



CONSULTING ENGINEERS

CIVIL • STRUCTURAL
GEOTECHNICAL • ENVIRONMENTAL

**PROPOSED RESIDENTIAL DEVELOPMENT
GWERNAFFIELD ROAD,
MOLD
FOR
ANWYL HOMES**

FINAL ISSUE

SEPTEMBER 2020

GEO-ENVIRONMENTAL INVESTIGATION REPORT

17136/GEIR/B

ROBERT E FRY & ASSOCIATES LTD.

45, Bridgeman Terrace
Wigan, WN1 1TT

Telephone: 01942 826020

Fax: 01942 230816

Email: mail@refa.co.uk

Company Registration No. 2436911



DOCUMENT STATUS

Site Reference	Gwernaffield Road, Mold.
Title	Geo-Environmental Investigation Report
Client	Anwyl Homes
Project No.	17136/GEIR
Report Version	Draft Issue
Date Issued	16 th October 2017
Issue Notes	Ground gas monitoring still proceeding
Report Version	Final Issue
Date Issued	13 th February 2018
Issue Notes	Now including a full programme of ground gas monitoring
Report Version	Revision A
Date Issued	14 th August 2020
Issue Notes	Report updated to include revised planning layout.
Report Version	Revision B
Date Issued	22 nd September 2020
Issue Notes	Report updated to include revised planning layout.
Report Version	
Date Issued	
Issue Notes	

TABLE OF CONTENTS

1.0	INTRODUCTION	6.0	GAS MONITORING
1.1	Instructions	6.1	General
1.2	Object	6.2	Installation
1.3	Scope	6.3	Dates
1.4	Development Proposals	6.4	Procedure
1.5	Services	6.5	Range
2.0	THE SITE	6.6	Monitoring
2.1	Location	6.7	Results
2.2	Boundaries	7.0	CONTAMINATION ANALYSIS & ASSESSMENT CRITERIA
2.3	Access	7.1	Sampling
2.4	Topography	7.2	Range
2.5	Site Conditions	7.3	Laboratory
2.6	Trees	7.4	Development Proposals
2.7	Walkover Survey	7.5	Analysis Range
3.0	DESK STUDY	7.6	Results
3.1	Historical Land Uses	7.7	Approach
3.2	Environmental Permits, Incidents & Registers	7.8	Site Classification
3.3	Landfill Sites	7.9	Criteria
3.4	Current Land Uses	8.0	RESULTS OF ANALYSIS & QUALITATIVE RISK ASSESSMENT
3.5	Hydrogeology & Hydrology	8.1	Model
3.6	Flooding	8.2	Results Summary
3.7	Environmentally Sensitive Areas	8.3	Metals & Inorganics
3.8	Geology	8.4	Speciated PAH
3.9	Ground workings	8.5	Sulphates
3.10	Mining	9.0	DISCUSSIONS
3.11	Boreholes	9.1	General
3.12	Background Soil Chemistry	9.2	Metals & Inorganics
3.13	Site History	9.3	PAH Suite
3.14	Anticipated Ground Conditions	9.4	Ground Gases
3.15	Preliminary Conceptual Site Model	9.5	Conceptual Site Model
4.0	SITE WORKS	9.6	Preliminary Remediation Proposals
4.1	Intrusive Works	9.7	Foundations
4.2	Locations	9.8	Ground Floor Construction
4.3	Records	10.0	CONCLUSIONS & RECOMMENDATIONS
4.4	Targeting	10.1	Remediation
5.0	GROUND CONDITIONS	10.2	Foundations
5.1	Topsoil	10.3	Ground Floor Construction
5.2	Natural Strata	10.4	SUDS
5.3	Bedrock	10.5	Precautions
5.4	Groundwater	10.6	Further Works
5.5	Excavations	11.0	NOTES
5.6	Contamination		
5.7	Sampling		
5.8	Index Testing		
5.9	Ground Gases		
5.10	SUDS		

LIST OF TABLES

	<i>Executive Summary</i>
Table 1	<i>Review of Historical Maps</i>
Table 2	<i>Anticipated Ground Conditions</i>
Table 3	<i>Potential Ground Related Issues</i>
Table 4	<i>Preliminary Conceptual Site Model</i>
Table 5	<i>Initial Ground Investigation Strategy</i>
Table 6	<i>Summary of Gas Monitoring Results (Complete)</i>
Table 7	<i>Table of Chemical Testing</i>
Table 8	<i>Summary of Contamination Analysis: Metals & Inorganics</i>
Table 9	<i>Summary of Contamination Analysis: Organics: PAH USEPA 16 Suite</i>
Table 10	<i>Revised Conceptual Site Model</i>

LIST OF DRAWINGS

17136/01	<i>Walkover Survey Plan</i>
17136/02	<i>Exploratory Hole Location Plan</i>
PL02 Rev J	<i>Planning Layout</i>

LIST OF APPENDICES

Appendix A	<i>Exploratory Location Plan</i>
Appendix B	<i>Walkover Survey Plan</i>
Appendix C	<i>Walkover Survey Photographs</i>
Appendix D	<i>Planning Layout</i>
Appendix E	<i>Window Sample Journals</i>
Appendix F	<i>Trial Pit Journals</i>
Appendix G	<i>Trial Pit Photographs</i>
Appendix H	<i>Groundsure Enviro-Insight Report</i>
Appendix I	<i>Groundsure Geo-Insight Report</i>
Appendix J	<i>Ordnance Survey Maps</i>
Appendix K	<i>Exova Jones Laboratory Test Results</i>
Appendix L	<i>PSL Laboratory Test Results</i>
Appendix M	<i>Gas Monitoring Record</i>
Appendix N	<i>Coal Authority Mining Report</i>

EXECUTIVE SUMMARY

Site	The site is irregular in shape and extends to an area of approximately 8.3 hectares. The site is located north of Gwernaffield Rd approximately 1km north west of Mold town centre.
NGR	SJ 22898 64760
Site History	The site has a recorded an agricultural past throughout its entire history. The site has previously contained a pond within the northwest corner of the site according to mapping however no evidence of this pond has been identified. The site also contains a water main and overhead electricity line.
Investigations	The investigations have extended to:- • Walkover survey • Desk study • Extensive intrusive investigations by trial pitting and window sample boreholes; • Chemical analyses of soil samples • Ground gas monitoring
Ground Conditions	Topsoil has been identified over the whole site area and has been proven to a maximum depth of 0.3m bgl. The underlying natural strata comprised mainly of clayey sands and gravels which have been proven to a maximum depth of 4.45m bgl. Firm to stiff brown sandy clays have been identified within positions TP07, TP20, TP22, TP23, TP25, TP28, WS06 and WS07 at depths between 0.3 – 2.5m bgl. No buried made ground deposits or evidence of backfill were identified within the location of the former historic pond.
Groundwater	Groundwater ingress has been identified at depths between 1.8 – 2.5m bgl within positions TP02 – TP06, TP22 – TP25, TP28 and WS08. These are considered to represent perched water within the superficial deposits. There may be a requirement for localised sump pumping operations in areas where impermeable clays deposits are exposed during inclement weather.
Environmental	Elevated levels of lead have been identified within the topsoil stratum. No further elevated concentrations of contaminants have been identified.
Ground Gases	A full programme of ground gas monitoring has identified CS1 (NHBC Green) ground gas conditions. Full radon gas precautions are required in all properties on this development.
Trees	The site contains a number of trees located around all site boundaries and along field boundaries. The majority of the site comprises of natural cohesive deposits and the natural strata within this site is considered to have a low volume change potential as defined by NHBC Handbook Chapter 4.2. Foundations may need to extend to depths up to 2.5m bgl where tree roots effects are present.
Foundations	The natural strata within the site is considered to offer a safe bearing capacity in the order of 150kN/m ² at a minimum depth of 0.6mbgl within granular strata and 0.9m with cohesive strata and it is anticipated that strip foundations will be formed at depths between 0.6 – 1.5m bgl. A water main and overhead electricity powerline within the site need to be considered as part of the layout and foundation designs. There is a requirement for nominal reinforcement within the foundations due to the presence of geological faults within the site.
Slabs	Properties within this site should be provided with a suspended ground floor construction. This may be of a specialist manufactured precast concrete beam and block type arrangement, or of a designed cast insitu construction. Full radon precautions are also required.
Remediation	The topsoil within the site is unsuitable for reuse with the proposed development and there will be a requirement to import topsoil for the proposed garden areas which will require validation by a third party to confirm that the imported topsoil is suitable for use within a residential development.

