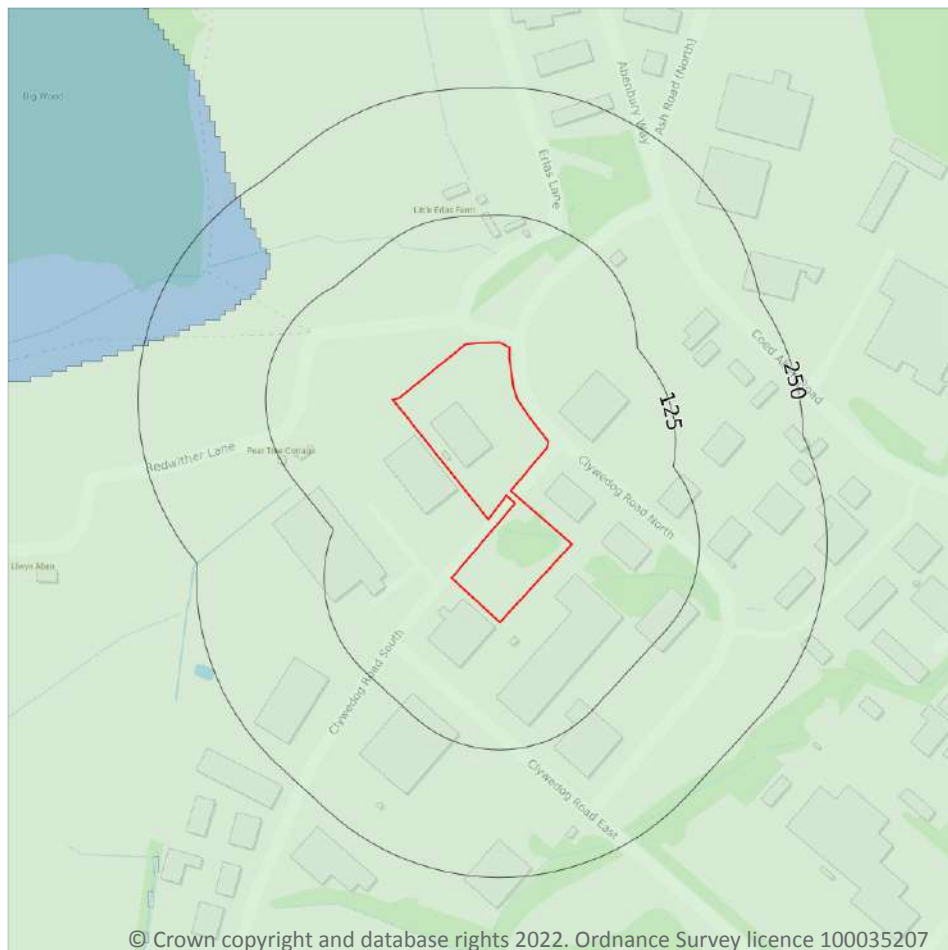
The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Greater than 1.0m
1 in 250 year	Greater than 1.0m
1 in 100 year	Greater than 1.0m
1 in 30 year	Greater than 1.0m

This data is sourced from Ambiantal Risk Analytics.



9 Groundwater flooding



9.1 Groundwater flooding

Highest risk on site

Low

Highest risk within 50m

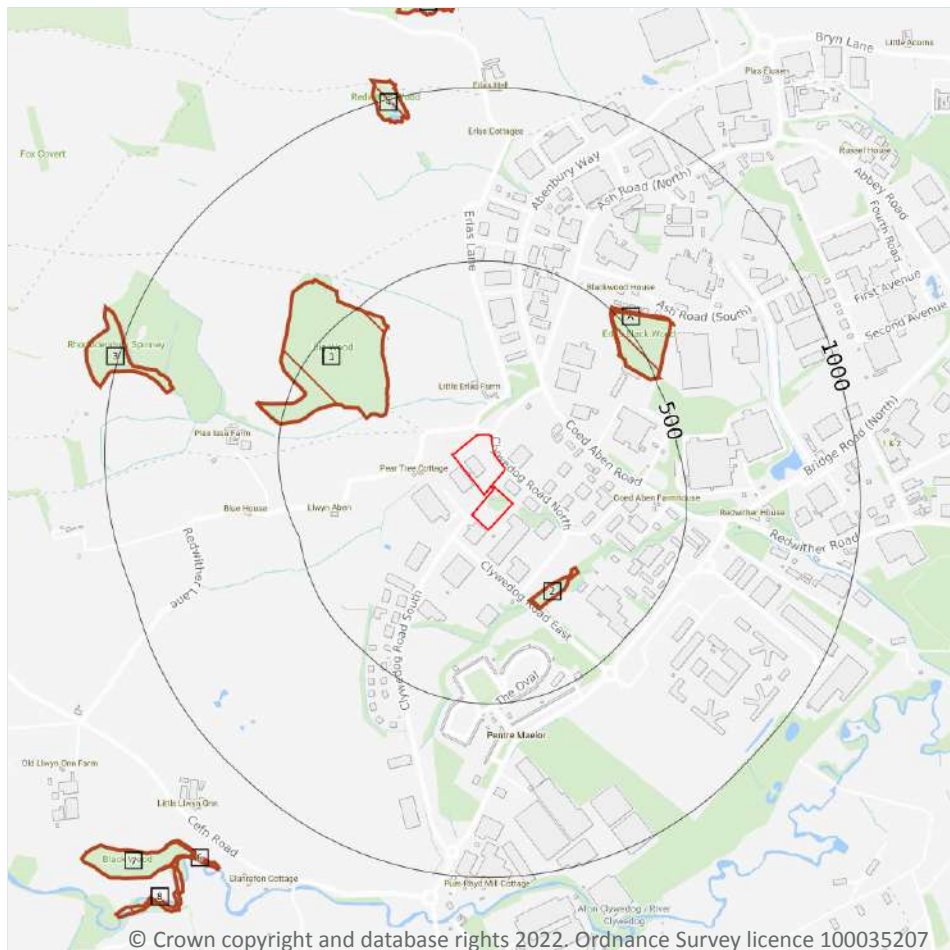
Low

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 65**

This data is sourced from Ambiantal Risk Analytics.

10 Environmental designations



- Site Outline
- Search buffers in metres (m)
- Designated Ancient Woodland

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

0

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m**0**

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m**0**

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m**0**

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m**0**

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m

0

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m

25

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 66**

ID	Location	Name	Woodland Type
1	223m NW	Unknown	Ancient Semi Natural Woodland
2	233m SE	Unknown	Ancient Semi Natural Woodland
A	436m NE	Unknown	Restored Ancient Woodland Site
A	437m NE	Unknown	Restored Ancient Woodland Site
3	825m W	Unknown	Ancient Semi Natural Woodland
4	928m N	Unknown	Ancient Semi Natural Woodland
5	1218m N	Unknown	Restored Ancient Woodland Site
6	1241m SW	Unknown	Ancient Semi Natural Woodland
7	1258m SW	Unknown	Restored Ancient Woodland Site
8	1279m SW	Unknown	Ancient Semi Natural Woodland
-	1398m W	Unknown	Ancient Semi Natural Woodland
-	1407m W	Unknown	Ancient Semi Natural Woodland
-	1605m NW	Unknown	Ancient Semi Natural Woodland
-	1640m SW	Unknown	Ancient Semi Natural Woodland
-	1702m W	Unknown	Restored Ancient Woodland Site
-	1707m SW	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
-	1716m SW	Unknown	Ancient Semi Natural Woodland
-	1720m W	Unknown	Restored Ancient Woodland Site
-	1725m SW	Unknown	Ancient Semi Natural Woodland
-	1750m W	Unknown	Ancient Semi Natural Woodland
-	1816m SW	Unknown	Ancient Semi Natural Woodland
-	1852m SE	Unknown	Ancient Semi Natural Woodland
-	1861m SE	Unknown	Ancient Semi Natural Woodland
-	1884m SE	Unknown	Ancient Semi Natural Woodland
-	1987m SE	Unknown	Ancient Semi Natural Woodland

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m

0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m

0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m

0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.



10.11 Green Belt

Records within 2000m

0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m

0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m

0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m

0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m

0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was



closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m

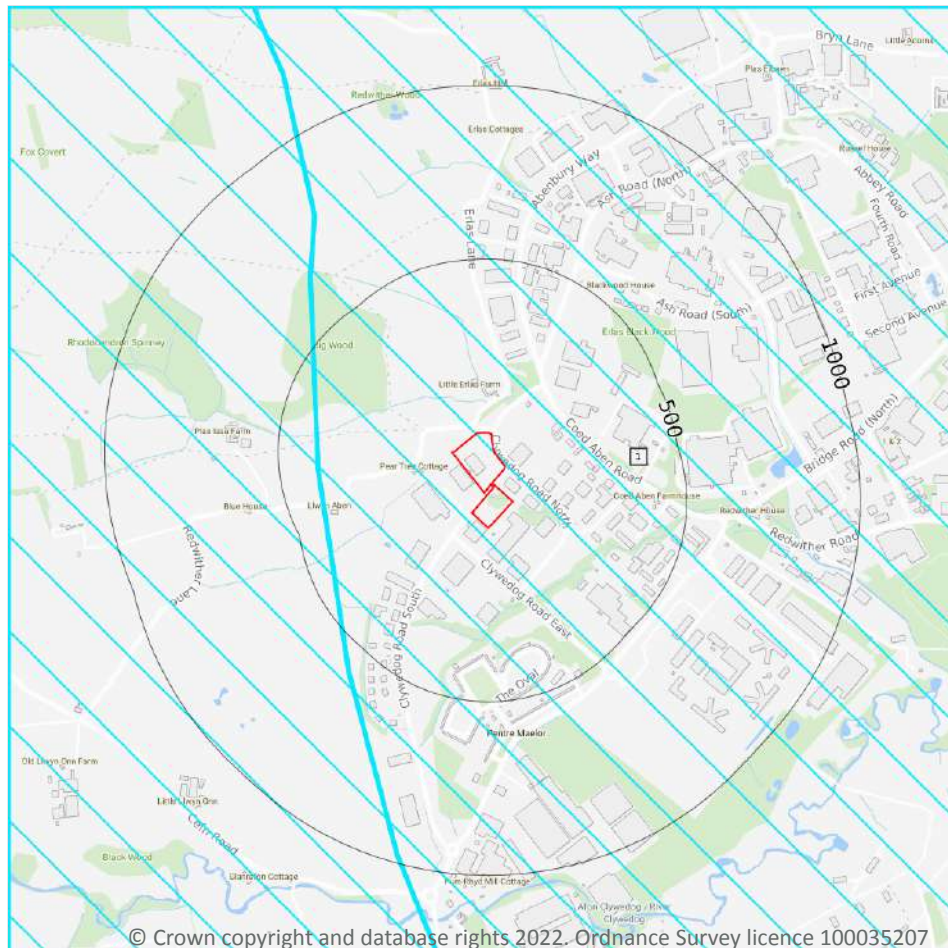
0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.



SSSI Impact Zones and Units



- Site Outline
- Search buffers in metres (m)
- ▨ SSSI Impact Risk Zones
- SSSI Units
- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site

1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 72**

ID	Location	Type of developments requiring consultation
1	On site	Infrastructure - Airports, helipads and other aviation proposals. Air pollution - Any industrial/agricultural development that could cause air pollution (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons & digestate stores > 750m², manure stores > 3500t). Combustion - General combustion processes >50mw energy input. incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	0
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Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m

0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.



This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m

0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.7 Registered Parks and Gardens

Records within 250m

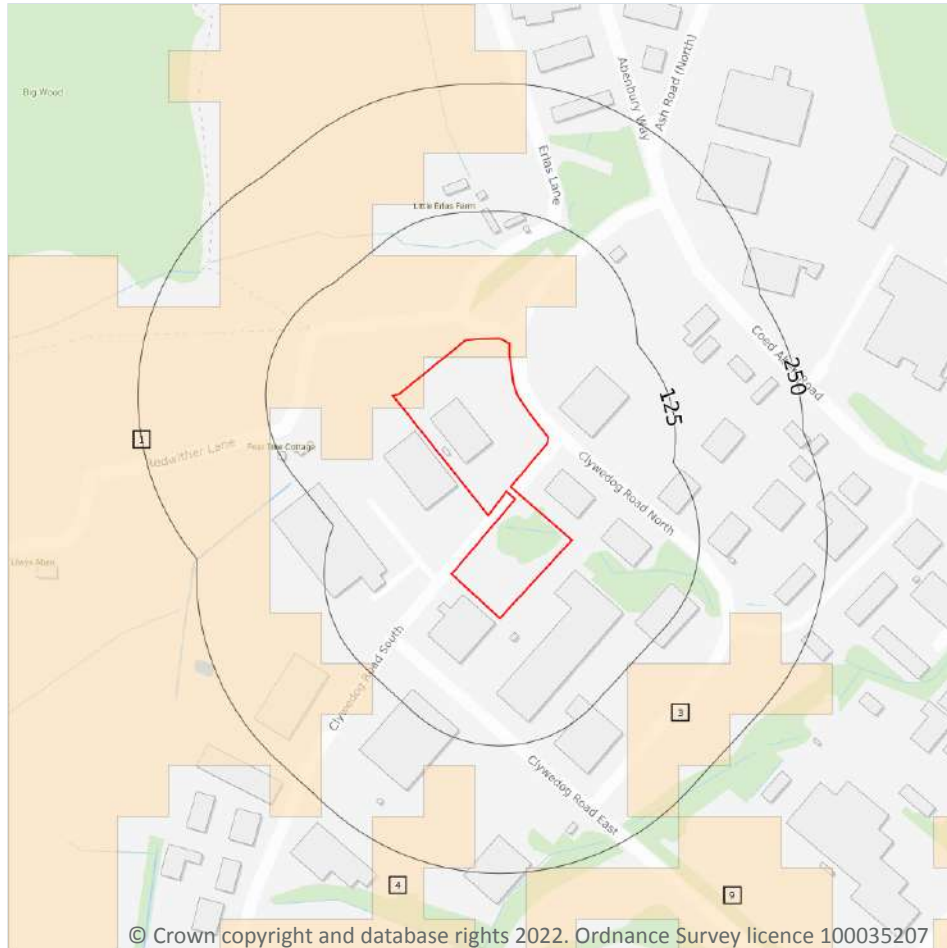
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Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.



12 Agricultural designations



- Site Outline
- Search buffers in metres (m)
- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m

4

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 76**

ID	Location	Classification	Description
1	On site	Grade 3a	Good to moderate quality agricultural land
3	122m SE	Grade 3a	Good to moderate quality agricultural land
4	146m S	Grade 3a	Good to moderate quality agricultural land



ID	Location	Classification	Description
9	246m S	Grade 3a	Good to moderate quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	0
---------------------	---

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	0
---------------------	---

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0
---------------------	---

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	0
---------------------	---

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m

0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m

0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m

0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

13.4 Limestone Pavement Orders

Records within 250m

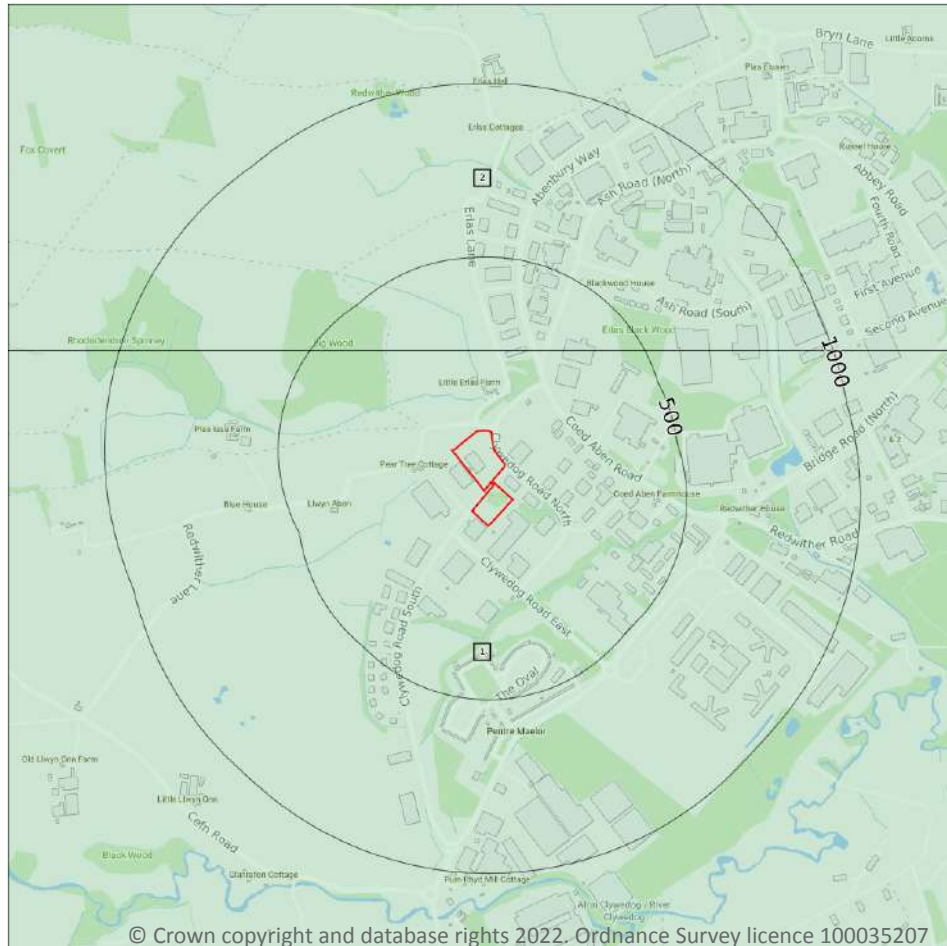
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Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.