This brief summary should not be assumed to represent a complete account of all the potential geo-environmental issues that may exist at the site. As such it is strongly recommended that the report be read in its entirety.

GEO-ENVIRONMENTAL INVESTIGATION WORKS

GWERNAFFIELD ROAD, MOLD.

1.0 INTRODUCTION

1.1 Instructions

1.1.1 We are instructed by Anwyl Construction Co. Ltd., Anwyl House, St. David's Business Park, Ewloe, Flintshire CH5 3DT to undertake a program of ground investigation works at a site situated off Gwernaffield Road, Mold which they intend to re-develop in a residential manner.

1.2 Object

1.2.1 The object of these investigations are as follows:

- To determine the engineering properties of the soils present within the site to form a basis upon which foundation and general infrastructure recommendations and design may be based;
- To enable sufficient information regarding ground conditions to be obtained from which risks to end users and the environment can be assessed;
- To utilise the information obtained from the investigations to provide recommendations for remediation measures where required.

1.3 Scope

1.3.1 The investigations considered within this report have comprised of the following elements:

- An initial environmental and engineering desk study based upon existing reports, services location information, geological, hydrogeology and hydrological information, a commercially available database and old Ordnance Survey maps;
- An initial walkover survey of the site has been undertaken prior to any intrusive investigations being commenced to determine the presence of any visible hazards or features which may affect the design of the ground investigation works;
- Undertake ground investigation works by trial pitting techniques and window sample boreholes;
- Determine the presence, nature and extent of any soil and groundwater contamination at the site;
- Determine the presence of any toxic or explosive gasses from areas of infilling within or adjacent to the site;
- Determination of the engineering properties of the soils present within the site to form a basis upon which recommendations for foundations and infrastructure construction may be based;
- Identify the potential requirements for any remedial action, where required.

1.4 Development Proposals

1.4.1 We understand that it is our client's intention that the site will be developed by the construction of two hundred and thirty eight (238 No.) residential properties with associated road access, garden and landscaped areas along with large areas of POS.

- 1.4.2 At the time of preparation of this report planning layout PL02/Rev J, produced by Astle Planning Design Ltd has been produced and is appended to this report. It is recognised that the development proposals may be amended as a result of the planning process. If the general principles of the development proposals vary from the assumptions made within this report, than any subsequent recommendations may become inappropriate and require reassessment in the light of the further information.

1.5 Services

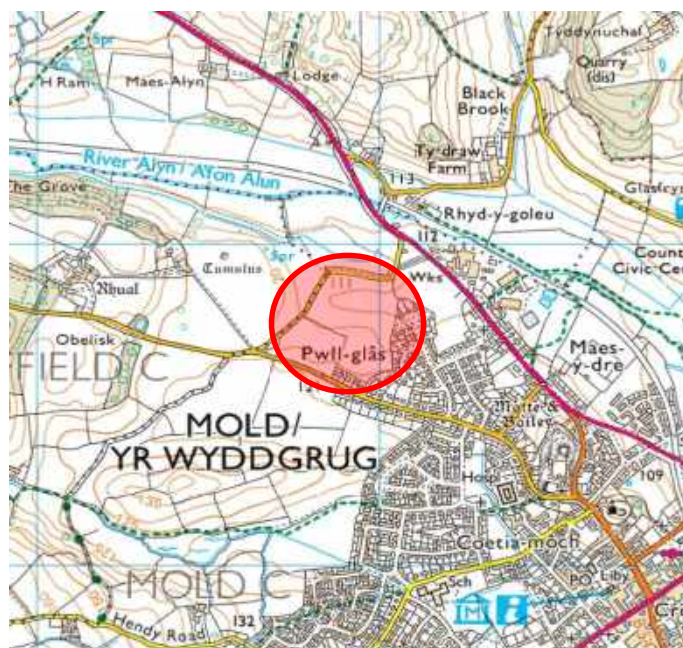
- 1.5.1 Information regarding the possible presence of live services within the site has been provided by our client, it has indicated the presence of a water main that enters the eastern area of the site nearside Meadowside and Alwyn Close and continues in a south westerly direction until it exits the site adjacent to Gwernaffield Road. The Local Authority plans also indicate the presence of soakaways located within the northern corner of the site.
- 1.5.2 The site walkover has identified the presence of overhead electricity cables travelling through the site with the orientation of north east to south west.
- 1.5.3 Prior to undertaking an intrusive works a visual inspection of each borehole and trial pit location was completed and, utilising a cable avoidance tool (CAT), a survey was carried out at each location. Prior to all boreholes being drilled a hand inspection pit was excavated to 1.2m below ground level.

2.0 THE SITE

2.1 Location

- 2.1.1 The site is irregular in shape and extends to an area of approximately 8.3 hectares. It is located upon the northern side of Gwernaffield Road approximately 1km to the north west of Mold town centre. The site is located at approximate National Grid Reference SJ 22898 64760 within a semi-rural area. The site location is shown in figure 1 below.

Figure 1 - Site Location



2.2 Boundaries

2.2.1 *The northern and western boundary is formed by an unmarked road that links the A541 Denbigh Road to Gwernaffield Road to the south. The eastern boundary is formed by numerous residential properties along Alwyn Close and Beech Wood Close and the southern boundary is partly formed by residential properties, and Gwernaffield Road.*

2.3 Access

2.3.1 *Access to the site is gained from directly from Gwernaffield Road to the south and we understand that numerous access points will be created as part of the development in agreement with the Local Authority.*

2.4 Topography

2.4.1 *The general topography of the site slopes towards the north with an approximate gradient of 1:30. Localised variations in topography are present within the site however these are not anticipated to pose a significant constraint on the development.*

2.5 Site Conditions

2.5.1 *At the time of the investigations the site appeared to be utilised for agricultural purposes and grazing land. There are no signs of previous development.*

2.6 Trees

2.6.1 *There are numerous trees and shrubs located along the majority of the site boundaries as well as being present within the site itself.*

2.6.2 *It is strongly recommended that all trees within the proposed development area should be subject to a detailed arboriculturist report prior to any trees being removed. It is also recommended that the arboriculturist report should extend to all trees which lie outside the site area but which may lie within potentially influencing distance of any proposed buildings.*

2.7 Walkover Survey

2.7.1 *Prior to commencing the ground investigation works we have undertaken an initial walkover survey of the site to identify any areas which may impact upon the proposed site redevelopment works. These features are identified upon the appended walkover survey plan which is appended to this report for reference. However the main features of the site are as follows:-*

- The majority of the site comprises of a single piece of agricultural land which slopes to the north at an approximate gradient of 1:30;*
- The site contains numerous trees and hedgerows within the site boundaries and also within the site itself;*
- The walkover has identified overhead electricity power line trending in a north east to south west direction through the centre of the site.*
- Numerous manhole covers have been identified along the southern boundary which correlate to the water main that trends in a north east towards Meadowside and Alwyn Close.*

3.0 DESK STUDY

3.0.1 As part of our environmental desk studies we have commissioned an Enviro-Insight report by Groundsure which gives details of all recorded environmental features relating to the site and its immediately surrounding area. We have also obtained copies of all available old Ordnance Survey maps for the area and these give some historical guidance regarding the former usage of the site area and its immediate vicinity. A Geo-Insight report has also been commissioned which assesses the geological structures within the general area of the site.

3.1 Historical Land Uses

3.1.1 The Enviro-Insight report has identified forty four (44 No.) potentially contaminative past land uses within 500m of the search boundary. The first ten records relate to unspecified ground workings and an unspecified heap located at a distance between 18m – 93m to the north. These unspecified ground workings pose a potential source of explosive and toxic gases to the development and therefore there will be a requirement for a programme of ground gas monitoring as part of the intrusive investigations. The remaining records are all located in excess of 120m from the site boundary and relate to various land uses such as unspecified works, tin plate works and railway sidings. All remaining records are not considered to pose a potential hazard to the proposed development site.

3.1.2 The environmental report has identified sixty six (66 No.) records of historical tanks, however these are all located in excess of 135m from the site boundary and therefore are considered too remote to pose a source of contamination to this development site.

3.1.3 The environmental report has identified thirty five (35 No.) records of historical energy features, however these are all located in excess of 150m from the site boundary and therefore are considered too remote to pose a potential source of PCB contamination to this development.

3.1.4 The environmental report has identified seven (7 No.) records of historical garage and motor vehicle repair sites, however these are all located in excess of 381m from the site boundary and are not considered to pose a potential source of hydrocarbon contamination.

3.1.5 The environmental report has identified thirty (30 No.) records of potentially infilled features within 500m of the study site. The first fourteen records again relate to the unspecified heap and ground workings and a pond discussed in paragraph 3.1.1. This infilled feature poses a potential source of toxic and explosive gases and therefore a programme of ground gas monitoring is required as part of the intrusive investigations. The remaining records relate to unspecified ground workings and ponds which are insignificant in size and are not considered to pose further sources of explosive and toxic gases to this development.

3.2 Environmental Permits, Incidents and Registers

3.2.1 There are twenty two (22 No.) records of historic IPC authorisations which have been identified within 500m of the study site boundary, however these are all located in excess of 210m from the site boundary and are considered too remote to pose a potential source of contamination to this development.

- 3.2.2 *The environmental report has identified twenty six (26 No.) records of Part A (1) and IPPC authorised activities, however these are all located in excess of 160m from the site boundary and are not considered to pose a significant source of contamination to this development*
- 3.2.3 *The environmental report has identified three (3 No.) records of licensed discharge consents, however these are all located in excess of 190m from the site boundary and are not considered to pose a source of contamination to this site.*
- 3.2.4 *The environmental report has identified two (2 No.) records of planning hazardous substance consent and enforcements, however these are all located in excess of 220m from the site boundary.*
- 3.2.5 *The environmental report has identified three (3 No.) COMAH and NIHHS sites within 500m of the study site, however these are all located in excess of 125m from the site boundary and are considered insignificant.*
- 3.2.6 *The environmental report has identified six (6 No.) records of National incidents recording system list 2, however these are all located in excess of 170m from the site boundary and have noted impacts to land, water and air that range from category four (no impact) to category two (significant). These pollution incidents are considered to pose environmental constraints on the development.*

3.3 Landfill Sites

- 3.3.1 *The environmental report has identified five (5 No.) records of Environment Agency historical landfill sites within 1500m of the study site. All records are located in excess of 270m from the site boundary and are not considered to pose a potential off site source of explosive or toxic gases.*
- 3.3.2 *The environmental report has not identified any further landfill sites or waste transfer sites within 850m of the site boundary, however records do exist beyond this distance.*

3.4 Current Land Uses

- 3.4.1 *The environmental report has identified twelve (12 No.) records of potentially contaminative industrial sites within 250m of the study site. All records are located in excess of 140m from the site and relate to generic tanks, electricity substation and Alyn works vehicle repair and testing and servicing site. These industrial sites are located at a significant distance from the site so as not to pose a potential environmental hazard to the development.*
- 3.4.2 *The environmental report has identified one (1 No.) petrol fuel site located 388m to the east, however this is now noted to be obsolete and does not pose a potential source of hydrocarbon contamination to this development site.*
- 3.4.3 *The environmental report has not identified any National Grid high voltage underground electricity transmission cables or high pressure gas transmission pipe lines within 500m of the site boundary.*

3.5 Hydrogeology & Hydrology

- 3.5.1 *The superficial deposits within the vicinity of the site are designated as three varying aquifers. The dominant aquifer within the site is Secondary A which contains permeable layers capable of supporting water supplies at local rather than strategic scale and in some cases form an important source of base flow to rivers. The remaining two aquifers within the site are noted to be Secondary undifferentiated and unproductive.*
- 3.5.2 *The site is located above Secondary A aquifer rocks which contain permeable layers capable of supporting water supplies at local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The development of this site is not considered to pose a potential hazard to aquifers within the superficial deposits and the underlying bedrock.*
- 3.5.3 *The environmental report has identified numerous records of ground water abstraction licenses, however these are all located in excess of 125m from the site boundary and the development of the site is not considered to pose a potential hazard to these abstraction license points.*
- 3.5.4 *The environmental report has provided Environment Agency information on groundwater vulnerability and soil leaching potential. This is classified as minor aquifer/high leaching potential with a Soil Vulnerability Category H1.*
- 3.5.5 *The environmental report has identified a number of records in relation to river networks and surface water features, however these are all located in excess of 45m from the site and the development site is not considered to pose a potential hazard to the river networks or surface water features.*

3.6 Flooding

- 3.6.1 *The environmental report does not indicate that the site lies within an Environment Agency flood plain area and the risk of flooding from rivers and the sea (RoFRaS) flood rating of very low. The environmental report however does identify groundwater flooding susceptibility areas within 50m of the boundary of the site and relates to clear water and superficial deposits flooding with potential at surface. Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area a groundwater flooding hazard should be considered in all land use planning decisions. It is recommended that all other relevant information e.g., records of previous incidents in ground water flooding, rainfall, property type and land drainage information be investigated in order to establish relative but not absolute risk of ground water flooding. A high confidence rating is given to this flooding susceptibility.*

3.7 Environmentally Sensitive Areas

- 3.7.1 *The environmental report has not identified any environmentally sensitive areas within 380m of the site boundary although records do exist beyond this distance.*