14 Geology 1:10,000 scale - Availability



— Site Outline
Search buffers in metres (m)

- Full coverage
- Partial coverage
- No coverage

14.1 10k Availability

Records within 500m

2

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

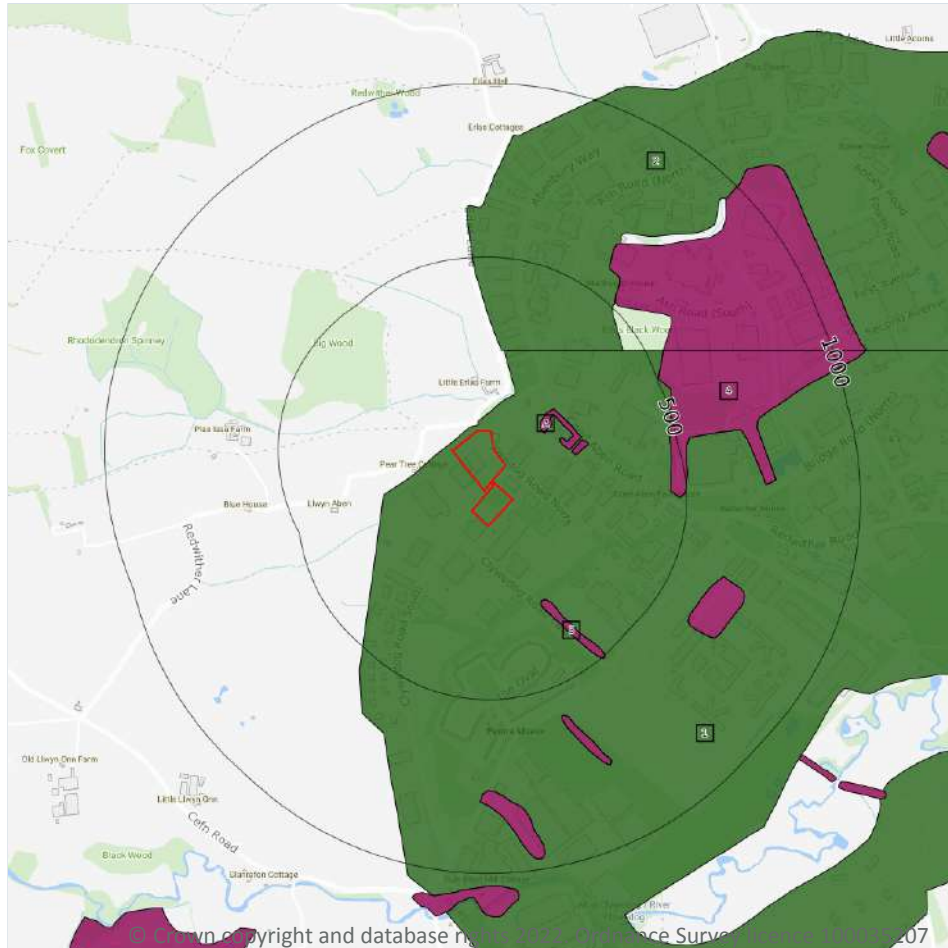
Features are displayed on the Geology 1:10,000 scale - Availability map on **page 79**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	No coverage	SJ34NE
2	232m N	Full	Full	Full	No coverage	SJ35SE

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Artificial and made ground



— Site Outline
Search buffers in metres (m)

- Reclaimed ground
- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

14.2 Artificial and made ground (10k)

Records within 500m

6

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 80**

ID	Location	LEX Code	Description	Rock description
1	On site	LSGR-UNKNOWN	Landscaped Ground (Undivided)	Unknown/unclassified Entry
A	141m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
A	196m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	235m N	LSGR-UNKNOWN	Landscaped Ground (Undivided)	Unknown/unclassified Entry

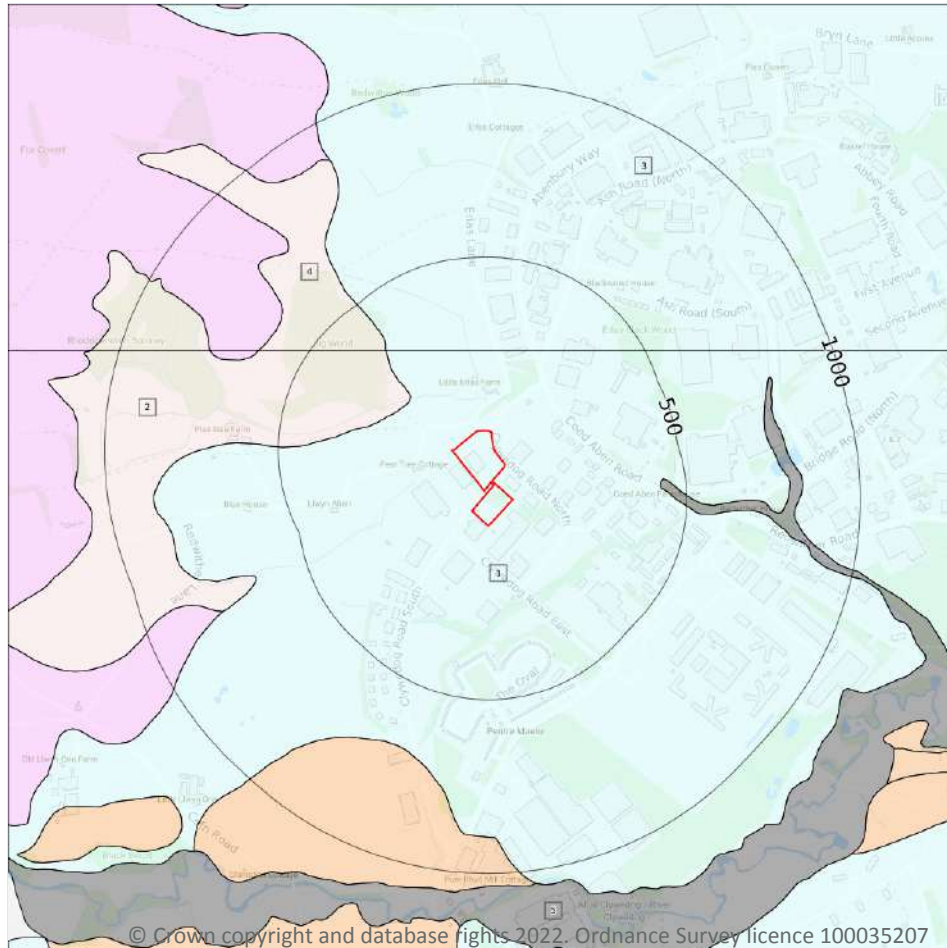


ID	Location	LEX Code	Description	Rock description
3	264m SE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	454m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m

5

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 82**

ID	Location	LEX Code	Description	Rock description
1	On site	TILL-DMTN	Till - Diamicton	Diamicton
2	186m NW	GLLD-C	Glaciolacustrine Deposits - Clay	Clay
3	232m N	TILL-DMTN	Till - Diamicton	Diamicton
4	346m NW	GLLD-C	Glaciolacustrine Deposits - Clay	Clay



ID	Location	LEX Code	Description	Rock description
5	426m E	ALV-C	Alluvium - Clay (unlithified Deposits Coding Scheme)	Clay

This data is sourced from the British Geological Survey.

14.4 Landslip (10k)

Records within 500m

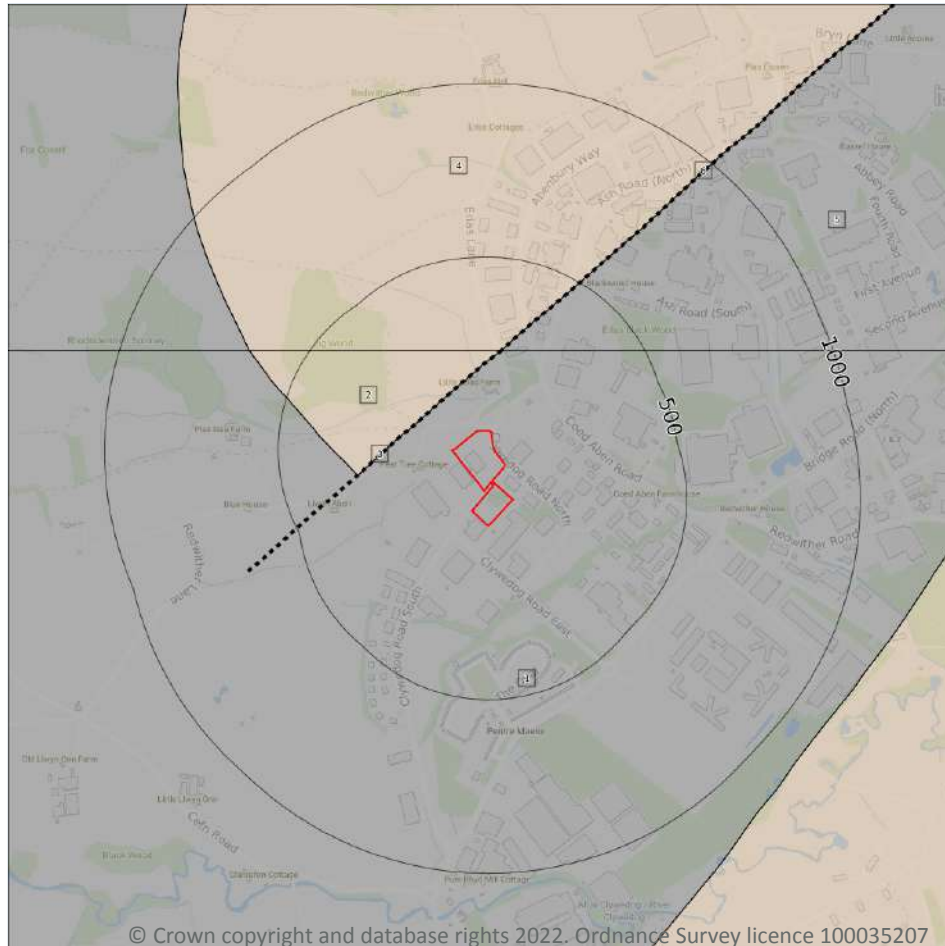
0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

..... Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m

4

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 84**

ID	Location	LEX Code	Description	Rock age
1	On site	SAL-CYCCM	Salop Formation - Sedimentary Rock Cycles, Coal Measure Type	Cisuralian Epoch - Westphalian D Sub-age
2	127m NW	KNSF-SDST	Kinnerton Sandstone Formation - Sandstone	Early Triassic Epoch
4	232m N	KNSF-SDST	Kinnerton Sandstone Formation - Sandstone	Early Triassic Epoch

ID	Location	LEX Code	Description	Rock age
5	235m N	SAL-MDST	Salop Formation - Mudstone	Cisuralian Epoch - Westphalian D Sub-age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m

2

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

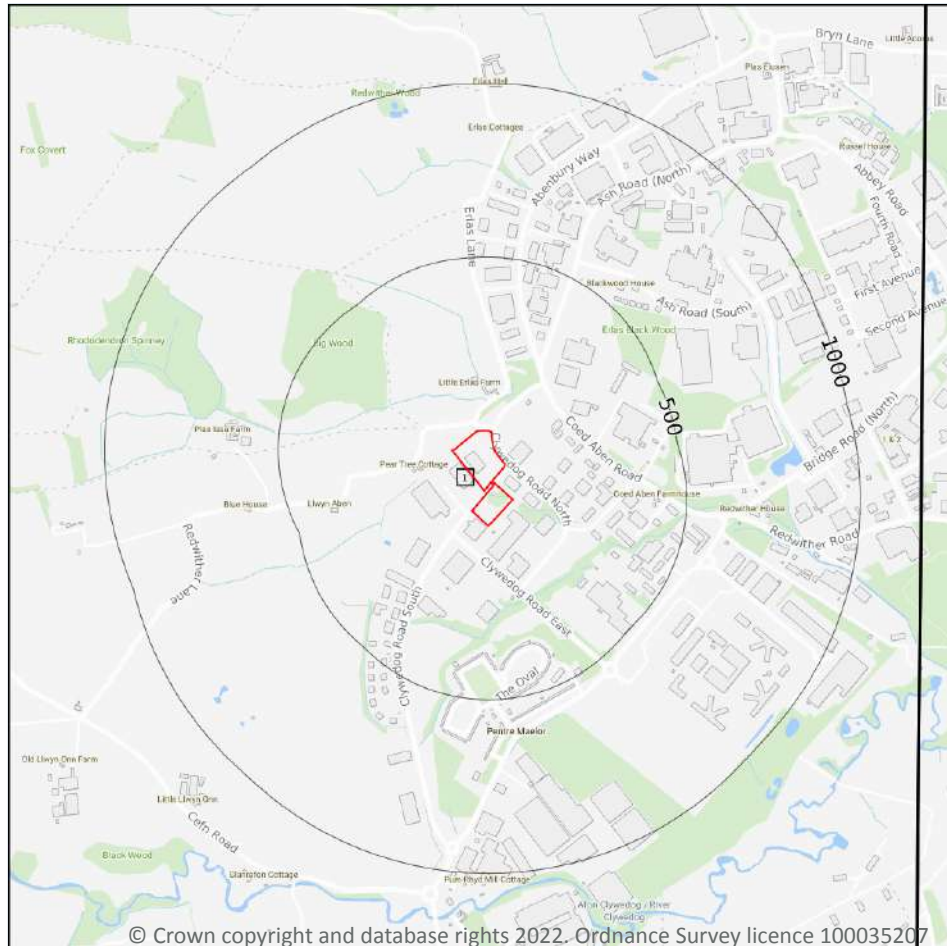
Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 84**

ID	Location	Category	Description
3	127m NW	FAULT	Normal fault, inferred
6	235m N	FAULT	Normal fault, inferred

This data is sourced from the British Geological Survey.



15 Geology 1:50,000 scale - Availability



— Site Outline
Search buffers in metres (m)

□ Geological map tile

15.1 50k Availability

Records within 500m

1

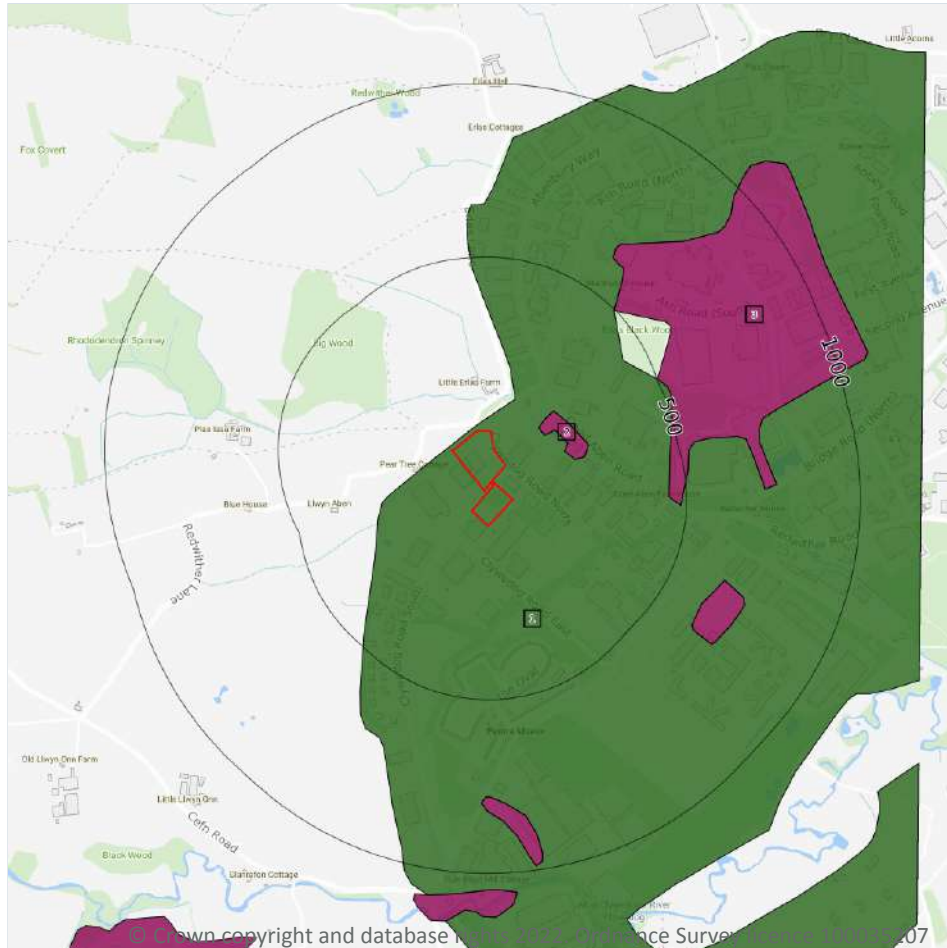
An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 86**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	Full	EW121_wrexham_v4

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground



- Site Outline
- Search buffers in metres (m)
- Made ground
 - Worked ground
 - Infilled ground
 - Disturbed ground
 - Landscaped ground

15.2 Artificial and made ground (50k)

Records within 500m

3

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 87**

ID	Location	LEX Code	Description	Rock description
1	On site	LSGR-ARTGR	LANDSCAPED GROUND (UNDIVIDED)	ARTIFICIALLY MODIFIED GROUND
2	136m E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	449m E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

This data is sourced from the British Geological Survey.



15.3 Artificial ground permeability (50k)

Records within 50m**1**

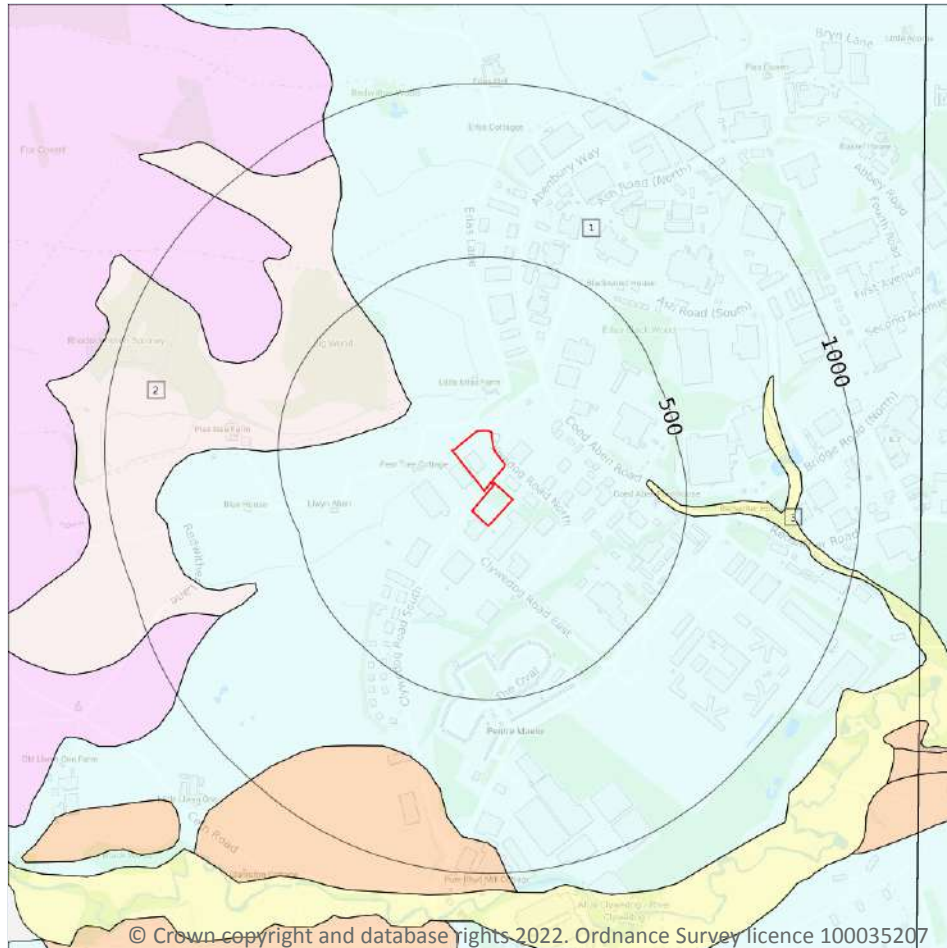
A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Mixed	Very High	Low

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m

3

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 89**

ID	Location	LEX Code	Description	Rock description
1	On site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
2	169m NW	GLLDD-XCZ	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN	CLAY AND SILT
3	386m E	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m

1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Mixed	High	Low

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m

0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

15.7 Landslip permeability (50k)

Records within 50m

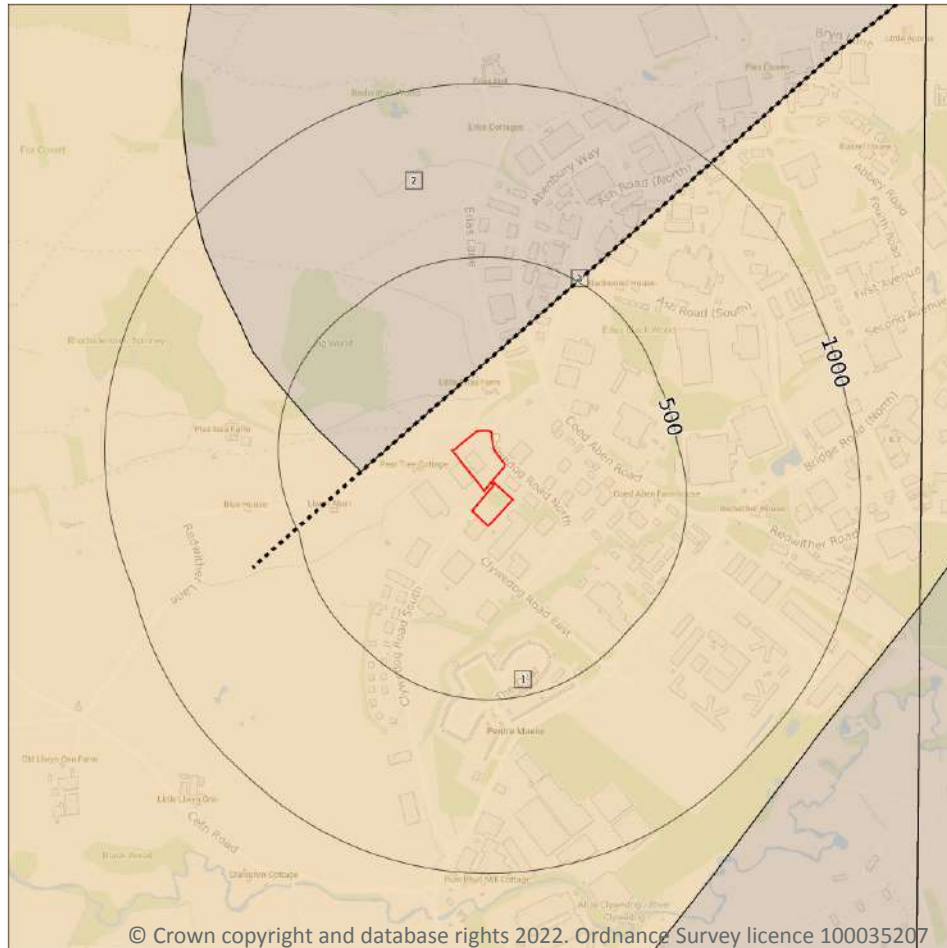
0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Bedrock



- Site Outline
- Search buffers in metres (m)
- Bedrock faults and other linear features (50k)
- Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m

2

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91**

ID	Location	LEX Code	Description	Rock age
1	On site	SAL-MDSC	SALOP FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE	WESTPHALIAN
2	127m NW	KNSF-SDST	KINNERTON SANDSTONE FORMATION - SANDSTONE	-

This data is sourced from the British Geological Survey.