3.8 Geology

- 3.8.1 *The Geo-Insight report has identified varying superficial deposits within the vicinity of the site however the majority of the site comprises of Glacial Fluvial deposits which are considered to represent varying sand and gravel deposits with minor units of clays and silts. The remainder of the superficial deposits on the site comprise of head and Glacial Till deposits and it is anticipated that the superficial geology within the site will be extremely variable comprising of varying sands, gravels, silts and clays.*
- 3.8.2 *The solid geology below the site comprises of two formations. The first comprises of the Pennine Lower Coal measures which covers the majority of the site which is considered to comprise of alternating sandstones, mudstones and siltstones. The remainder of the site comprises of bedrocks of the Etruria formation. The bedrock below the site is considered to have a low to high permeability with a fracture flow type.*
- 3.8.3 *The geological report has identified two geological faults within the site noted to be inferred, although the displacement is unknown. These geological faults may hold the potential for minor ground movements within the site and nominal reinforcement should be included within the foundation design for this development. Further faults have been identified although these are located in excess of 30m from the site boundary.*
- 3.8.4 *The geological report has identified that the site lies within an area where 10 – 30% of properties are above the action level for radon gas and therefore full radon protective measures are required within the development.*

3.9 Ground workings

- 3.9.1 *The geological report has identified numerous historical surface ground working features within 250m of the study site. The first thirteen records all relate to a pond and unspecified ground workings identified within section 3.1 which pose a potential source of explosive and toxic gases to this development. All remaining records are located in excess of 150m from the site boundary.*
- 3.9.2 *The geological report has identified numerous records of historical underground working features and current ground working features within 1000m of the study site boundary, however all records are located in excess of 700m from the site boundary and are not considered to pose a potential constraint on the development of this site.*

3.10 Mining

- 3.10.1 *The site is located within a Coal Authority reporting area and a Coal Authority mining report has been obtained. The Coal Authority mining report is appended to this report for reference and confirms that the site is not located in an area that is effected by past underground coal mining.*
- 3.10.2 *The Geological report has identified two on site records of iron ore mining and vane mineral mining however these are noted to be localised or sporadic and are not considered to pose potential sources of minor ground movements due to collapse of mine workings.*

3.11 Boreholes

3.11.1 The Geological report has identified thirteen borehole records within 250m of the study site boundary. The first record is located 55m north west and has identified varying superficial deposits of very clayey gravels, sands and clays. All remaining borehole records are located in excess of 160m from the site boundary.

3.12 Background Soil Chemistry

3.12.1 The Geo-Insight report includes an estimated geometric mean soil concentration of various elements. Assessment of this information suggests that the majority of soil concentrations are anticipated to be below tier 1 assessment criteria in relation to human health effects however elevated concentrations of lead have been noted, therefore as part of the intrusive investigations lead analysis should be carried out to the underlying natural strata to confirm that it does not contain elevated concentrations of lead that may be at a harmful concentrations to long term end users of the site.

3.13 Site History

3.13.1 Table 1 – Review of Historical Maps

Date	Site	Adjacent Land
1872 – 1874	The site appears to comprise of agricultural fields divided into four parcels of land with a pond located within the north western corner of the site. Hedgerows and trees shown within the site itself. Within the south western corner of the site garden areas of Groes-onen farm are shown to extend into the site.	Located immediately north to the site is a factory pond which is significant in size and Gwernaffield Road is located immediately adjacent to the southern boundary of the site and an unmarked road adjacent to the western boundary. The remaining surrounding land comprises mainly of agricultural fields. Alyn steel works is located approximately 250m to the north east.
1899 – 1900	The site is now divided into three parcels of agricultural land and the pond located within the north west corner of the site is no longer represented on mapping.	No significant changes.
1910 – 1912	No significant changes.	No significant changes.
1960 – 1964	No significant changes.	The pond located to the north is now appeared to be under-going groundworks and infilling and residential development has taken place adjacent to the southern corner of the site.
1970 – 1971	No significant changes.	Further residential development has taken place to the east of the site along Beechwood Close and Ffordd Pennant.
1990 – 1992	The site is now shown to comprise of a single parcel of agricultural land and the garden areas associated with Groes-Onen cottages no longer encroach on the site and terminate at the south western boundary.	There has now been a continuation of residential development Ffordd Pennant up to Alwyn Close and Meadowside.
2002	No significant changes.	No significant changes.
2010 – 2014	No significant changes.	No significant changes.

3.13.2 Careful appraisal of the historical maps has identified that the site has remained in agricultural usage throughout all its entire history. The historic maps have identified a historic pond located in the north western corner of the site and will require targeted investigation. An assessment of the surrounding land has identified a large infilled pond located immediately north of the site boundary. This infilled feature will require a program of ground gas monitoring to identify any potential migrating explosive or toxic gases.

3.14 Anticipated Ground Conditions

3.14.1 Based upon the information obtained during the initial desk study phase, the anticipated ground conditions are expected to comprise of strata as detailed in table 2 below.

Table 2 – Anticipated Ground Conditions

Ground Material	Anticipated Condition
Topsoil	Topsoil is assumed to be present over the whole site area.
Made Ground	Potential localised made ground deposits located within the former pond located within the north west corner of the site.
Superficial Deposits	Superficial deposits within the site are considered to comprise of variable glacial till, glaciofluvial and head deposits of varying clays, sands and gravels.
Bedrock	The underlying bedrock comprises of Pennine Lower Coal Measures Formation and Etruria Formation, however this is expected to lie at significant depth below the site.
Groundwater	Expected to lie at depth within the bedrock aquifer and localised areas of perched water within the superficial deposits.

3.14.2 Based upon the data available within the desk study and tables 1 and 2 above, potential ground related issues associated with the proposed redevelopment of this site are likely to include the elements noted in table 3 below.

Table 3 – Potential Ground Related Issues

Type of Issue	Site Specific issue	Remarks (refer to walk over survey plan)
Potential on Site Contamination Sources	1. Localised areas of made ground associated with the former infilled pond. 2. Naturally occurring contamination within the surface deposits.	1. To be determined. 2. Background soil chemistry has indicated elevated lead concentrations.
Potential off Site Contamination Sources	1. Large infilled pond located to the north.	1. A program of ground gas monitoring required.
Potential Geotechnical Hazards	1. Poor ground conditions associated with made ground. 2. Heave and shrinkage associated with cohesive deposits. 3. Localised groundwater.	1. Uncompacted made ground material. 2. Anticipated cohesive clay deposits. 3. Groundwater perched within glacial till deposits.

3.15 Preliminary Conceptual Model

3.15.1 The information presented within this Desk Study section of this report has been used to compile a preliminary conceptual model for the site. The identified potential contaminant and receptors have been considered along with any possible pathways that may link them. The resulting pollution linkages are considered in Table 4 below. The risk classification has been estimated in accordance with the terms and definitions based upon CIRIA C552 Contaminated Land Risk Assessment, A Guide to Good Practice.

Table 4 – Preliminary Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Probability	Consequence	Risk	Mitigation / Investigation
Contaminated Soils	Site personnel during construction	Direct contact of soils Inhalation or ingestion of soil / dust	Lw	Md	Moderate / Low	Soil sampling during intrusive investigations. Laboratory analysis of samples
	Future site users	Direct contact of soils Inhalation or ingestion of soil / dust	Li	Md	Moderate	
	Surface water in the vicinity of the site	Leaching of contaminants through drainage system	Lw	Mi	Low	
	Ground water in aquifer	Leaching of contaminants to ground water	Lw	Sv	Moderate	
	Future site users	Vapour migration from soils	Li	Md	Moderate	
	Proposed buildings and services	Direct contact with contaminated soils	Lw	Mi	Low	
	Plants in gardens and soft landscaping	Direct contact	Lw	Mi	Low	
Contaminated ground water	Site personnel during construction	Water entering excavations	Lw	Mi	Low	Sampling of ground water (where encountered)
	Future site Users	Retained surface water	Lw	Mi	Low	
Toxic and explosive gases	Proposed buildings and occupiers	Ground gas migration into buildings	Li	Md	Moderate	Program of ground gas required
Radon gases	Proposed buildings and occupiers	Ground gas migration into buildings	Li	Md	Moderate	Full radon gas precautions required
Key: Probability: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor Consequence: Hi = High, Li = Likely, Lw = Low Likelihood, Ul = Unlikely						

4.0 **SITE WORKS**

4.1 **Intrusive Works**

4.1.1 The ground conditions at this site have been investigated by the excavation of twenty nine (29 No.) trial pit excavations utilising a back-hoe style excavator. These works were also supplemented by the drilling of eleven (11 No.) window sample boreholes. These investigation works were carried out by Geo-Ventures (UK) Ltd., who are a specialist ground investigation contractor.