15.9 Bedrock permeability (50k)

Records within 50m

1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Fracture	Moderate	Low

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m

1

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

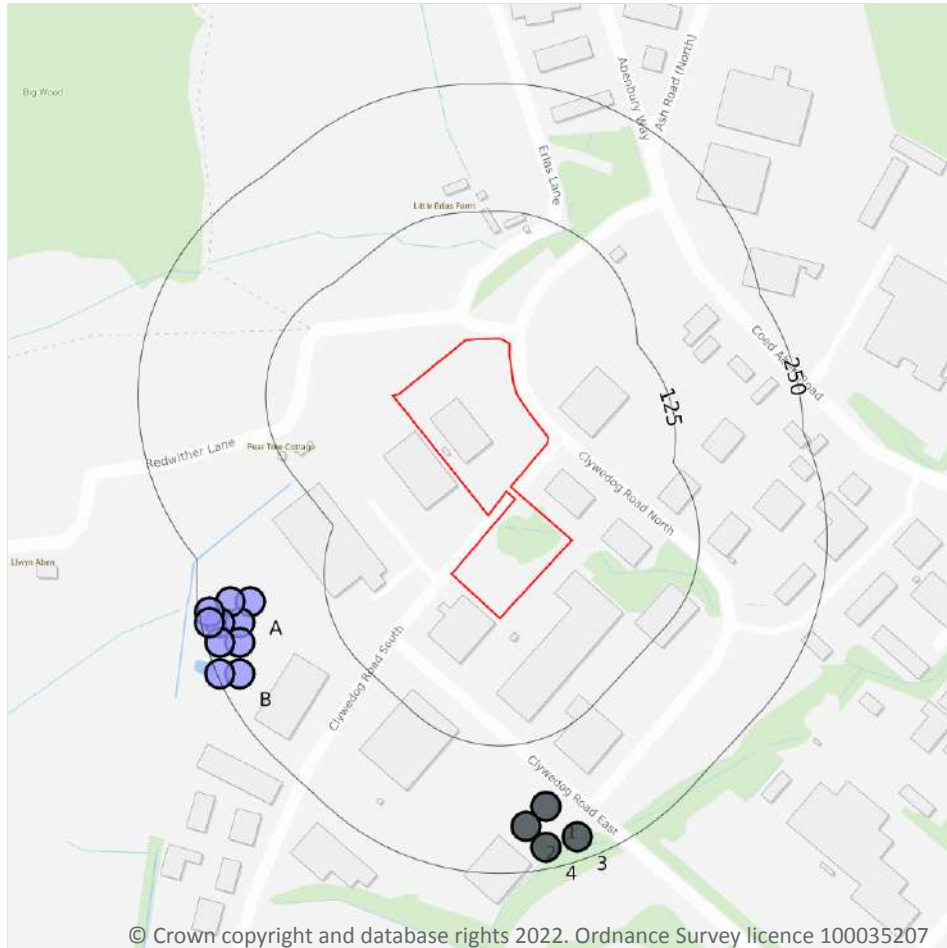
Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91**

ID	Location	Category	Description
3	127m NW	FAULT	Fault, inferred, displacement unknown

This data is sourced from the British Geological Survey.



16 Boreholes



- Site Outline
- Search buffers in metres (m)
- Confidential
 - 0 - 10m
 - 10 - 30m
 - 30m+
 - Unknown

16.1 BGS Boreholes

Records within 250m

14

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on **page 93**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	190m S	337320 349310	WELSH IND EST. PROPOSED SUBSTATION, TRIAL PIT.4	-	Y	N/A
A	199m W	337030 349510	WREXHAM IND EST. PLANS 3 & 4, TP7	3.0	N	153223

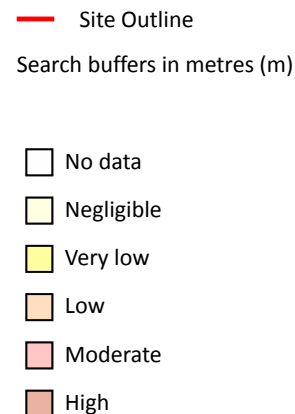
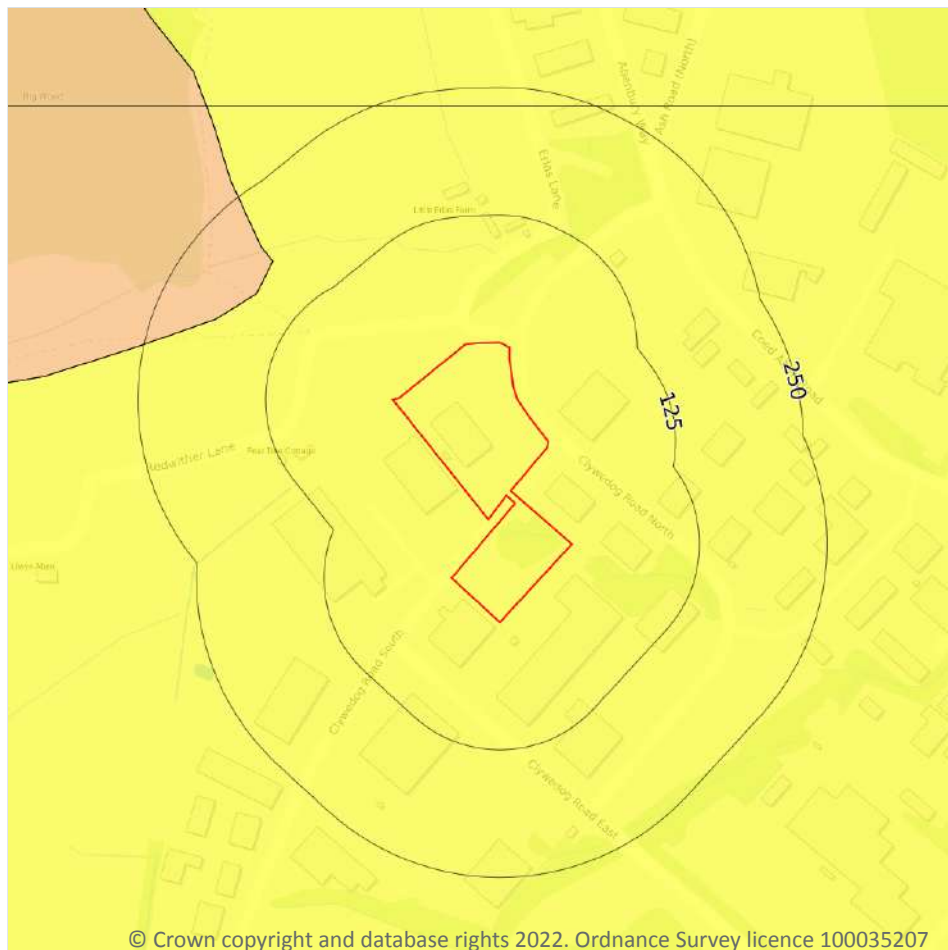


ID	Location	Grid reference	Name	Length	Confidential	Web link
2	206m S	337300 349290	WELSH IND EST. PROPOSED SUBSTATION, TRIAL PIT.1	-	Y	N/A
A	213m W	337020 349490	WREXHAM IND EST. PLANS 3 & 4, TP4	3.0	N	153220
A	218m W	337020 349470	WREXHAM IND EST. PLANS 3 & 4, TP 1	3.0	N	153217
A	219m W	337010 349510	WREXHAM IND EST. PLANS 3 & 4, TP8	3.0	N	153224
3	227m S	337350 349280	WELSH IND EST. PROPOSED SUBSTATION, TRIAL PIT.3	-	Y	N/A
4	229m S	337320 349270	WELSH IND EST. PROPOSED SUBSTATION, TRIAL PIT.2	-	Y	N/A
B	229m SW	337020 349440	WREXHAM INDUSTRIAL ESTATE (PLANS 3 & 4) 12	5.0	N	153228
A	232m W	337000 349490	WREXHAM IND EST. PLANS 3 & 4, TP5	3.0	N	153221
A	237m W	337000 349470	WREXHAM IND EST. PLANS 3 & 4, TP2	3.0	N	153218
A	240m W	336990 349500	WREXHAM INDUSTRIAL ESTATE (PLANS 3 & 4) 9	5.0	N	153225
A	242m W	336990 349490	WREXHAM IND EST. PLANS 3 & 4, TP6	3.0	N	153222
B	247m SW	337000 349440	WREXHAM INDUSTRIAL ESTATE (PLANS 3 & 4) 11	4.0	N	153227

This data is sourced from the British Geological Survey.



17 Natural ground subsidence - Shrink swell clays



17.1 Shrink swell clays

Records within 50m

1

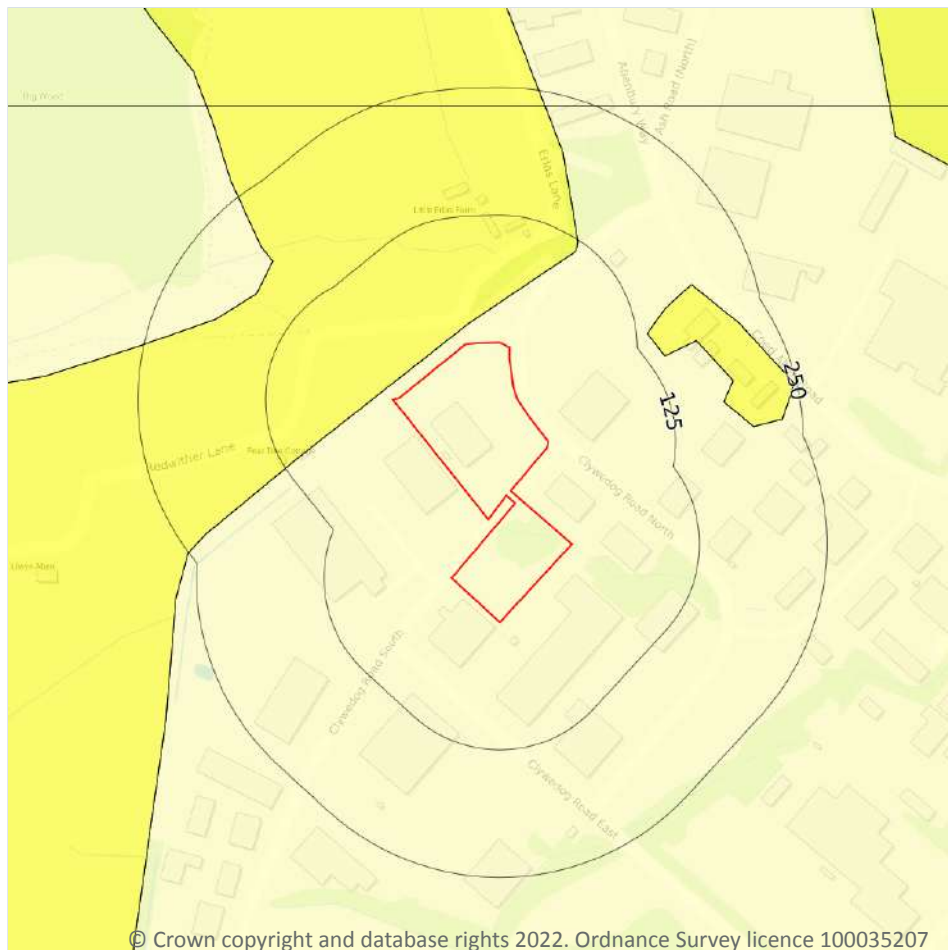
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 95**

Location	Hazard rating	Details
On site	Very low	Ground conditions predominantly low plasticity.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



- Site Outline
- Search buffers in metres (m)
- ☐ No data
 - ☐ Negligible
 - ☐ Very low
 - ☐ Low
 - ☐ Moderate
 - ☐ High

17.2 Running sands

Records within 50m

2

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 96**

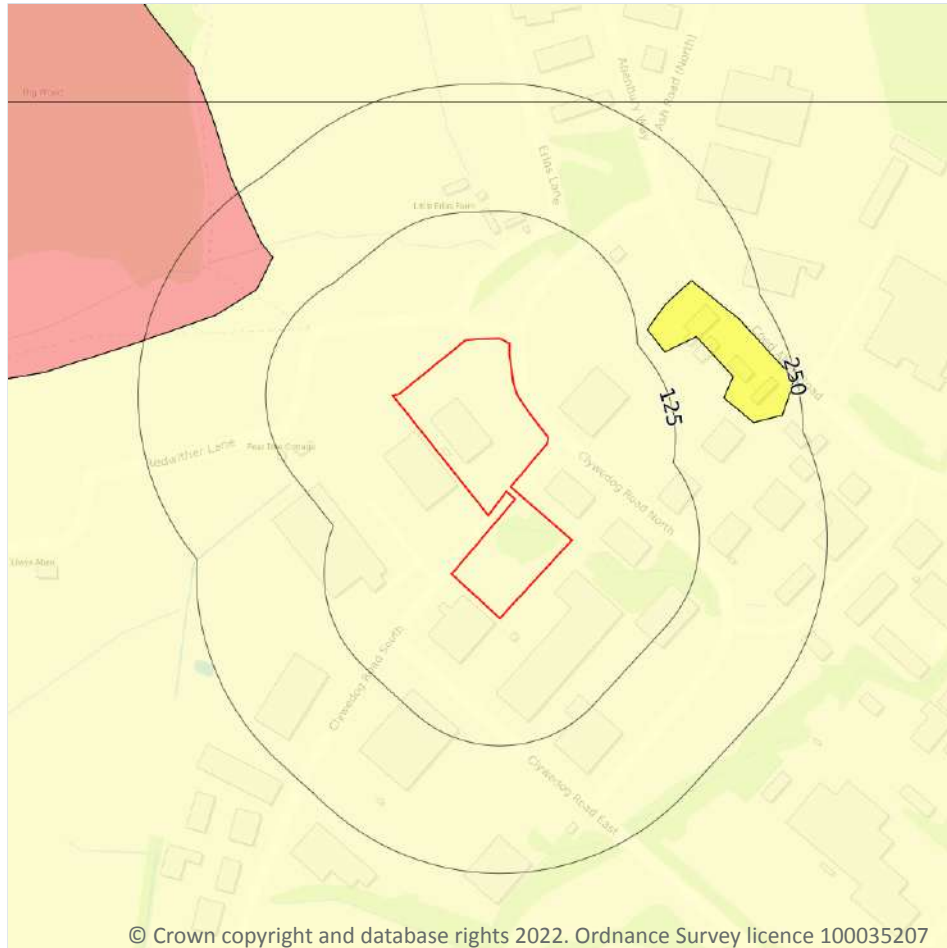
Location	Hazard rating	Details
On site	Negligible	Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.

Location	Hazard rating	Details
13m NW	Very low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Compressible deposits



— Site Outline
Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

17.3 Compressible deposits

Records within 50m

1

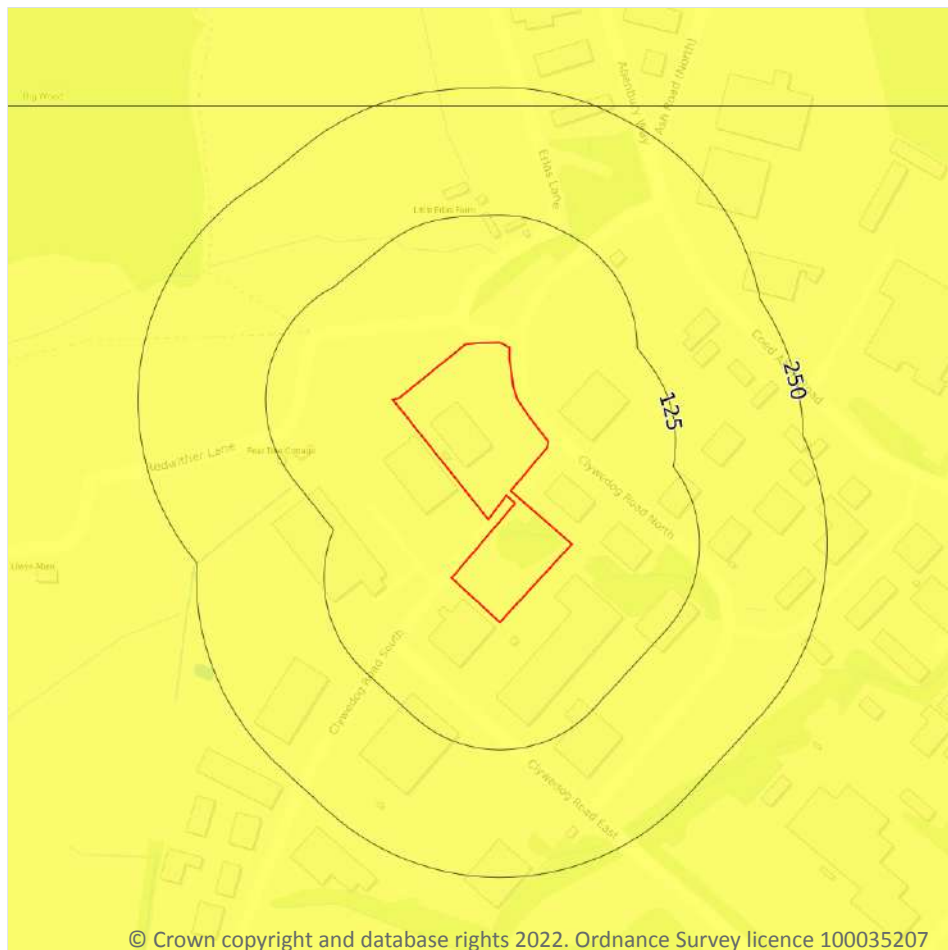
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 98**

Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



- Site Outline
- Search buffers in metres (m)
- ☐ No data
 - ☐ Negligible
 - ☒ Very low
 - ☐ Low
 - ☐ Moderate
 - ☐ High

17.4 Collapsible deposits

Records within 50m

1

The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

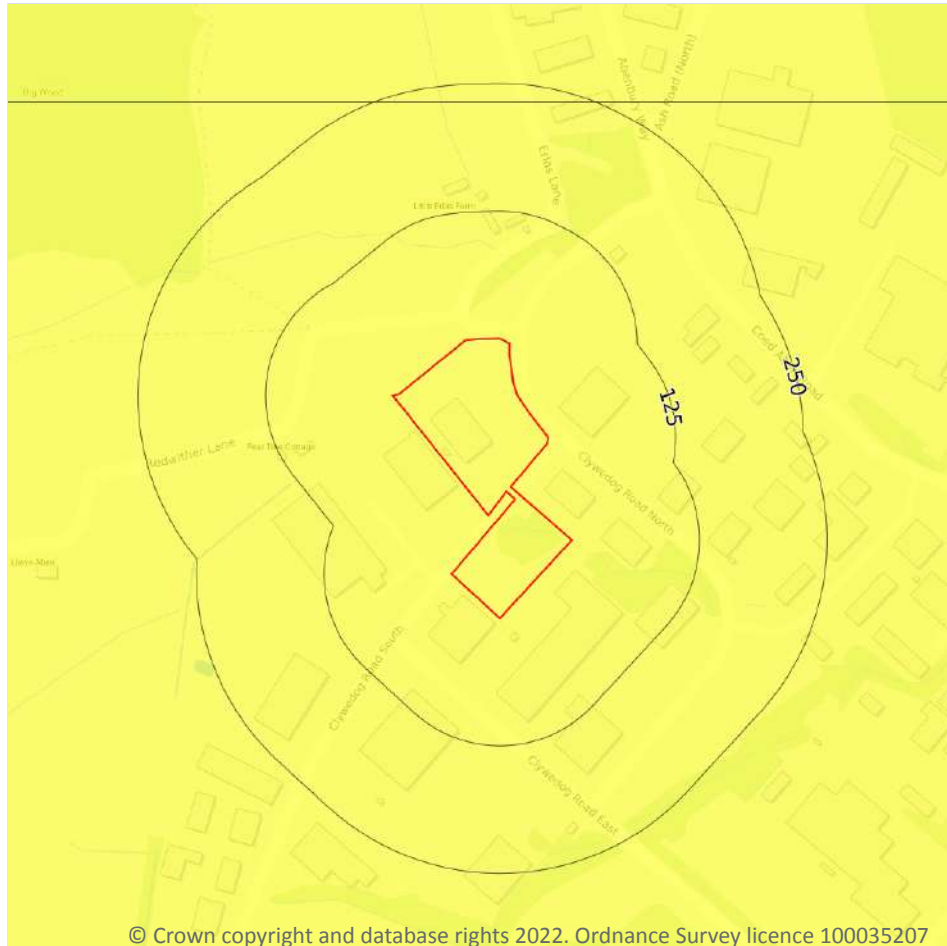
Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 99**

Location	Hazard rating	Details
On site	Very low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Landslides



- Site Outline
- Search buffers in metres (m)
- ☐ No data
 - ☐ Negligible
 - ☒ Very low
 - ☐ Low
 - ☐ Moderate
 - ☐ High

17.5 Landslides

Records within 50m

1

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

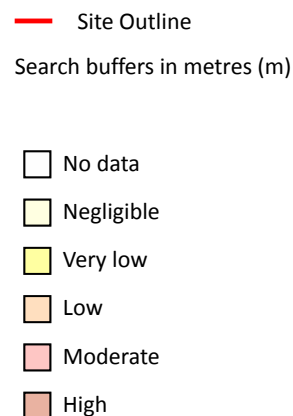
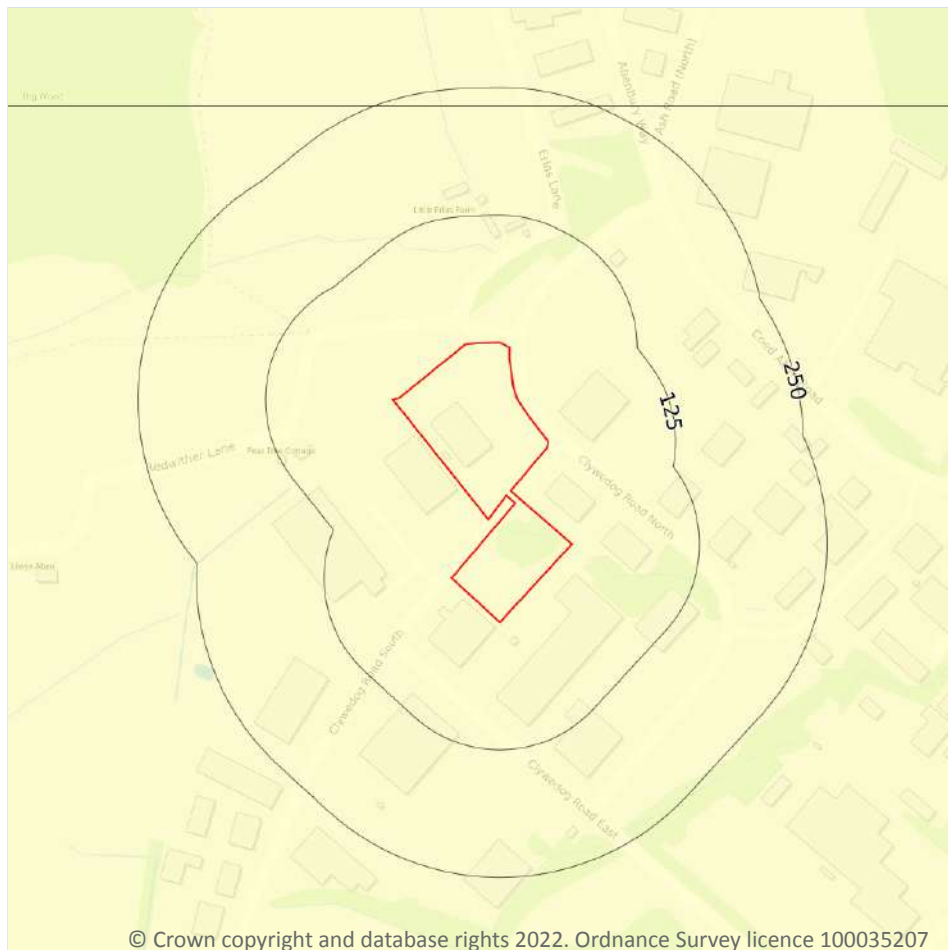
Features are displayed on the Natural ground subsidence - Landslides map on **page 100**

Location	Hazard rating	Details
On site	Very low	Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Ground dissolution of soluble rocks



17.6 Ground dissolution of soluble rocks

Records within 50m

1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 101**

Location	Hazard rating	Details
On site	Negligible	Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.

This data is sourced from the British Geological Survey.



18 Mining, ground workings and natural cavities



- Site Outline
- Search buffers in metres (m)
- Natural cavities (Area)
- Natural cavities (Point)
- BritPits
- Surface ground workings
- Underground workings
- Historical Mineral Planning Areas
- Mining Cavities
- Non Coal Mining
 - Sporadic underground mining of restricted extent possible
 - Localised small scale underground mining possible
 - Small scale mining possible
 - Underground mining known or likely within or in close proximity
 - Underground mining known within or in very close proximity

18.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

18.2 BritPits

Records within 500m

0

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m

22

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining, ground workings and natural cavities map on **page 103**

ID	Location	Land Use	Year of mapping	Mapping scale
1	On site	Unspecified Pit	1977	1:10000
2	On site	Unspecified Heap	1964	1:10560
3	28m NE	Unspecified Pit	1977	1:10000
4	64m S	Unspecified Heap	1964	1:10560
5	76m SE	Unspecified Heap	1964	1:10560
A	83m NE	Ponds	1938	1:10560
A	83m NE	Ponds	1872	1:10560
A	89m NE	Pond	1949	1:10560
A	89m NE	Pond	1898	1:10560
6	104m E	Unspecified Heap	1964	1:10560
B	125m SW	Unspecified Heap	1964	1:10560
7	132m W	Unspecified Heap	1964	1:10560
8	132m E	Unspecified Heap	1977	1:10000
9	143m S	Unspecified Heap	1964	1:10560
C	150m NE	Unspecified Pit	1977	1:10000
C	150m NE	Unspecified Pit	1964	1:10560
B	157m SW	Ponds	1872	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
B	158m SW	Ponds	1938	1:10560
10	197m SW	Unspecified Heap	1964	1:10560
11	246m E	Unspecified Heap	1977	1:10000
D	247m NE	Ponds	1872	1:10560
D	250m NE	Ponds	1938	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m

0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This is data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m

0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m

0

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

This data is sourced from the British Geological Survey.



18.7 Mining cavities

Records within 1000m

0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

18.8 JPB mining areas

Records on site

0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site

1

Areas which could be affected by past, current or future coal mining.

Location	Details
On site	The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.

This data is sourced from the Coal Authority.

18.10 Brine areas

Records on site

0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.11 Gypsum areas

Records on site	0
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Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0
-----------------	---

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

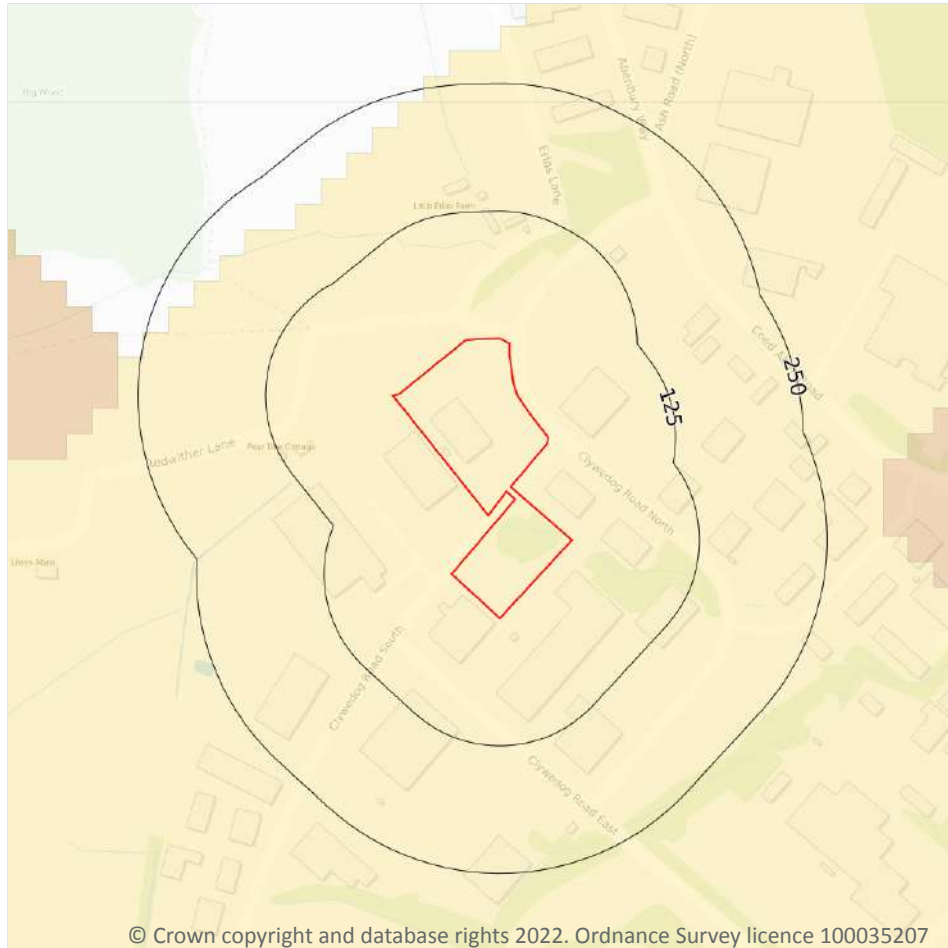
18.13 Clay mining

Records on site	0
-----------------	---

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Radon



— Site Outline
Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

19.1 Radon

Records on site

1

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 108**

Location	Estimated properties affected	Radon Protection Measures required
On site	Between 1% and 3%	None

This data is sourced from the British Geological Survey and Public Health England.



20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m

2

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km². In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km²; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

This data is sourced from the British Geological Survey.

20.2 BGS Estimated Urban Soil Chemistry

Records within 50m

0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km²).

This data is sourced from the British Geological Survey.

20.3 BGS Measured Urban Soil Chemistry

Records within 50m

0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km².

This data is sourced from the British Geological Survey.



21 Railway infrastructure and projects

21.1 Underground railways (London)

Records within 250m	0
---------------------	---

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

21.2 Underground railways (Non-London)

Records within 250m	0
---------------------	---

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

21.3 Railway tunnels

Records within 250m	0
---------------------	---

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m	0
---------------------	---

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

This data is sourced from Ordnance Survey/Groundsure.

21.5 Royal Mail tunnels

Records within 250m	0
---------------------	---

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.



This data is sourced from Groundsure/the Postal Museum.

21.6 Historical railways

Records within 250m	0
---------------------	---

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m	0
---------------------	---

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m	0
---------------------	---

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m	0
---------------------	---

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m	0
---------------------	---

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 Ltd.



Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference>.

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9XN

Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1872

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1872
Revised 1872
Edition N/A
Copyright N/A
Levelled N/A



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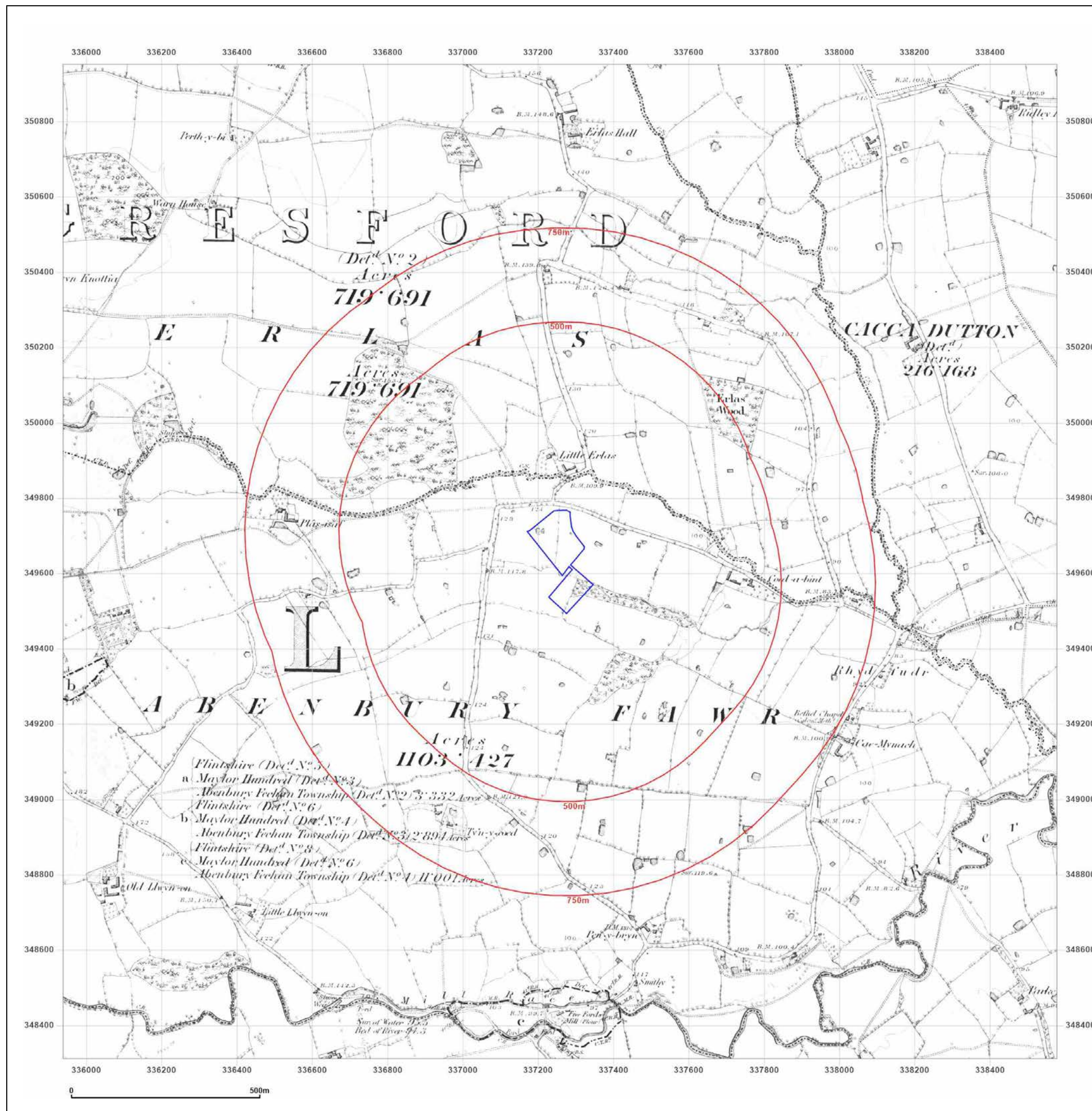


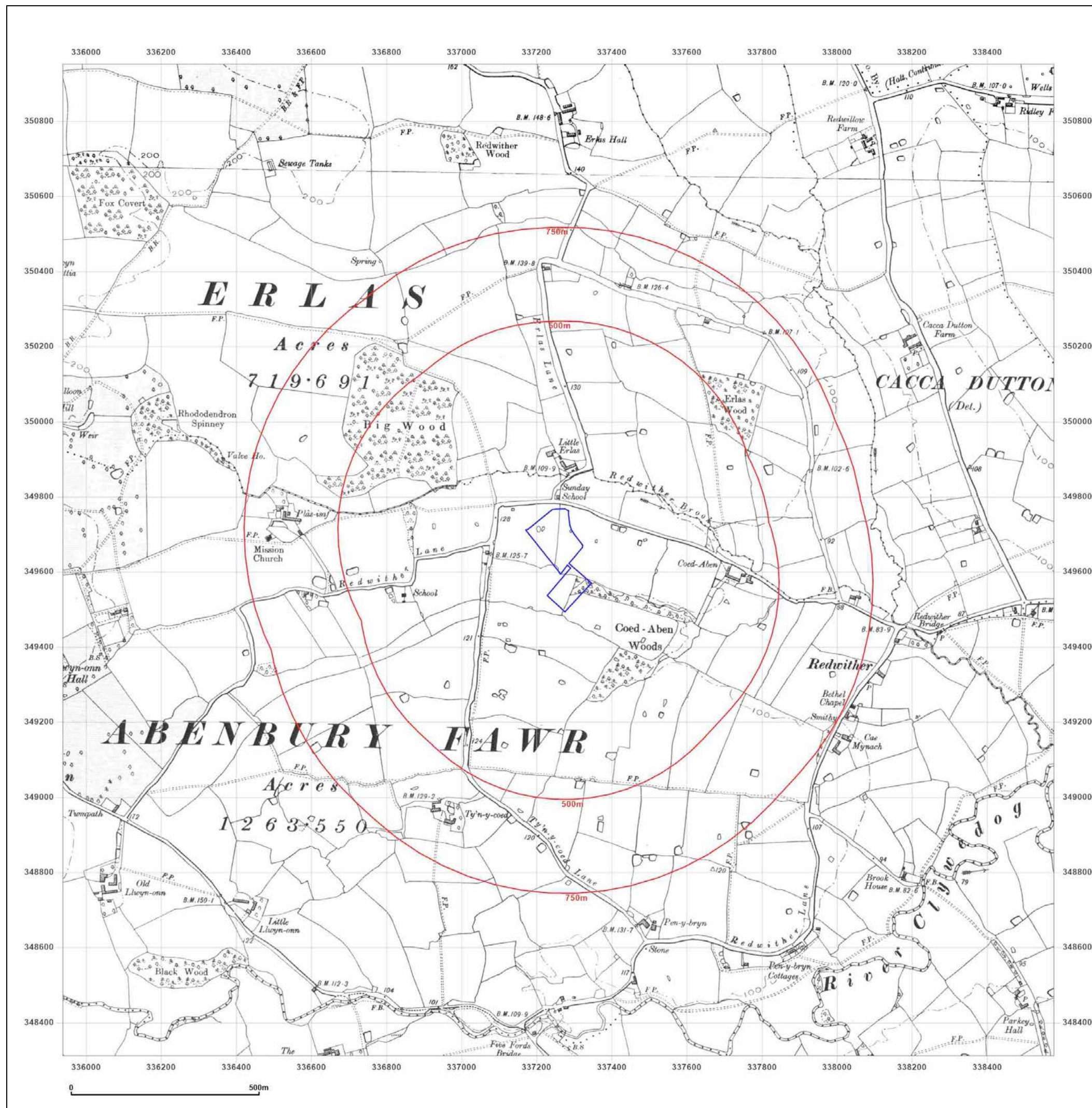
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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1909-1914