4.1.2 During the excavations and drilling works representative samples of soils encountered have been obtained for laboratory analysis and testing where considered to be appropriate.

4.2 **Locations**

4.2.1 The locations of the trial pits and boreholes have been chosen by ourselves to provide a general overview of the ground conditions within the site and to target specific areas of interest.

4.2.2 The locations of the trial pits and boreholes are indicated upon the appended exploratory hole location plan in relation to the site features present at the time of the investigation.

4.3 Records

4.3.1 During the investigations records of the strata types, water entries, ground conditions and levels within each borehole and trial pit have been maintained. This information has been collated into a series of borehole journals which are appended to this report for reference. Representative samples of the strata encountered have been retained for laboratory testing as required and where appropriate.

4.4 Targeting

4.4.1 The desk study information has identified the presence of a large infilled pond located to the north boundary and therefore boreholes WS 03 – WS 0 & WS08 have been installed with stand pipes to carry out a program of ground gas monitoring. Trial pit TP 06 was excavated within the location of a former historic pond within the site and all remaining boreholes and trial pits have been conducted over the remainder of the site to provide information on general conditions. Generally the investigations and sampling regime is based upon the recommendations laid down in BS10175 : 2001 “Investigation Of Potentially Contaminated Sites”. Representative samples of the strata encountered have been retained for chemical analyses.

Table 5 - Initial Ground Investigation Strategy

Exploratory Hole No.	Target	Purpose
TP 01, TP 05, TP 0 7 – TP29 WS 01 – WS02 WS 06 – WS 11	General ground conditions	To determine the general nature of underlying soils and geology including: 1. Nature, distribution and thickness of made ground 2. Nature, degree and extent of potential contamination 3. Content of unacceptable material eg biodegradable matter etc. 4. Suitability of the ground for the founding of structures 5. Engineering properties of the ground 6. Monitor ground gases to assess potential risk
WS 03 – WS 05	Former infilled pond located outside the site boundary.	
TP 06	Former infilled pond within the site.	

5.0 GROUND CONDITIONS

5.1 Topsoil

5.1.1 These investigations have identified the presence of topsoil over the whole of the site area which has been proven to a maximum depth 0.3m bgl.

5.1.2 The position TP06 was targeted within an area of a former historic pond. The deposits in this location have identified topsoil overlying natural strata with no indication of pond of made ground deposits.

5.2 Natural Strata

5.2.1 All exploratory holes within this site have identified the presence of natural strata underlying topsoil stratum. The natural strata within the site comprises of clayey, sands and gravels which have been proven to a maximum depth of 4.45m bgl.

5.2.2 During the drilling works in-situ standard penetration tests (SPT's) have been conducted within the natural strata and recorded SPT 'N' values between 8 – refusal. Based upon these SPT results the natural strata within the site is considered capable of offering a safe bearing capacity in the order of 150kN/m² at a minimum depth of 0.6 bgl.

5.2.3 Within position TP 07 brown silt was identified at a depth of 0.4m – 0.6m bgl. Within position TP 07, TP 20, TP 22, TP 23, TP25, TP 28, WS 06 and WS 07 firm to stiff sandy clays have been identified at depths varying between 0.3m – 2.5m bgl. These clays are considered to offer a safe bearing capacity of 150kN/m² at minimum depth of 0.9m.

5.3 Bedrock

5.3.1 No exploratory holes within this investigation have identified the presence of bedrock and it is considered to lie below the site at significant depths.

5.4 Groundwater

5.4.1 Groundwater ingress has been identified within positions TP 02 – TP 06, TP 22 - TP 25, TP 28 and WS 08 at depths varying between 1.8m – 2.5m bgl. These groundwater strikes are considered to represent perched water within the superficial deposits and the groundwater table is considered to lie at significant depth below the site. During extended periods of adverse weather conditions, groundwater may become perched upon the underlying impermeable strata and this may lead to the presence of localised significant volumes of groundwater which may impact upon excavations etc. Where encountered any localised groundwater may be removed by simple sump pumping operations.

5.5 Excavations

5.5.1 The majority of the strata encountered within this site is of granular material and instability has been noted within the trial pit excavations, therefore excavations made within this site are considered incapable of staying open for significant periods of time and are likely to be subject to sudden catastrophic collapse without warning.

5.5.2 It is essential that personnel should not be allowed to approach or enter any excavation made upon this site unless appropriate precautions have been adopted to ensure that hazardous side instability has been prevented. This is particularly important in relation to foundation and drainage construction where operatives may be specifically required to enter excavations. Excavations and working practices in the ground at this site should be carried out in accordance with the recommendations laid down in HSE publication HSG 150 "Health & Safety in Construction".

5.6 Contamination

5.6.1 This intrusive investigation has not identified any visual or olfactory evidence of contamination or identified deposits of made ground that may hold potential contaminants.

5.7 Sampling

5.7.1 Based upon the previous usage of the site representative samples of the strata encountered during these investigations have been retained for chemical analyses.

This analysis has been intended to determine the potential presence of any contaminants which may represent a hazard to site operatives or end users of the site. This section of the work is considered in more detail in section 7 and 8 of this report.

5.8 Index Testing

5.8.1 *Seven (7 No.) samples of the natural clay strata have been obtained during these investigations and have been submitted to a civil engineering laboratory for determination of their index properties. The testing has been undertaken by Professional Soils Laboratory Ltd., at their UKAS accredited laboratory facility. Copies of their test results are appended to this report for reference.*

5.8.2 *Careful assessment of the laboratory testing confirms that the majority of the clay soils present within the site have a plasticity index less than 12%. However one sample at TP 20 (1.8m) has recorded a plasticity index in the order of 23% however the modified plasticity result for this sample would be 21.6%. Therefore considering that the remainder of clay samples have recorded plasticity indices < 20%, and that sample TP 20 (1.8m) has marginally exceeded the 20% threshold, the clay soils within this site are considered to have a low volume change potential as defined by the NHBC Handbook Chapter 4.2.*

5.9 Ground Gases

5.9.1 *The desk study information has not identified any historic or active landfills within 250m of the site, however a large infilled pond has been identified directly north of the site and accordingly a phase of ground gas monitoring has been proposed.*

5.9.2 *Four (4 No.) window sample boreholes (WS 03, WS 05 & WS 08) have been utilised for the installation of ground gas monitoring standpipes to assess the potential risk of ground gas generation and migration from the former pond located to the north.*

5.9.3 *The site is located in an area affected by Radon gases and therefore full Radon gas precautions will be required within the proposed development.*

5.10 SUDS

5.10.1 *Assessment of the ground conditions present within this site has identified mainly granular strata with minor units of impermeable cohesive clays. It is considered that the site may be susceptible to the use of a soakaway system for groundwater disposal. Accordingly insitu soakaway testing should be carried out within the site to determine potential infiltration rates.*

6.0 GAS MONITORING

6.1 General

6.1.1 *The initial desk study has identified a large infilled pond located immediately north of the site and accordingly a program of ground gas monitoring has been included within these investigations to determine the extent of any potential ground gas hazards.*

6.2 Installation

6.2.1 *To identify the presence of possible present of ground gases generated from pond to the north, four (4 No.) window sampler boreholes have been completed as permanent ground gas monitoring points.*

All standpipes installed within the window sampler boreholes are located along the northern boundary of the site in an effort to determine the presence of any ground gases generated from the nearby infilled pond. The response zone for these installations extends to a depths varying between 3.0m - 4.0m below ground level.