Scale: 1:10,560

Printed at: 1:10,560



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Surveyed 1872
Revised 1909
Edition N/A
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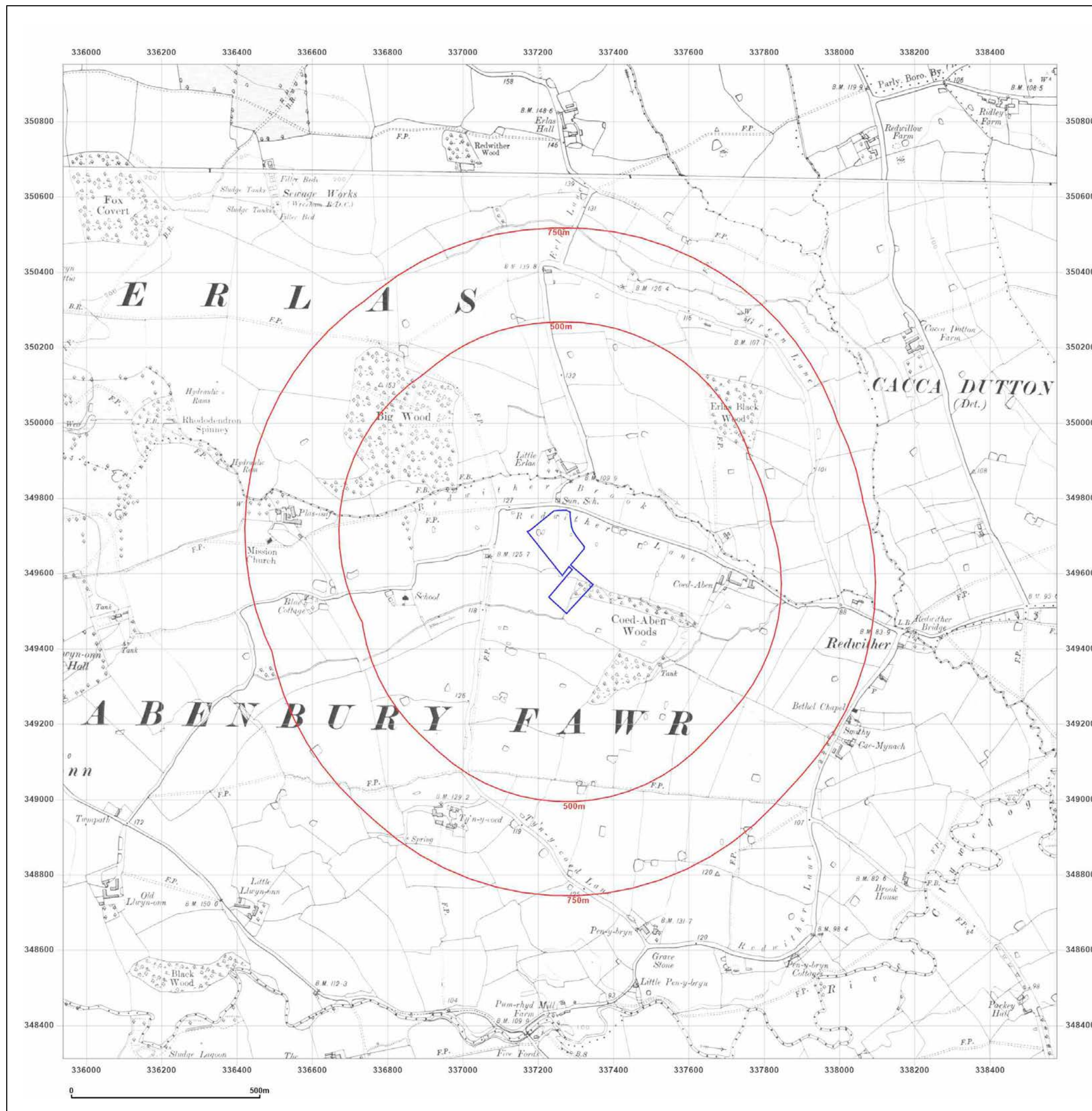


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1872
Revised 1938
Edition 1938
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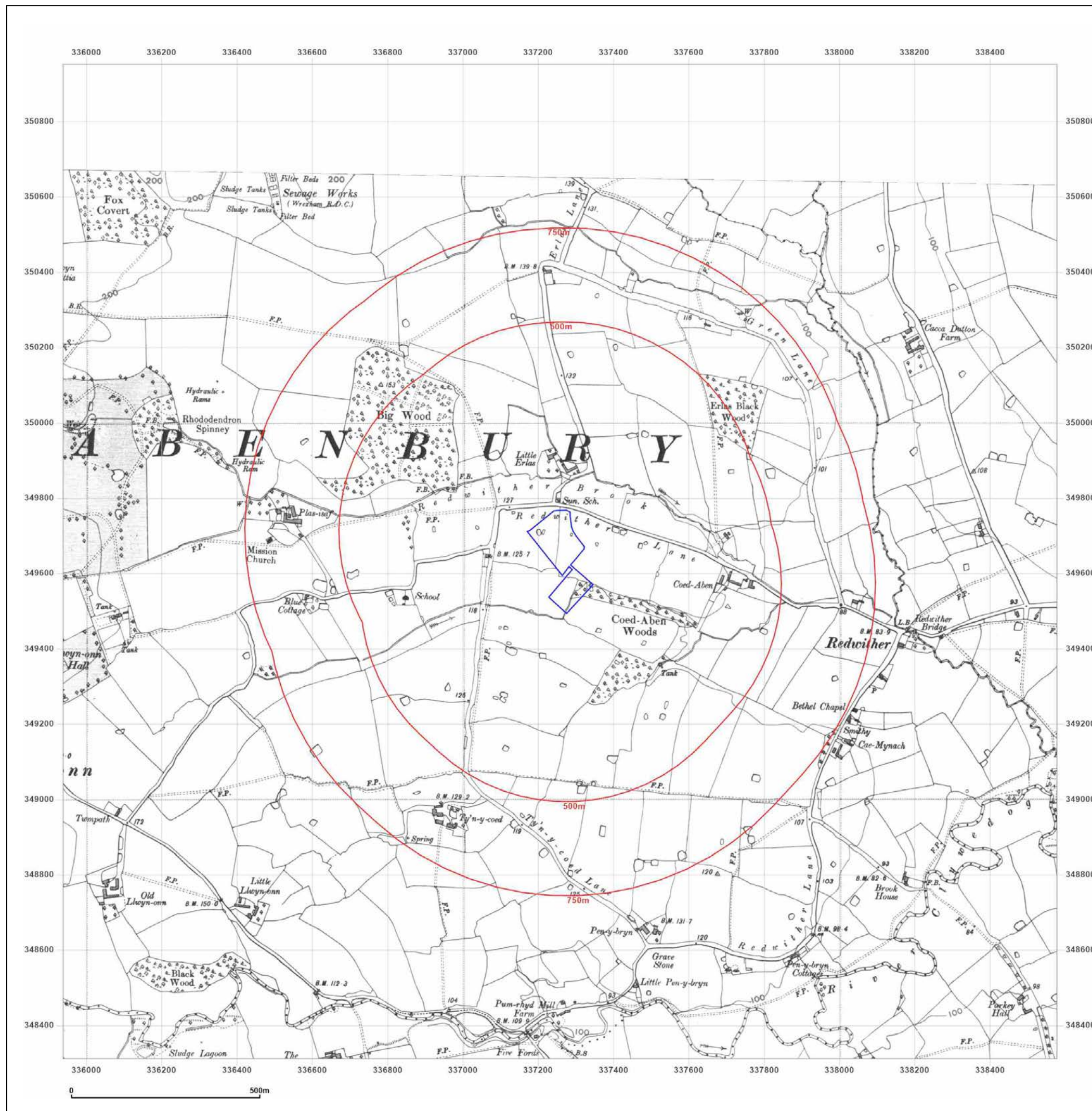


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1949

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1871
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Surveyed 1872
Revised 1949
Edition N/A
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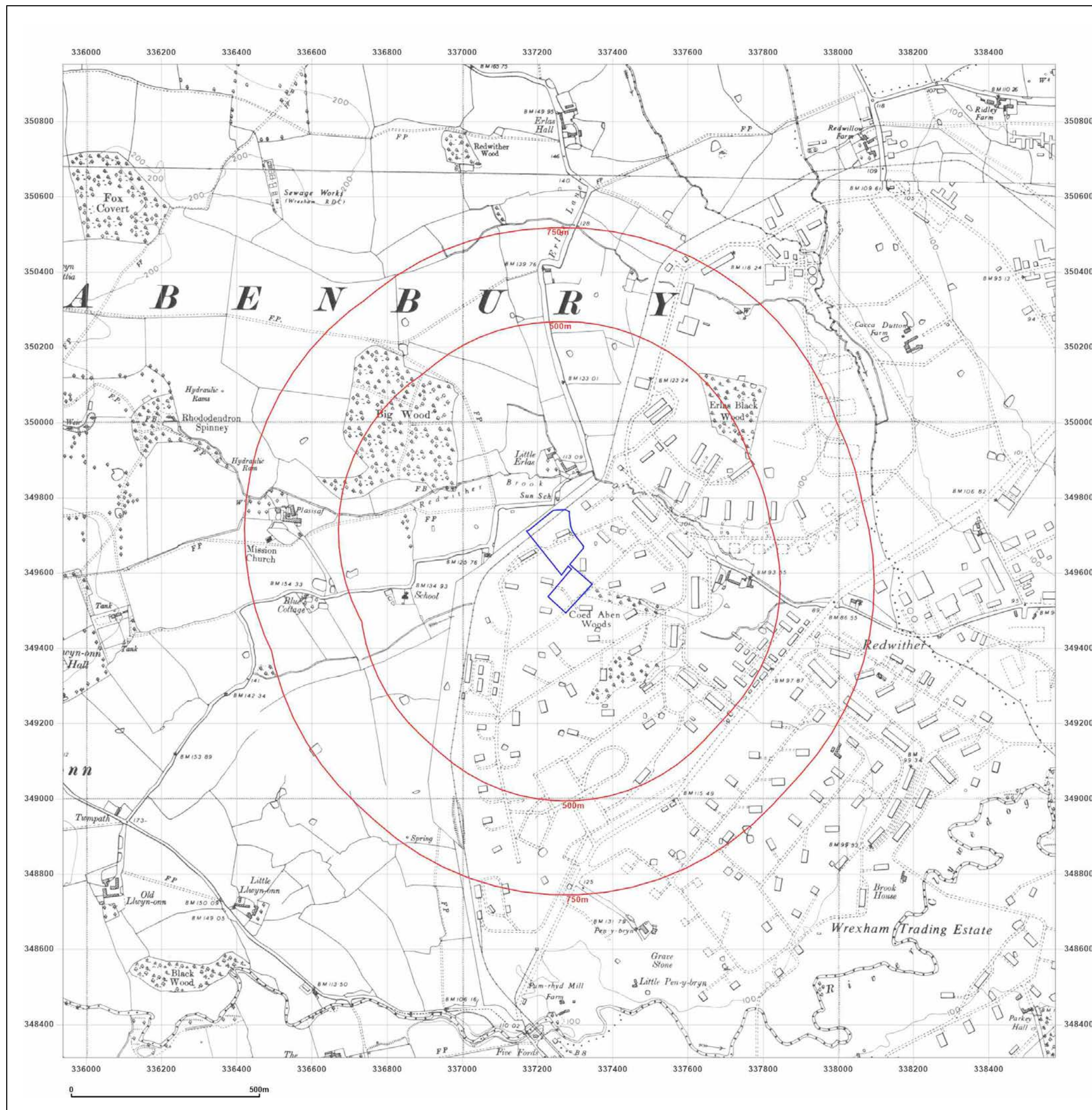


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: Provisional

Map date: 1960-1964

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1874
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Surveyed 1964
Revised 1964
Edition N/A
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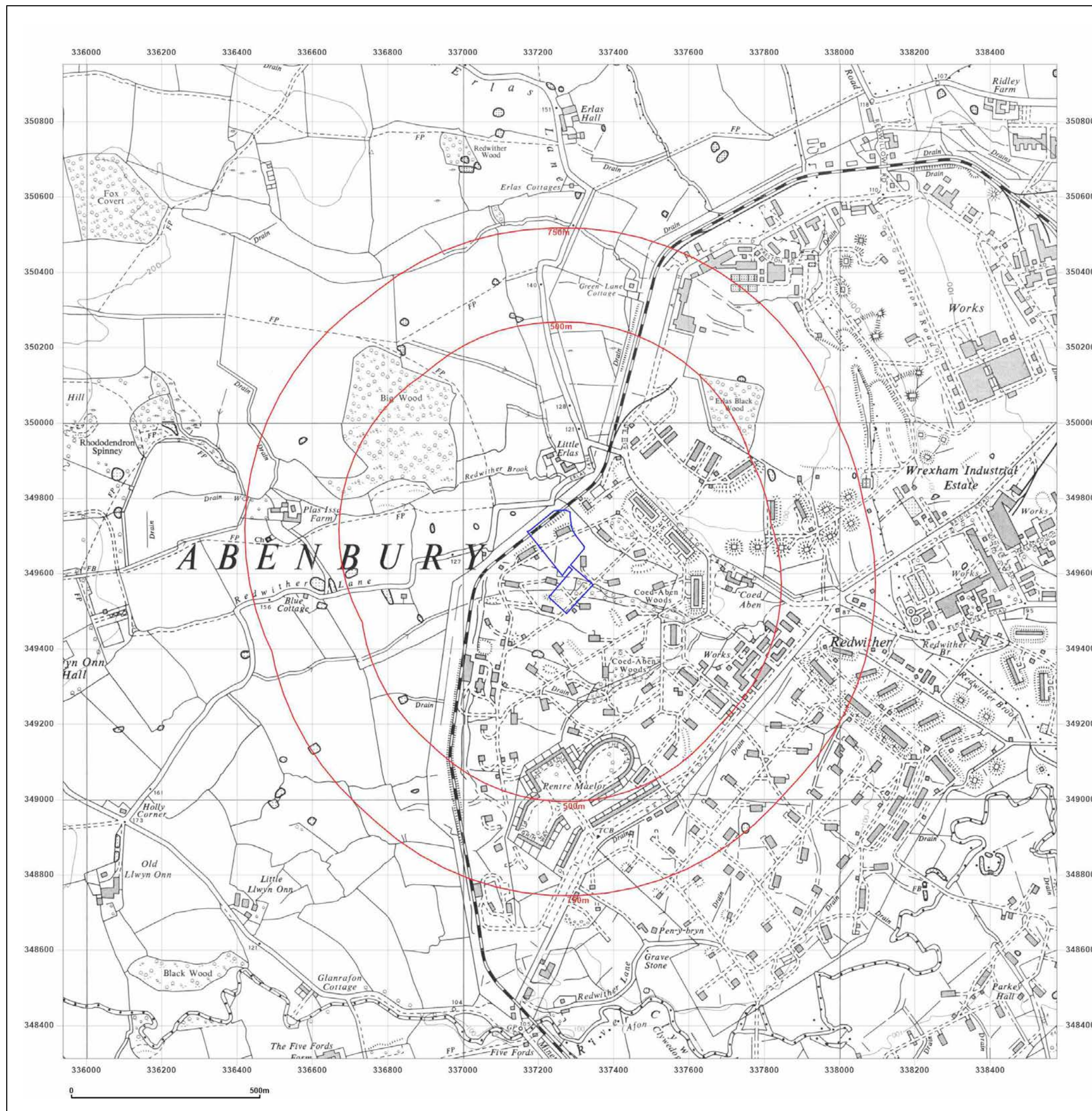


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: Provisional

Map date: 1968

Scale: 1:10,560

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Surveyed 1968
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Edition N/A
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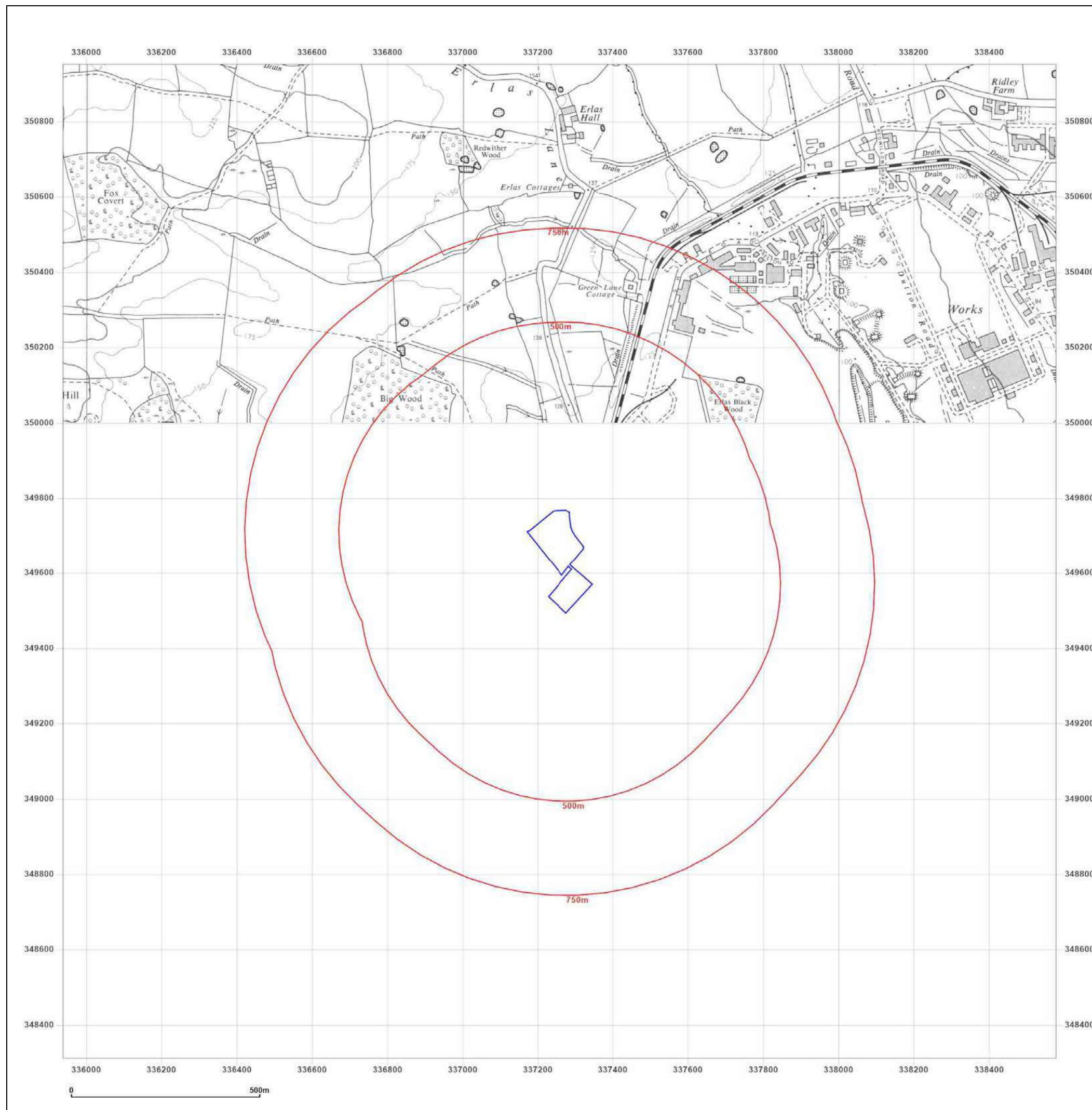


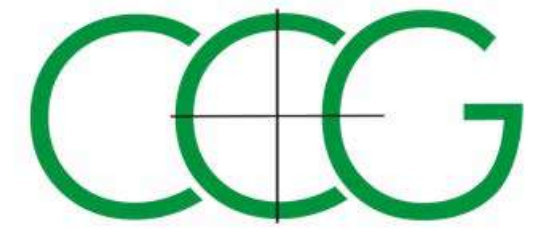
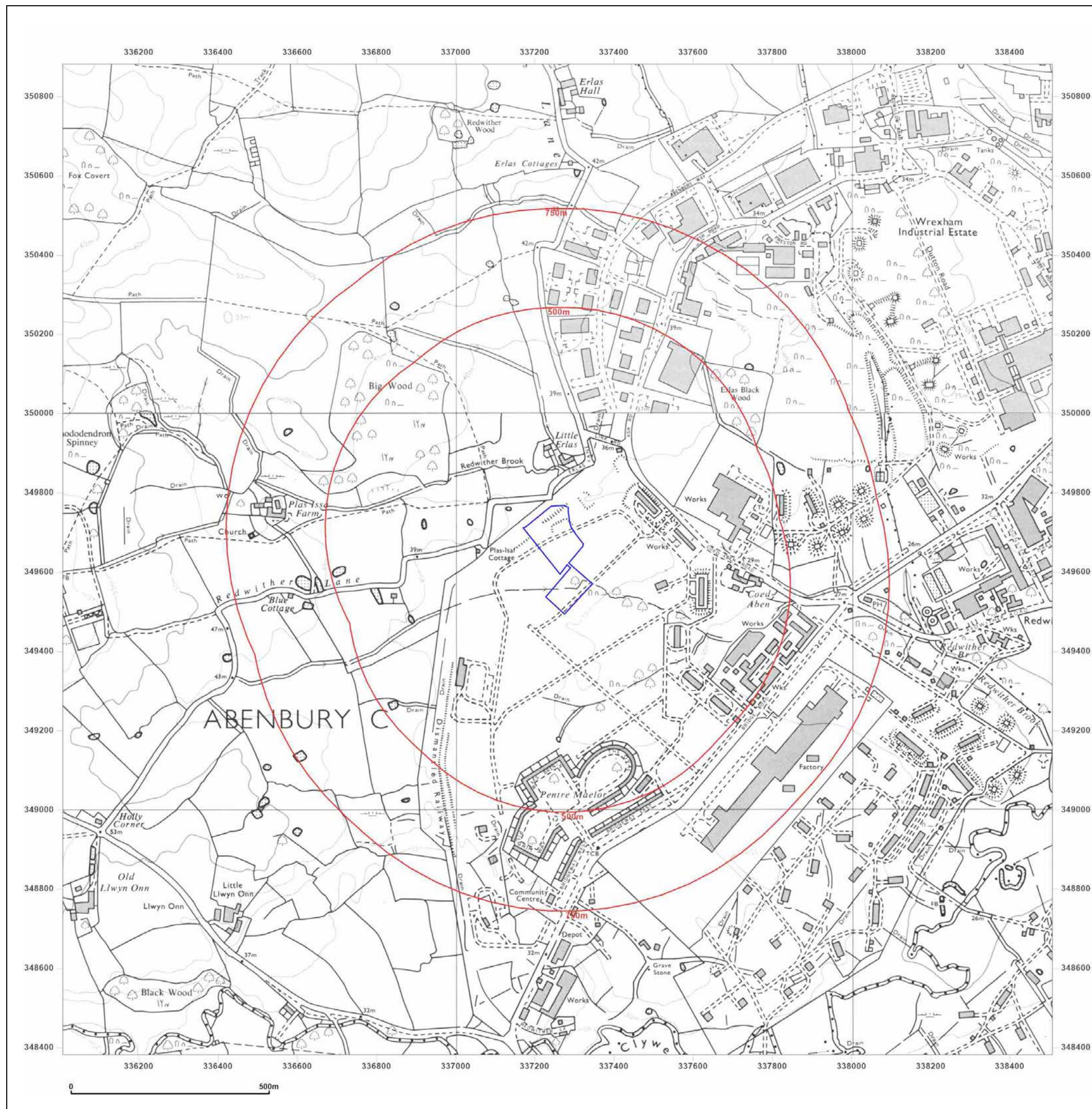
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1979-1982

Scale: 1:10,000

Printed at: 1:10,000



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Surveyed 1975
Revised 1978
Edition N/A
Copyright 1979
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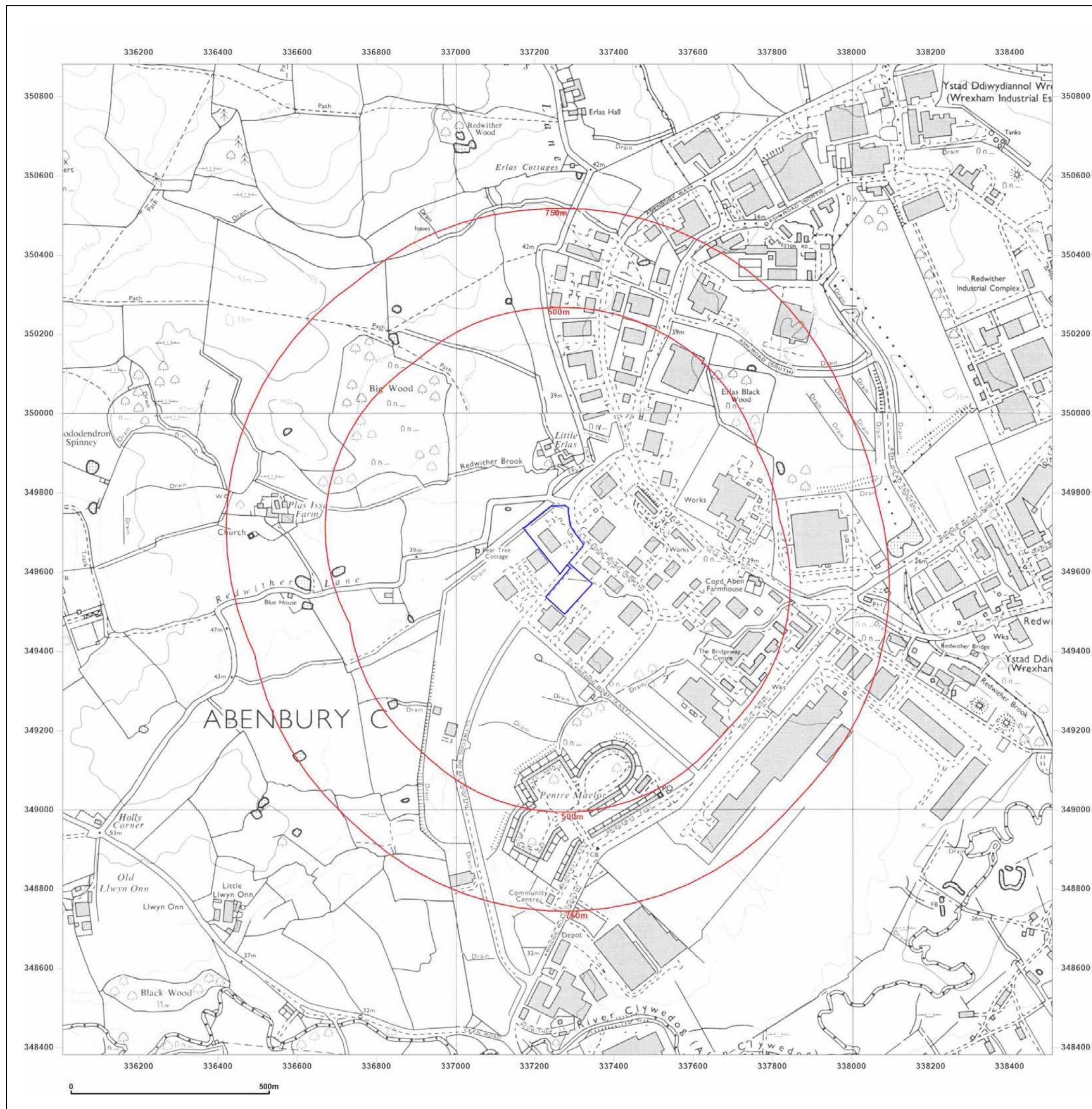


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Grid Ref: 337257, 349631

Map Name: National Grid

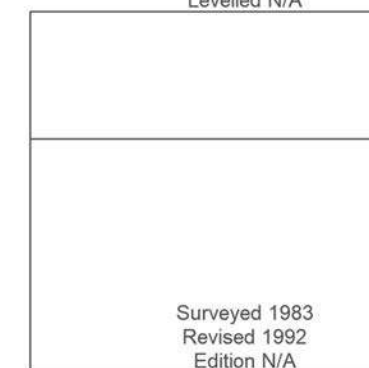
Map date: 1992

Scale: 1:10,000

Printed at: 1:10,000



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Edition N/A
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Surveyed 1983
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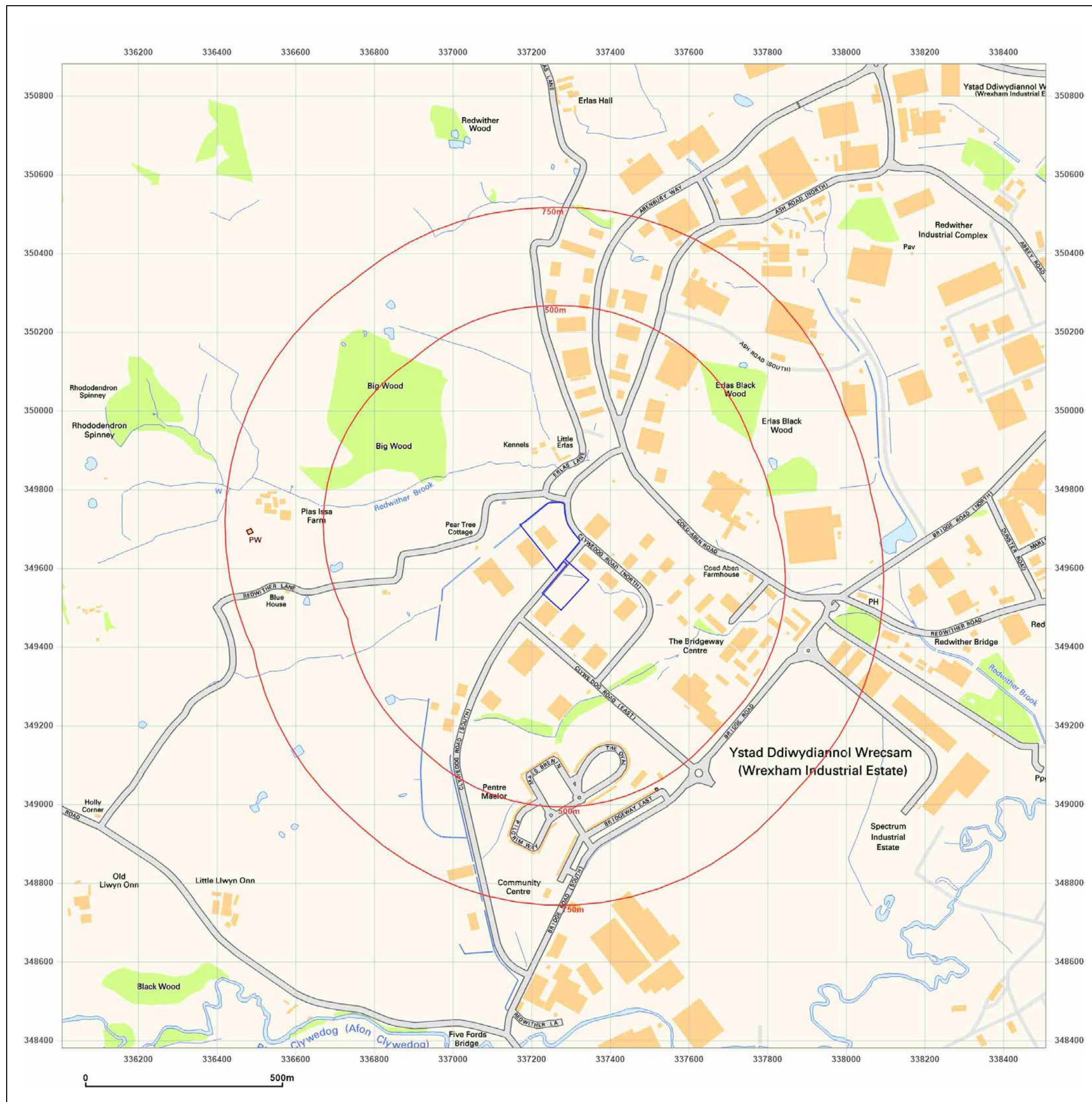


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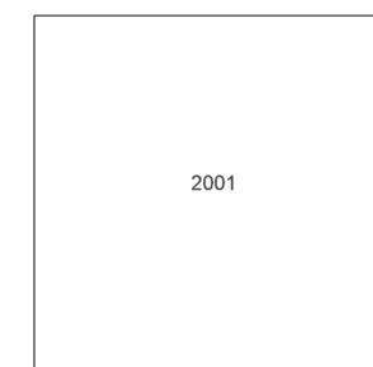
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

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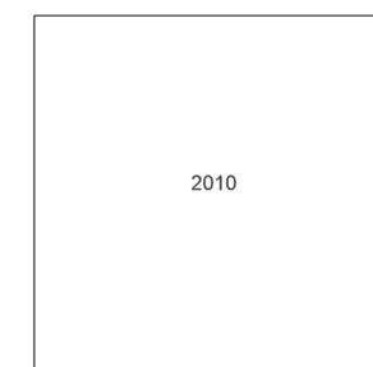
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



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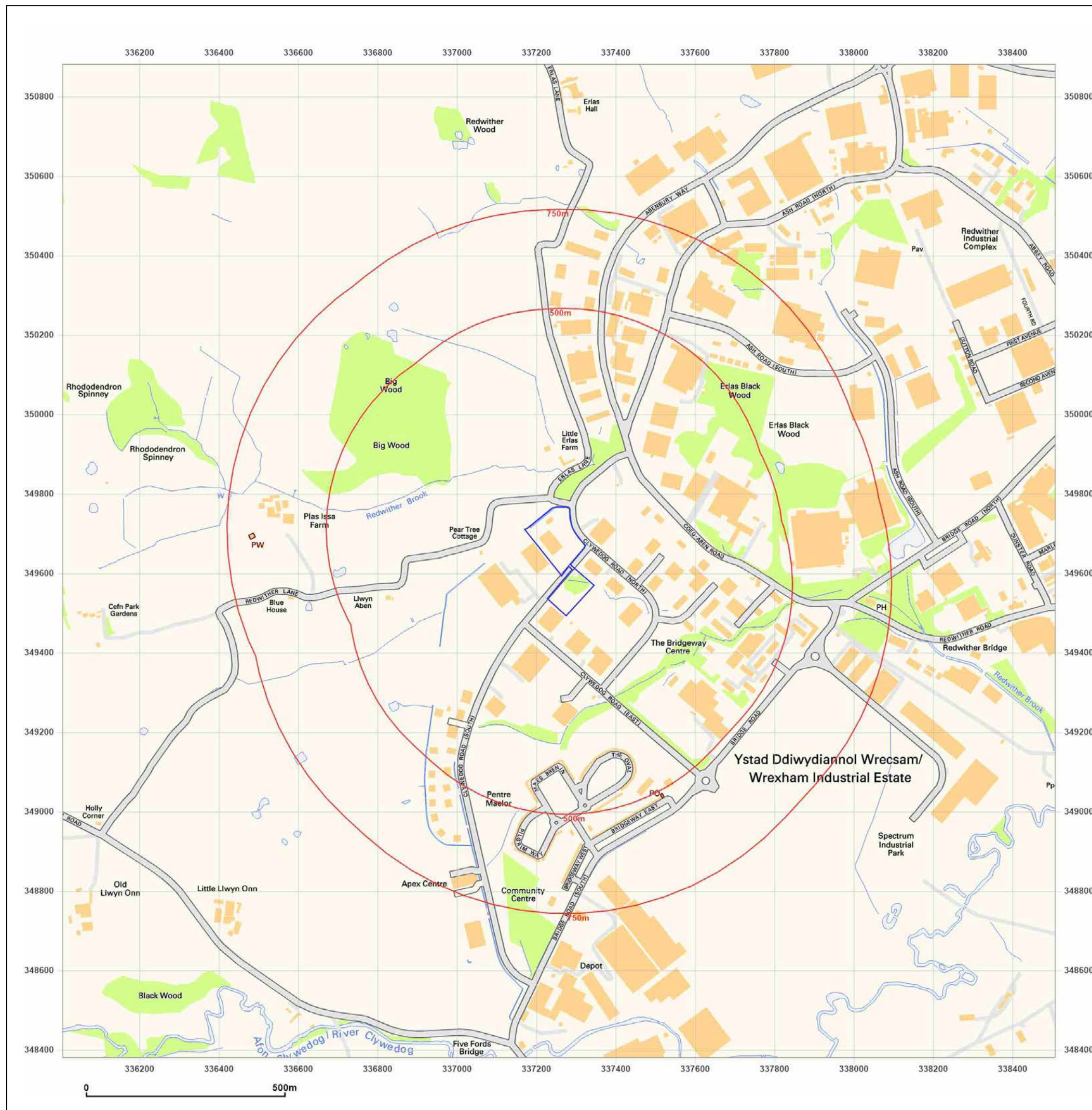


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
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Map Name: National Grid

Map date: 2022

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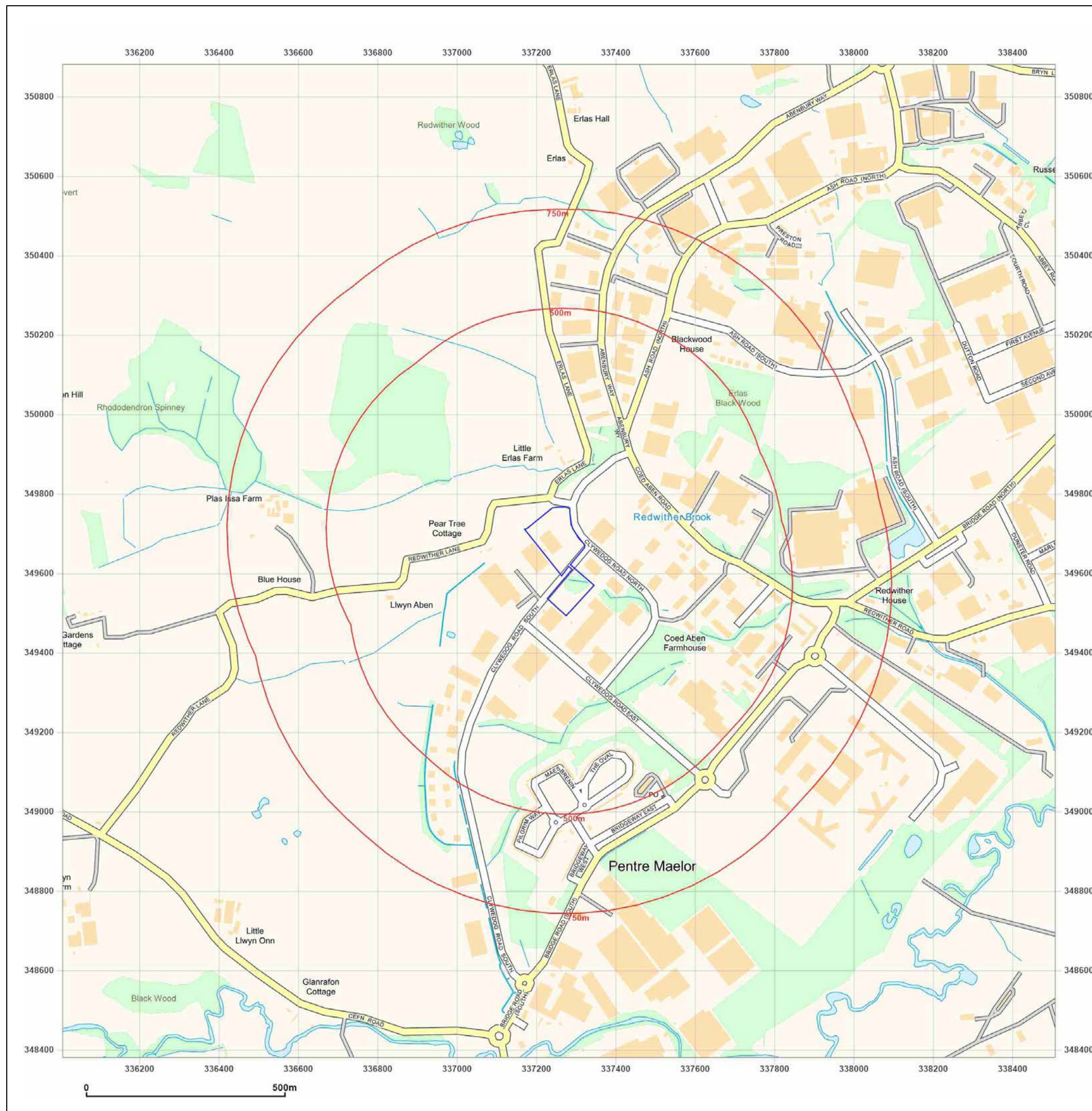