- 6.2.2 *The installations have included for the insertion of high density polyethylene 50mm diameter plain and slotted standpipes. The annulus space around the standpipe has been filled with non-calcareous pea gravel in the range of 2mm – 5mm. The upper 1.0m of the borehole has been sealed with bentonite clay and both positions have been finished with a gas tap and lockable steel cover. Full details of the installations are appended to this report for reference.*

6.3 Dates

- 6.3.1 *Gas monitoring commenced on 12th September 2017 and continued until 6th December 2017.*

6.4 Procedure

- 6.4.1 *The installation of the gas wells and gas monitoring procedures have been based upon the recommendations laid in CIRIA C665 "Assessing Risks Posed by Hazardous Ground Gasses to Buildings". In accordance with that documentation, it is intended that the period of monitoring will be up to 3 months with at least six gas monitoring visits being undertaken during that period. This assessment is based upon tables 5.5a and 5.5b and relates to a residential development with a very low potential source of gas.*

6.5 Range

- 6.5.1 *The installed wells are to be monitored for flammable gas (calibrated to methane, carbon dioxide, oxygen and gas flow) using a portable infrared gas analyser. Full details of the analysis program and assessment are presented within the appendix of this report.*

6.6 Monitoring

- 6.6.1 *The recommendations require that gas monitoring rounds should encompass various climatic conditions particularly in relation to atmospheric pressure but including at least one period of falling pressure with one during and after heavy rainfall.*

6.7 Results

- 6.7.1 *The conceptual site model suggests that potential ground gases to the site is largely based on the following factor:*
- *Ground gas generated from nearby historic landfill located to the north.*
- 6.7.2 *A complete programme of ground gas monitoring has identified a maximum methane concentration of 0.2% within position WS3.*
- 6.7.3 *All boreholes have identified the presence of carbon dioxide with the maximum concentration recorded of 3.2%.*

Table 6: Summary Of Gas Monitoring Results (complete)

Location	No Of Monitoring Occasions	Methane % v/v	Carbon Dioxide % v/v	Oxygen %	Flow l/hr	W.L. Depth	Base of Installation (m)	Atmospheric Pressure (mB)
WS 3	6	0.0 – 0.2	0.1 - 2.2	18.9 – 20.8	0.0	0.72 - DRY	4.00	994 - 1029
WS 4	6	0.0 – 0.1	0.0 – 3.2	16.9 -21.1	0.0	0.68 - 2.36	3.6	994 - 1029
WS 5	6	0.0	0.0 – 3.0	16.8 – 21.0	0.0	0.64 - 2.59	3.00	994 - 1029
WS 8	6	0.0 – 0.1	0.0 – 3.2	17.9 – 21.0	0.0	0.83 - 1.51	3.5	994 - 1029

Note ND - none detected

6.7.4 Monitoring has not recorded measurable flows and as such a calculation of gas screen value (GSV) is based upon the default flow rate of 0.1l/hr. This value represents a limit of detection for the LMS type G3M Gas Monitor.

6.7.5 Based upon the monitoring data calculations the maximum GSV for methane is 0.0002l/hr and 0.003l/hr for carbon dioxide. Reference to Table 8.5 of CIRIA C665 confirms that based upon these GSV value the site should be classified as Characteristic Situation 1 (NHBC Green). No concentrations of carbon dioxide have been recorded above 5% and methane above 1.5% therefore there is no requirement to raise the Characteristic Situation by one level. The site is located within an area where full radon ground gas precautions are required.

7.0 **CONTAMINATION ANALYSIS & ASSESSMENT CRITERIA**

7.1 **Sampling**

7.1.1 A total of thirty (30 No.) samples of topsoil and natural strata encountered during these investigations have been retained for chemical analyses. These samples are considered to be representative of the shallow ground conditions within the site and form a basis for assessment of their potential for reuse within a residential environment.

7.1.2 All samples obtained from this site were considered to be subject to a program of PAH analyses. Accordingly all samples have been placed into a 250ml wide necked brown glass jar. All soil samples have been stored in cool boxes at temperatures of approximately 4° (+/- 2° centigrade) until delivery in the selected laboratory. All sample containers were marked with the site address, trial pit and borehole number, depth and date of sampling. All samples have been tested within the specified handling period to accord with the sampling protocol presented by Exova Jones Environmental.

7.2 **Range**

These investigations have identified the presence of two predominant strata types within this site.

7.2.1 Topsoil deposits have been identified over the whole site area and this topsoil material has been analysed to determine it's suitable for reuse within the proposed garden and landscaped areas of the development.

7.2.2 The desk study information has identified potentially elevated concentrations of lead within the natural strata and therefore samples of the natural strata have been obtained for lead analysis only.

7.3 Laboratory

7.3.1 All samples selected for chemical analyses have been returned to Exova Jones Environmental who are an MCERTS and UKAS accredited laboratory facility. Each sample has been subject to a range of chemical analyses to determine the concentrations of a wide range of common contaminants and confirmation of the UKAS and MCERTS accreditation for each test is indicated within the results.

7.4 Development Proposals

7.4.1 We are aware that the site is to be re-developed on a private residential basis and that the proposals include for the preparation of private garden areas. The majority of the site will be covered by buildings, hard standing and access road ways. Clearly however it is essential to ensure that the materials present within the sensitive garden areas are suitable for retention within a residential environment.

7.5 Analysis Range

7.5.1 The initial desk study and preliminary conceptual model confirm that this site is unlikely to have been affected by contamination based upon its history. However a number of issues relating to the site may have generated potentially hazardous contamination and these are as follows:-

- Naturally occurring contaminants within the topsoil material and natural strata.

7.5.2 Table 7 below confirms the range of analyses undertaken upon the samples of soil obtained from this site.

Table 7 – Table of Chemical Testing

Analysis Suite	Determinands	No. of Samples
Metals	Arsenic, Cadmium, Chromium (total), Copper, Lead, Mercury, Nickel, Selenium, Zinc	20
Lead only	Lead	10
Organics	PAH – USEPA 16 suite	20
Inorganics	Cyanide, Soluble sulphates, Sulphide, pH, Organic matter	20

7.6 Results

7.6.1 The full results of the testing program are appended to this report and should be read in conjunction with the comments and recommendations regarding risk assessments.

7.7 Approach

7.7.1 The current UK approach to the consideration of contaminated land is based upon the principles of risk assessment. This in turn is founded upon the use of a source-pathway-target principle in order to establish the presence of a potential pollutant linkage. Our approach to the risk assessment is consistent with UK guidance and best practice.

As advocated in the EA Policy Statement: Guidelines For Environmental Risk Assessment And Management a tiered approach has been adopted. This tiered approach is central to Part IIA of the Environmental Protection Act 1990 and the Town and Country Planning Act 1990.