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1899

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1899
Revised 1899
Edition N/A
Copyright N/A
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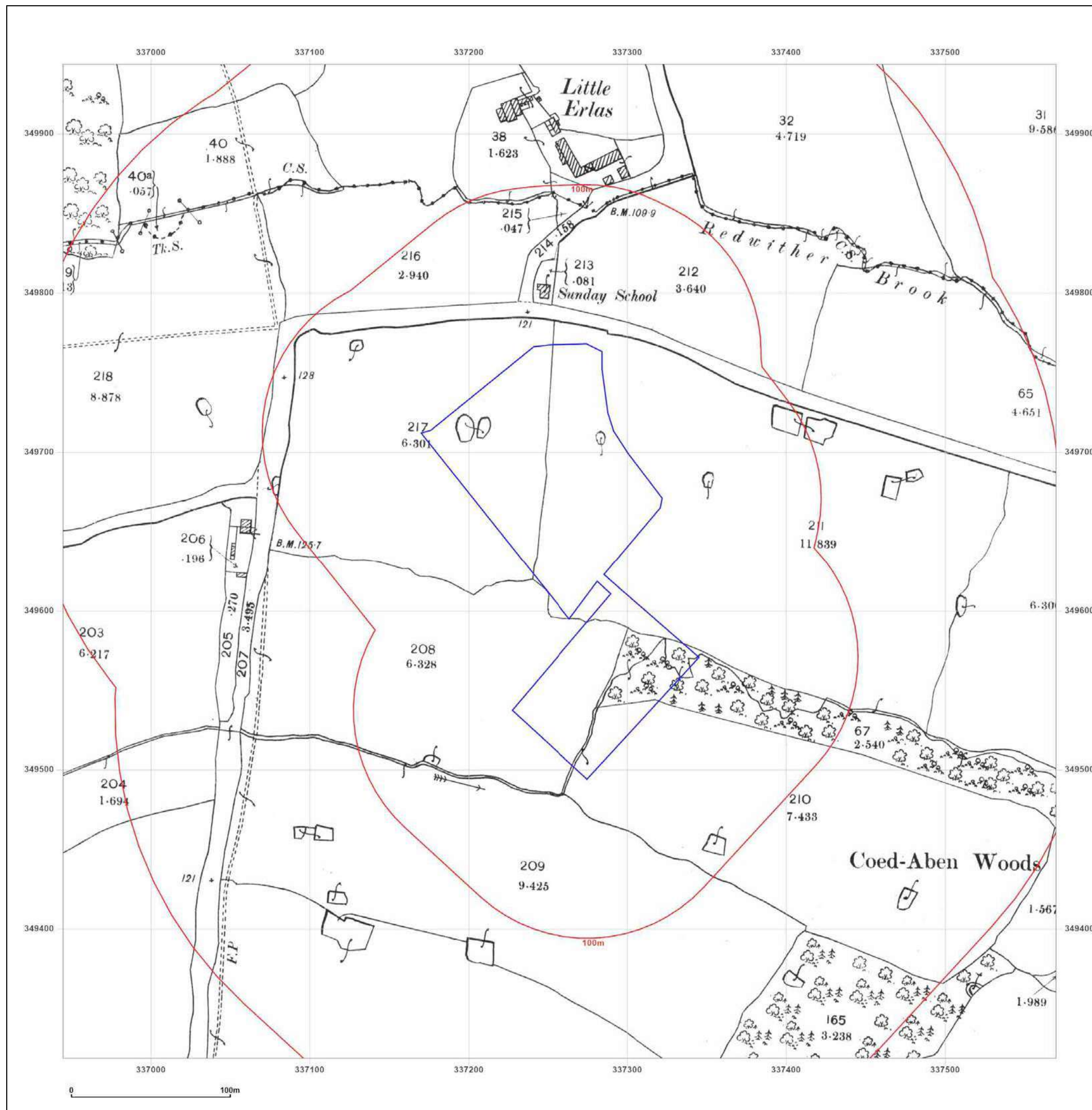


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: County Series

Map date: 1912

Scale: 1:2,500

Printed at: 1:2,500



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Edition N/A
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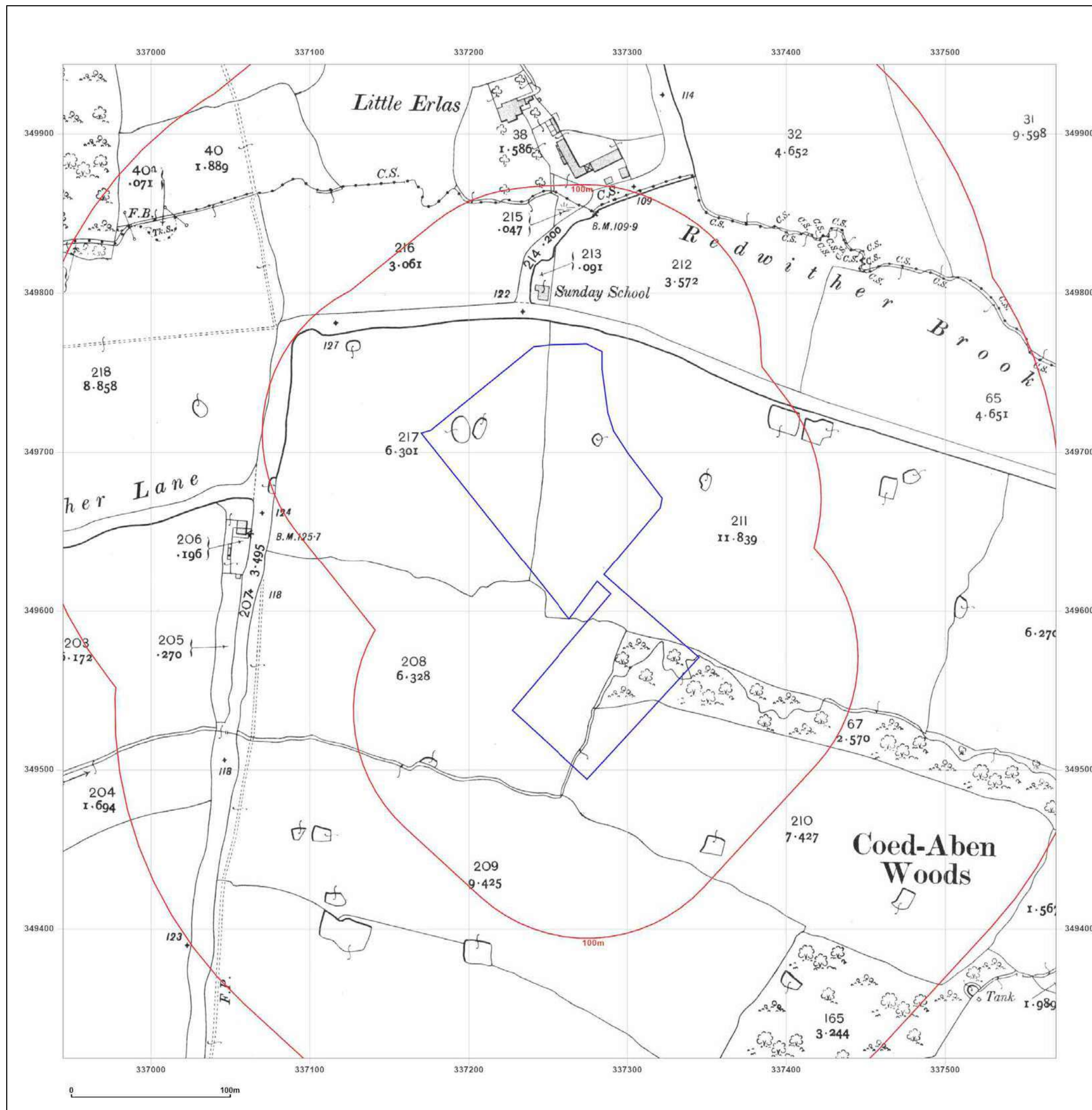


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1961

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1960
Revised 1960
Edition N/A
Copyright 1961
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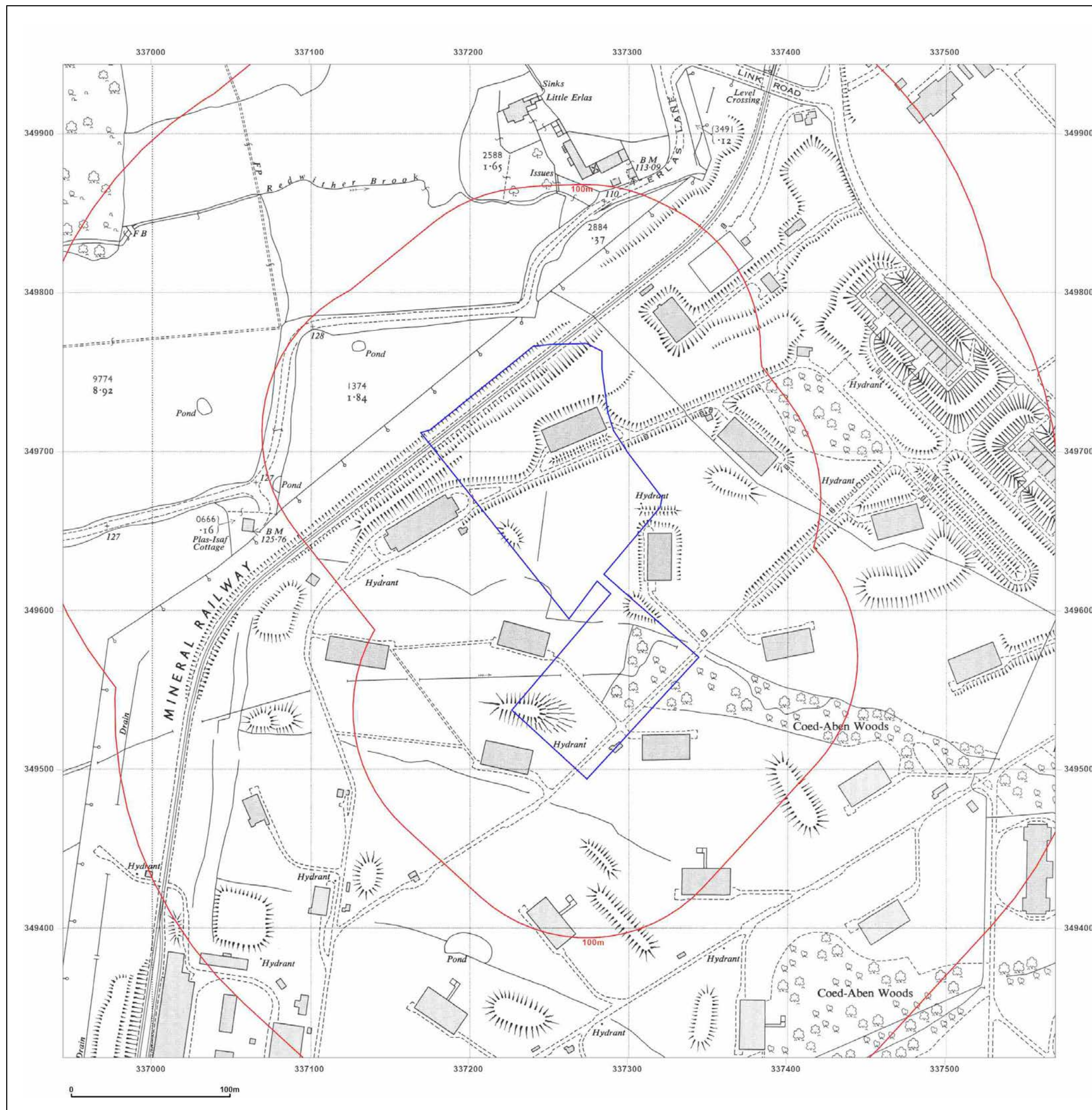


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1961

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
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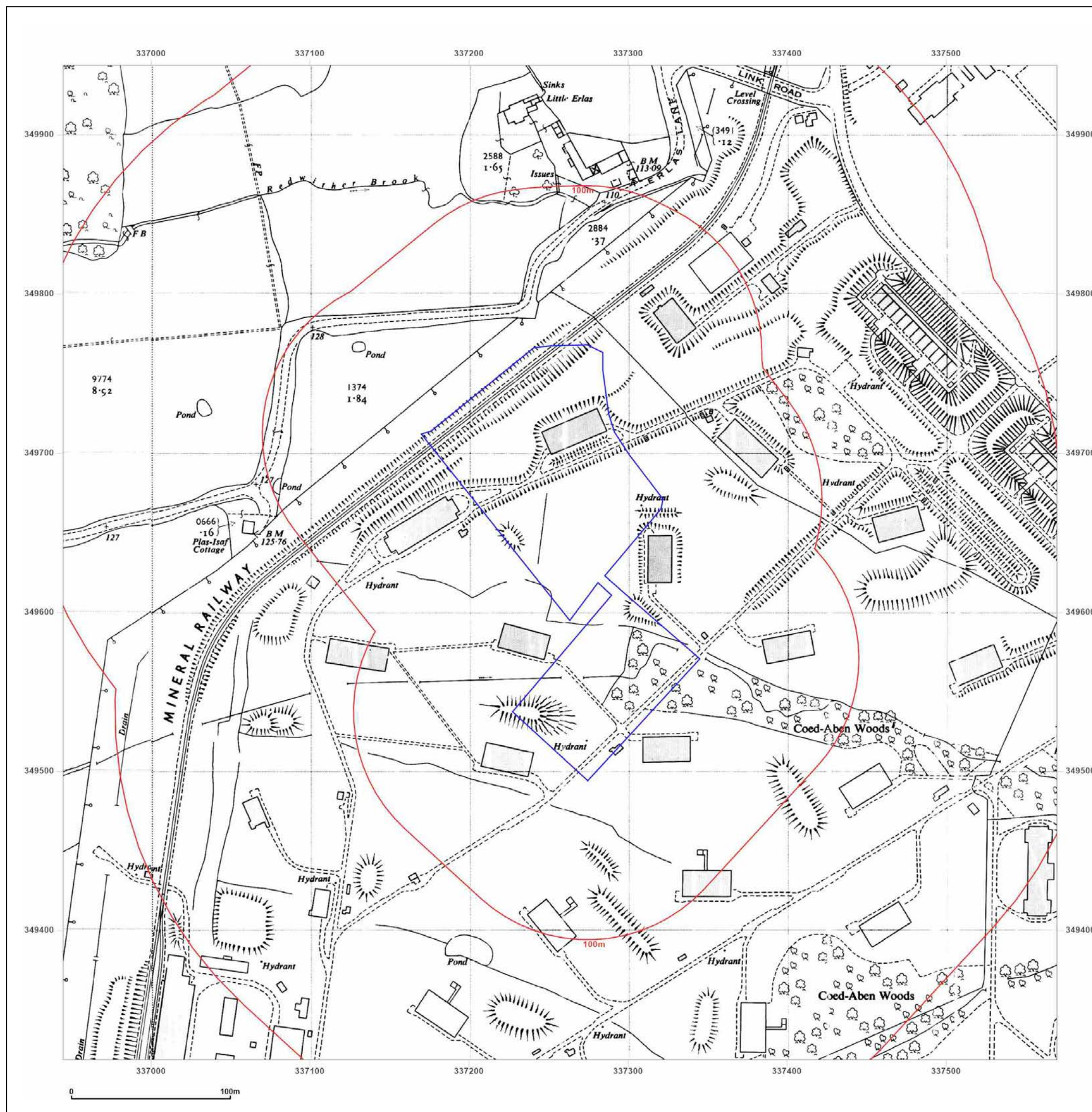


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1978

Scale: 1:2,500

Printed at: 1:2,500



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Revised N/A
Edition N/A
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Surveyed N/A
Revised 1976
Edition 1978
Copyright 1961
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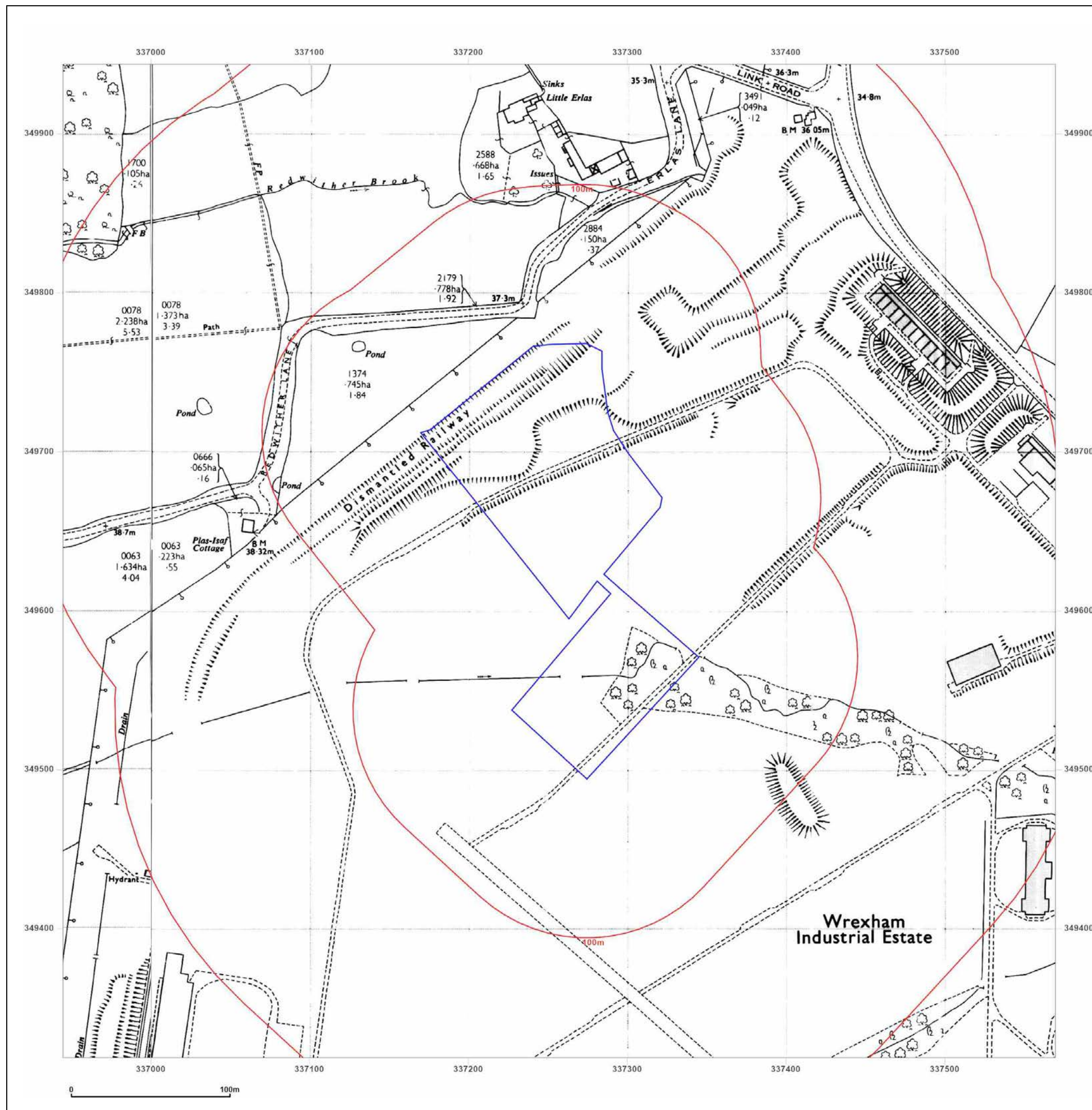


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Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1982

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1959
Revised 1982
Edition N/A
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1982-1985