7.8 Site Classification

- 7.8.1 The current development proposals for this site confirm that the site will be developed on a private residential basis utilising large areas of private gardens. Accordingly the site usage has been considered on the basis of an end land use of residential as defined by EA Science Report SC050021/SR3 2009 in relation to the most recent soil guideline values.*

7.9 Criteria

- 7.9.1 The concentrations of contaminants within the ground have been compared to a range of generic soil guideline values that have been prepared by DEFRA and the Environment Agency. Where published, soil guideline values (sgv) have been utilised as intervention values for the purpose of an initial tier 1 assessment.*
- 7.9.2 At the time of the preparation of this report soil guideline values were available only for a limited number of contaminants and the development of both the CLEA model and additional soil guideline values is on-going. Where published soil guideline values are available they have been utilised as intervention values for the purposes of an initial tier 1 assessment. A number of sgv's have recently been updated to reflect a modern approach to the protection of human health.*
- 7.9.3 In March 2014 the Department for Environment Food & Rural Affairs published SP1010 : Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination Policy Companion Document. This document provides a series of Category 4 screening levels based upon differing land uses. Reference has been made to the values presented within this report in relation to the appropriate land usage.*
- 7.9.4 Where soil guideline values were not published at the time of preparing this report, generic assessment criteria (GAC) published by Land Quality Management Ltd., in conjunction with the Chartered Institute Of Environmental Health have been adopted. The values published in the LQM/CIEH S4UL's for Human Health Risk Assessment" Registration No. S4UL3265.*
- 7.9.5 Reference has also been made to published soil screening values presented by Atkins Ltd., under their Atrisk Subscription Service. The SSVs have been adopted where SGVs or GACs are not available. The remaining contaminants have been considered based upon information that was the best available at the time of the study.*

8.0 RESULTS OF ANALYSIS & QUALITATIVE RISK ASSESSMENT

8.1 Model

- 8.1.1 As discussed above, assessment of contaminated land is based upon a simple assessment of pollutant linkages referred to as the source-pathway-target model. This assessment considers the current or proposed usage of the site in terms of suitability for use. This implies the use of risk assessment in principle in order to evaluate the potential effects and concerns of contamination on a site-specific basis.*

8.1.2 Initial assessment of the chemical analyses results has been undertaken to assess the concentrations of determinands in relation to tier 1 assessment criteria. The summary of these test results is detailed below.

8.2 Results Summary

8.2.1 The following tables 8 and 9 have been prepared as a summary of the laboratory analyses depending upon the class of analyses undertaken. The test results have been compared to the adopted assessment criteria, relating to a proposed residential land usage.

8.2.2 All samples obtained during these investigations have been considered in each table. Principally the tables below relate to topsoil and natural strata and assess its suitability for reuse.

Table 8: Summary of Contamination Analysis: Metals & Inorganics - Topsoil

	No. of Samples	Range of Values (mg/kg)	Assessment Criteria (mg/kg)	No. of Samples Failing	Locations
Arsenic	20	9.3 – 19.2	37 ³	0	-
Cadmium	20	0.3 – 1.0	11.0 ³	0	-
Chromium (total)	20	39.8 – 68.4	910 ³	0	-
Copper	20	20.0 – 40.0	2400 ³	0	-
Lead	20	17.0 – 293.0	200 ¹	9	TP01-0.1, TP03-0.1, TP04-0.1, TP04-0.15, TP15-0.15, TP17-0.1, TP18-0.1, TP20-0.1, TP28-0.15
Mercury	20	<0.1	40 ³	0	-
Nickel	20	19.6 – 37.9	180 ³	0	-
Selenium	20	<1.0	250 ³	0	-
Zinc	20	120 – 200	3700 ³	0	-
Total Cyanide	20	0.6 – 1.1	34.2 ³	0	-
Phenol	20	<0.15 – 0.71	120 ³	0	-
pH	20	5.92 – 7.36	-	0	-
SOM	20	3.85 – 12.55	-	0	-
SO ₄ (2:1)	20	<0.001 – 0.009	0.5 ⁴	0	-

¹ DEFRA : SP1010 : Category 4 Screening Levels
² Atkins Atrisk SSV residential without home grown produce (1% SOM)
³ LQM and CIEH S4UL's for Human Health Risk Assessment (Registration No. S4UL 3265) residential with home grown produce (1% SOM)
⁴ BRE Special Digest 1:2005 DS-1 (units in g/l) ND – None Detected

8.3 Metals & Inorganics

8.3.1 Reference to table 8 above has identified numerous elevated concentrations of lead within the topsoil strata and therefore the topsoil is considered unsuitable for reuse within the garden areas of the proposed development. Lead analysis of the underlying natural strata has not identified any elevated concentrations and therefore there is no requirement for remediation in terms of natural strata. All remaining determinands have been recorded at concentrations below the adopted assessment criteria.

Table 9: Summary of Contamination Analysis: Organics: PAH USEPA 16 Suite - Topsoil					
	No. of Samples	Range of Values (mg/kg)	Assessment Criteria¹ (mg/kg)	No. of Samples Failing	Locations
Acenaphthene	20	<0.05	210	0	-
Acenaphthylene	20	<0.03	170	0	-
Anthracene	20	<0.04	2400	0	-
Benzo[a]anthracene	20	<0.06 – 0.19	7.2	0	-
Benzo[a]pyrene	20	0.04 – 0.21	5.0 ²	0	-
Benzo[b]fluoranthene	20	<0.05 – 0.26	2.6	0	-
Benzo[ghi]perylene	20	<0.04 – 0.17	320	0	-
Benzo[k]fluoranthene	20	<0.02 – 0.1	77.0	0	-
Chrysene	20	0.02 – 0.14	15.0	0	-
Dibenz[ah]anthracene	20	<0.04	0.24	0	-
Fluoranthene	20	0.06 – 0.22	280	0	-
Fluorene	20	<0.06	170	0	-
Indeno[123-cd]pyrene	20	<0.06 – 0.15	27.0	0	-
Naphthalene	20	<0.04	2.3	0	-
Phenanthrene	20	<0.03 – 0.08	95.0	0	-
Pyrene	20	0.06 – 0.22	620	0	-
¹ LQM & CIEH S4UL's for human health risk assessment (Registration No. S4UL 3265) – Residential with home grown produce (1% SOM)					
² DEFRA : SP1010 : Category 4 Screening Levels					

8.4 Speciated PAH

8.4.1 The soil samples retained from these investigations have been subject to a programme of analyses which have assessed the concentrations of the individual constituents of the polycyclic aromatic hydrocarbon series. A summary of the topsoil and made ground samples are shown in table 9 above. The assessment criteria utilised are based upon the presence of 1.0% soil organic matter within the samples generally. Reference to the tests results does however show variable soil organic matter content.

8.4.2 Assessment of table 9 above confirms that all PAH concentrations have been recorded below the adopted assessment criteria and therefore no remedial action is required in terms of PAH compounds.

8.5 Sulphates

8.5.1 Within the program of laboratory testing each sample has also been analysed to determine the concentration of water soluble sulphates within the ground. Reference to the laboratory results presented by Exova Jones Environmental confirms that soluble sulphates are present at concentrations are between <0.01 – 0.09g/l. Reference to BRE Special Publication 1 : 2005 "Concrete in Aggressive Ground" confirms that at <0.5g/l, the design sulphate class for this site is DS-1. Accordingly the ACEC class for the site is assessed to be AC-1s on the basis that the site does not have mobile groundwater and the pH value is >5.5. Reference to Table D of BRE Special Publication 1 indicates that the DC class for this site should be considered to be DC-1.