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
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Revised N/A
Edition N/A
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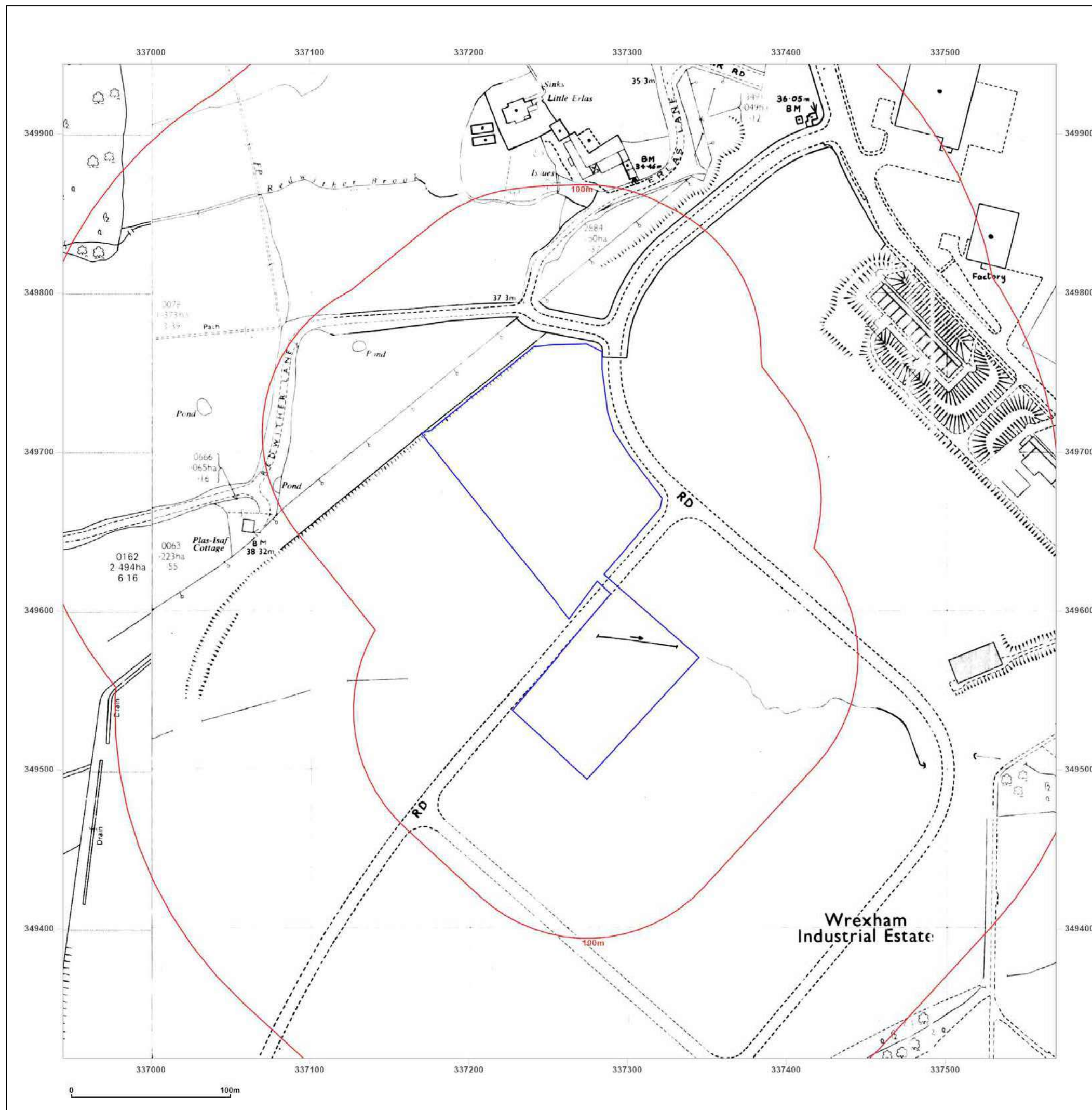


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1985

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised 1983
Edition N/A
Copyright 1985
Levelled 1959



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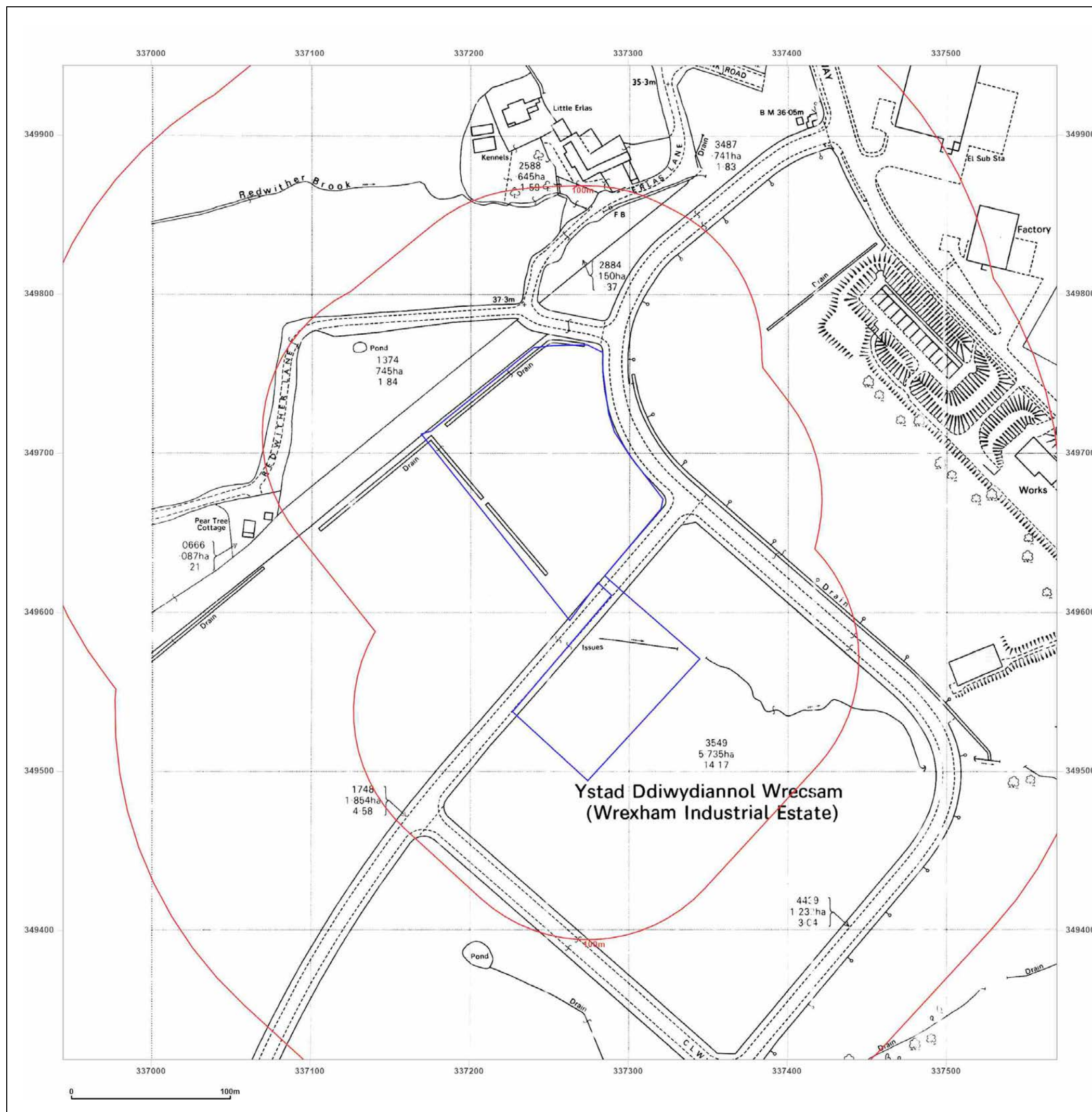


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1986

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised 1983
Edition N/A
Copyright 1986
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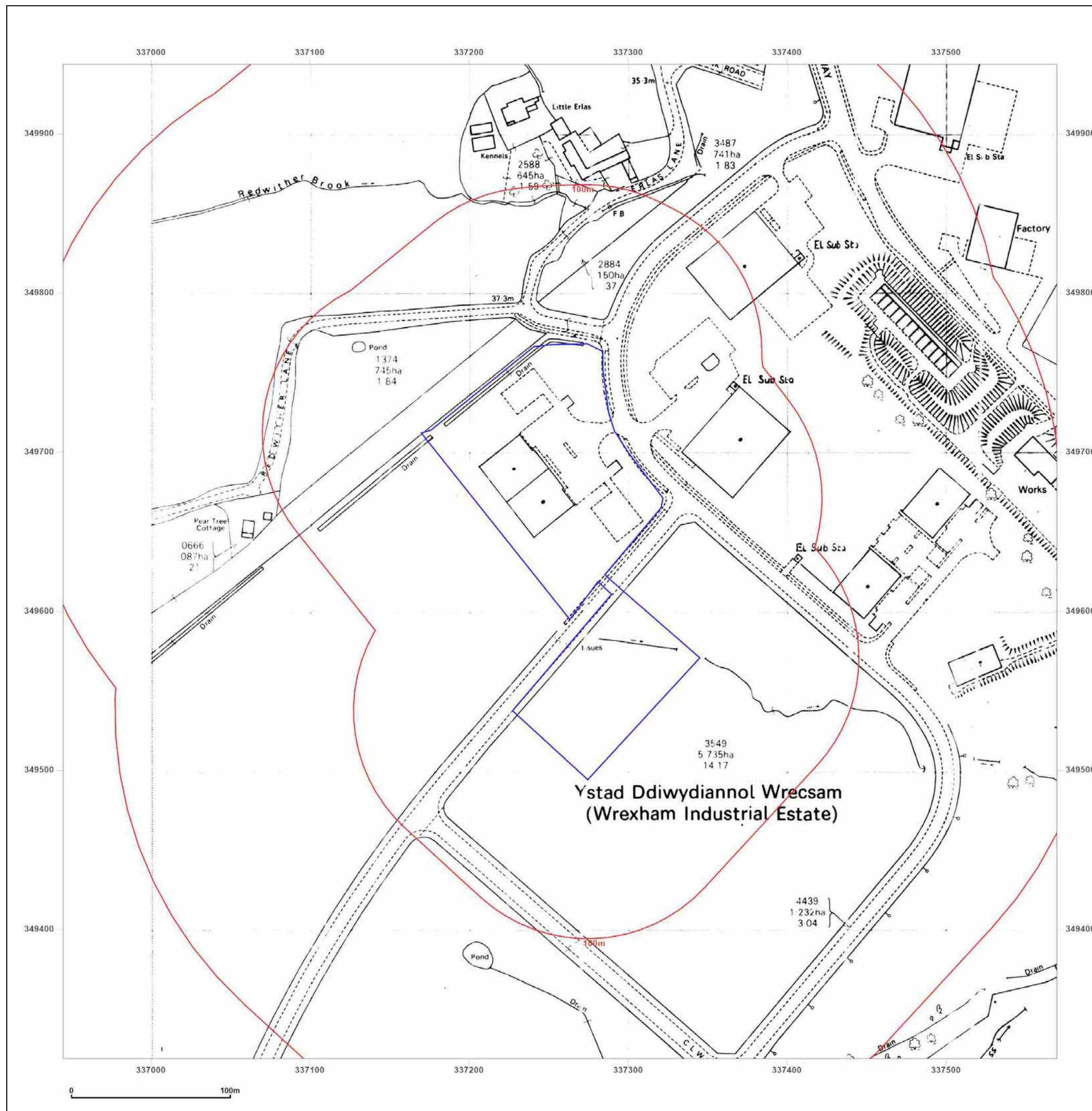


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Production date: 15 July 2022

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www.groundsure.com/sites/default/files/groundsure_legend.pdf





Site Details:

Unit 68 Clywedog Road East,
Wrexham Industrial Estate, LL13
9XN

Client Ref: CMAPS-AAG-1050504-4165-150722
Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1991

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1959
Revised 1983
Edition N/A
Copyright 1991
Levelled 1959



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Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1991

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised 1991
Edition N/A
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1989-1992

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1992
Revised N/A
Edition N/A
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Levelled N/A

Surveyed N/A
Revised 1989
Edition N/A
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Levelled 1959



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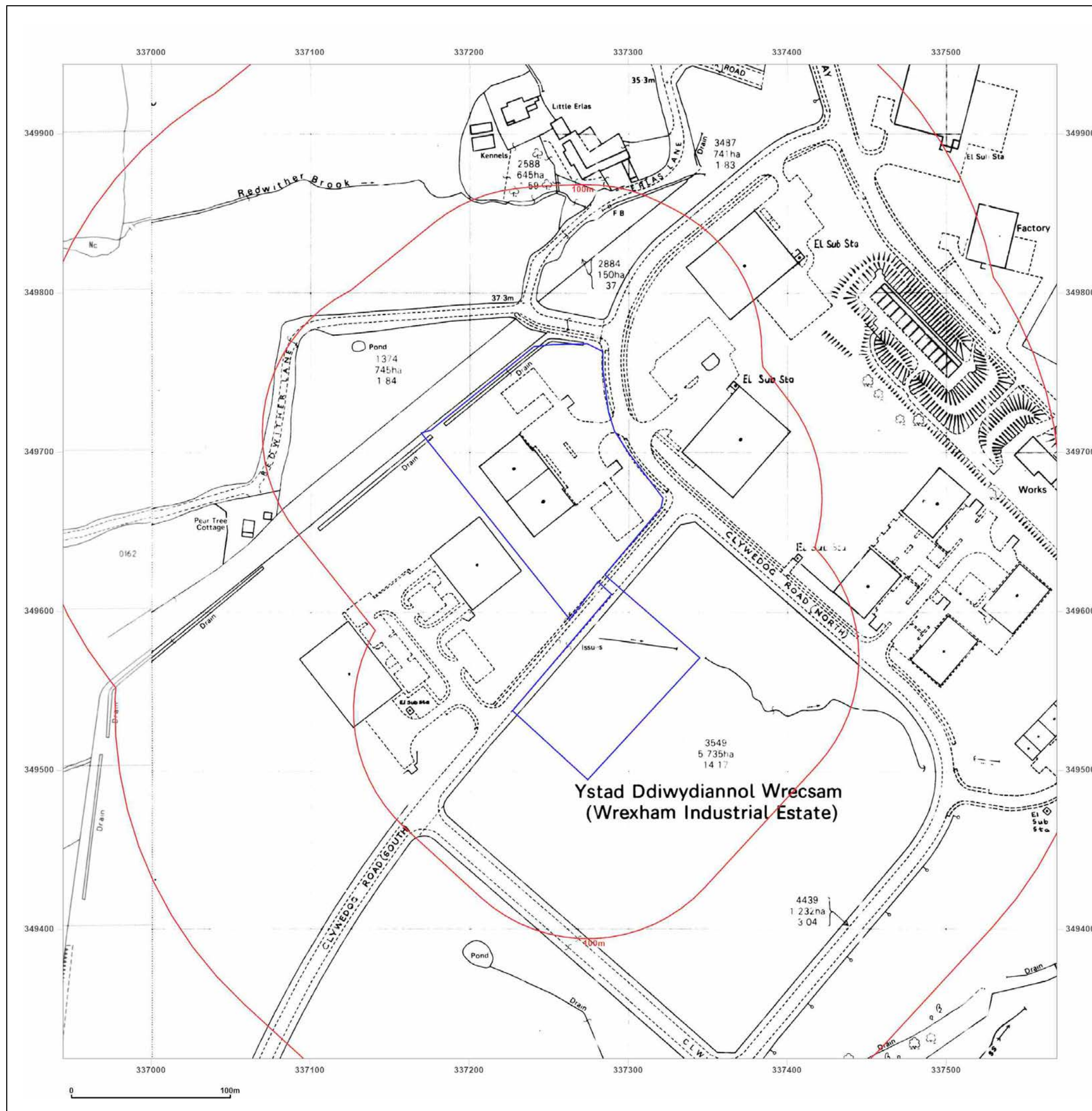


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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1992

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
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Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised 1993
Edition N/A
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: National Grid

Map date: 1994

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1994
Revised N/A
Edition N/A
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Map Name: National Grid

Map date: 1994

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
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Site Details:

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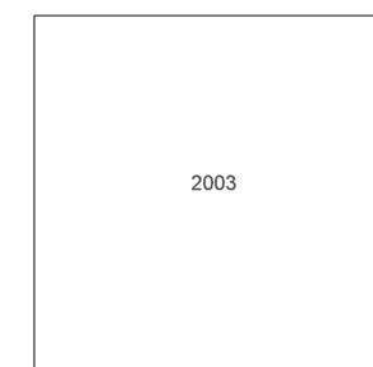
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Report Ref: CMAPS-AAG-1050504-4165-150722HIS
Grid Ref: 337257, 349631

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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Production date: 15 July 2022

Map legend available at:
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APPENDIX E: SITE PHOTOGRAPHS



1. Existing building occupying the study site as seen from the site access area off Clywedog Road North
2. Vehicle parking area as seen from Clywedog Road North





3. Peripheral / communal landscaping extending round the eastern site boundary as seen from Clywedog Road North
4. Small brick housing containing gas valve positioned along the eastern site boundary off Clywedog Road North





5. As above, showing metal service covers set in landscaping as seen from Clywedog Road North
6. Study site as seen from its boundary with Clywedog Road South





7. Eastern site boundary extending along Clywedog Road North
8. Southern site boundary extending along Clywedog Road South





9. Western site boundary Note brick built electrical sub-station to the right
10. Southern elevation of existing commercial building where 1nr extension is to be built





11. Brick built electrical sub-station to the rear of existing commercial unit
12. Unspecified corrugated cladded structure positioned to the rear of existing commercial building





13. Warning signage affixed to door of electrical sub-station to the rear of existing commercial unit
14. Unspecified corrugated clad structure positioned to the rear of existing commercial building





- 15. Door way leading into the rear of onsite commercial unit
- 16. Rae of existing building





- 17. As Figure 16 above
- 18. Location of proposed northern extension





- 19. As Figure 18 above
- 20. Location of proposed northern extension



APPENDIX F: COAL MINING REPORT



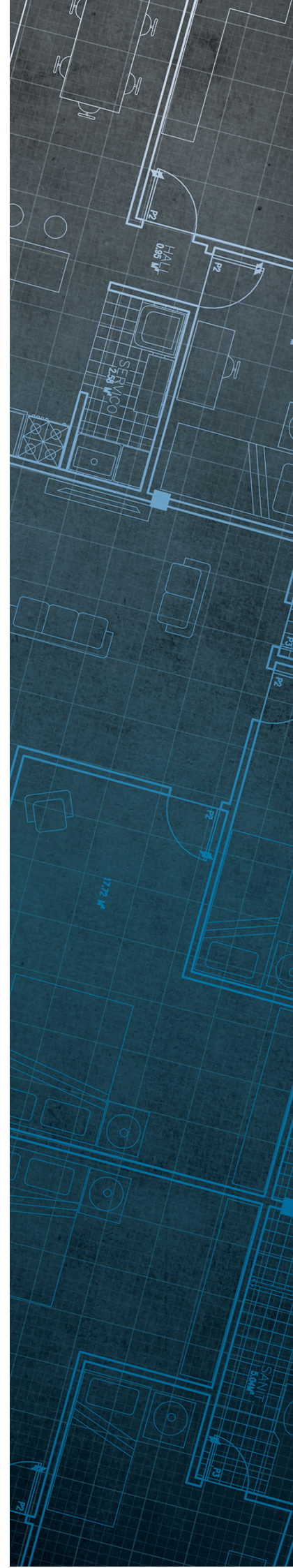
The Coal
Authority

Consultants Coal Mining Report

Dragon Packaging Ltd
Unit 47 And 48
Clywedog Road North
Wrexham Industrial Estate
Wrexham
LL13 9XN

Date of enquiry:	16 August 2022
Date enquiry received:	16 August 2022
Issue date:	16 August 2022

Our reference:	51003304971001
Your reference:	LL13 9XN



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

Tony Gerrard

Enquiry address

Dragon Packaging Ltd
Unit 47 And 48
Clywedog Road North
Wrexham Industrial Estate
Wrexham
LL13 9XN

How to contact us

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NG18 4RG

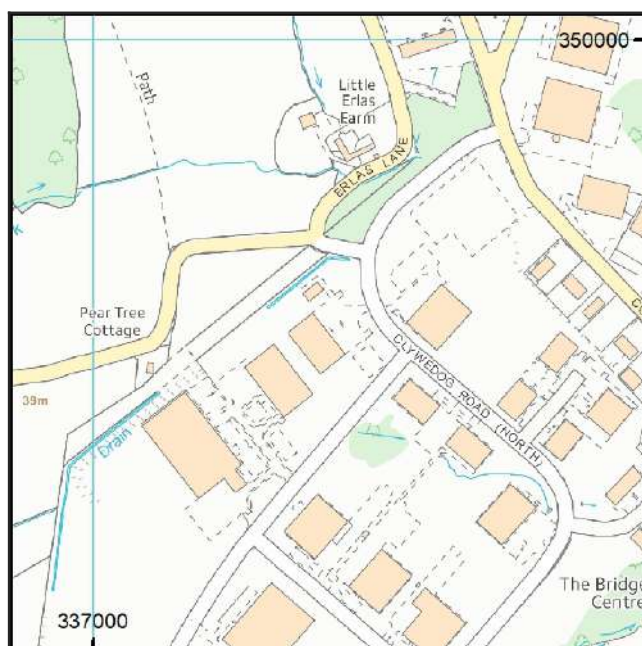
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 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

None available.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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