9.0 DISCUSSIONS

9.1 *General*

- 9.1.1 *The initial desk study of this site has identified that the site has remained in agricultural usage throughout its entire history, though desk study information has indicated within the natural strata potentially indicating elevated lead concentrations. The desk study has also identified a large infilled pond directly to the north that poses a potential source of explosive and toxic ground gases to this development.*
- 9.1.2 *The results of the chemical analyses undertaken upon representative samples of the strata obtained from this site have been assessed in section 7 above and are subject to further discussion below.*

9.2 *Metals & Inorganics*

- 9.2.1 *Chemical analysis has identified numerous elevated concentrations of lead within the topsoil material and therefore the topsoil is considered to be unsuitable for use within the garden areas of the proposed development. There will be a requirement for the importation of topsoil to be utilised within the garden areas of the development. Any imported material to the site will require validation by a third party to determine their suitability for use within the proposed residential development.*

9.3 *PAH Suite*

- 9.3.1 *Chemical analysis has confirmed that all PAH concentrations are below the adopted assessment criteria, however due to elevated lead concentrations the topsoil material is considered unsuitable for reuse within the proposed development.*

9.4 *Ground Gases*

- 9.4.1 *The initial desk study has identified the presence of a large infilled pond located immediately north of the site and therefore poses a potential source of explosive and toxic gases to the proposed residential development.*
- 9.4.2 *Based upon the full programme of ground gas monitoring the site has been classified as Characteristic Situation 1 NHBC (Green).*
- 9.4.3 *The site has been identified within an area affected by radon gases and therefore there will be a requirement for the incorporation of full radon precautions within all properties on this development.*
- 9.4.4 *The intrusive investigation targeted the former location of a historic pond within the north western corner. Trial pit 06 has not identified any disturbed ground or evidence of the former pond and it is anticipated that this may just correlate to a low lying area that annually accumulated surface water. Therefore this historic pond is not considered to pose a potential source of made ground material or explosive or toxic gases.*

9.5 *Conceptual Site Model*

- 9.5.1 *As a result of these intrusive ground investigations and subsequent program of chemical analyses, it has been possible to revise the preliminary conceptual site model presented in section 3. The revised conceptual site model is now shown in table 10 below.*

Table 10 – Revised Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Probability	Consequence	Risk	Mitigation / Investigation
Contaminated Soils	Site personnel during construction	Direct contact of soils Inhalation or ingestion of soil / dust	Ul	Md	low	Topsoil material unsuitable for reuse within the proposed development and therefore will be a requirement for imported topsoil.
	Future site users	Direct contact of soils Inhalation or ingestion of soil / dust	Li	Mi	Low	
	Surface water in the vicinity of the site	Leaching of contaminants through drainage system	Lw	Mi	Low	
	Ground water in aquifer	Leaching of contaminants to ground water	Ul	Md	Low	
	Future site users	Vapour migration from soils	Ul	Mi	Very Low	
	Proposed buildings and services	Direct contact with contaminated soils	Lw	Mr	Very Low	
	Plants in gardens and soft landscaping	Direct contact	Lw	Mi	Low	
Contaminated ground water	Site personnel during construction	Water entering excavations	Lw	Mr	Very Low	No significant ground water presence
	Future site Users	Retained surface water	Ul	Mr	Very Low	
Toxic and explosive gasses	Proposed buildings and occupiers	Ground gas migration into buildings	Ul	Md	Low	CS1 (NHBC Green)
Radon gases	Proposed buildings and occupiers	Ground gas migration into buildings	Li	Md	Moderate	Full radon gas precautions required
Key: Probability: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor Consequence: Hi = High, Li = Likely, Lw = Low Likelihood, Ul = Unlikely						

9.6 Preliminary Remediation Proposals

9.6.1 Chemical analysis has identified elevated concentrations of lead within the topsoil material within the site and therefore this material is deemed unsuitable for reuse within the proposed residential development. There will be a requirement for the importation of clean inert topsoil material for use within the garden areas of the development and this imported material will require validation by a third party to determine its suitability for use within a residential environment.

9.6.2 An full programme of ground gas monitoring has identified CS1 (NHBC Green) conditions.

- 9.6.3 *It is important to note that should any visual or olfactory evidence of potential contamination become apparent during the development works, then these areas must be drawn to the attention of the appropriate authorities to allow inspection, sampling, testing and assessment to be carried out to ensure that these materials do not represent a hazard to site operatives or end users. It is important that site staff are aware that any suspicious ground conditions should be reported to the site supervisor and works suspended until investigations have been completed.*
- 9.6.4 *The site has been identified within an area affected by radon gases and therefore full radon ground gas precautions should be incorporated into all residential properties on this development.*
- 9.6.5 *Copies of this ground investigation should be presented to the regulatory authorities for confirmation of their acceptance of these recommendations.*

9.7 Foundations

- 9.7.1 *The ground investigation works have identified that the superficial deposits at this site comprise predominately of granular sands and gravels which are considered to offer a safe bearing capacity in the order of 150kN/m² at a minimum depth of 0.6m. Due to the presence of geological faults there will be a requirement for nominal reinforcement in foundations.*
- 9.7.2 *Based upon our assessment of the ground conditions present within the site, we are of the opinion that the proposed structures may be provided with strip foundations at varying depths between 0.6m – 1.5m below ground level. Service information on the site has identified the presence of a water main and an overhead electricity line running centrally through the site and these will need to be considered within the planning layout and the foundation designs.*
- 9.7.3 *The cohesive clays within this site have been proven to be of low volume change potential as defined by the NHBC Handbook Chapter 4.2. It is therefore important to recognise that foundations within cohesive clay may be required to extend to greater depths than the specified 1.5m in locations due to tree roots effects.*

9.8 Ground Floor Construction

- 9.8.1 *It is recommended that all properties within this site should be provided with a suspended ground floor construction. This may be of a specialist manufactured precast concrete beam and block type arrangement, or of a designed cast insitu construction.*
- 9.8.2 *The site has been identified within a radon affected area and therefore full radon gas precautions should be incorporated into all structures on this development.*

10.0 CONCLUSIONS & RECOMMENDATIONS

10.1 Remediation

- 10.1.1 *Chemical analysis has identified elevated concentrations of lead within the topsoil material and therefore topsoil within the site is considered unsuitable for use within the proposed development. There will be a requirement for the importation of clean inert topsoil for use within the proposed garden areas of the development and there will be a requirement for validation of this imported material to confirm that it is suitable for use within the proposed residential development.*

- 10.1.2 *A full programme of ground gas monitoring has identified CS1 ground gas conditions, however the site has been identified within a radon effected area and full radon ground gas precautions should be incorporated in all properties on this development.*

10.2 Foundations

- 10.2.1 *The ground investigation works have identified that the superficial deposits at this site comprise predominately of granular sands and gravels which are considered to offer a safe bearing capacity in the order of 150kN/m² at a minimum depth of 0.6m. Due to the presence of geological faults there will be a requirement for nominal reinforcement in foundations.*
- 10.2.2 *Based upon our assessment of the ground conditions present within the site, we are of the opinion that the proposed structures may be provided with strip foundations at varying depths between 0.6m – 1.5m below ground level. Service information on the site has identified the presence of a water main and an overhead electricity line running centrally through the site and these will need to be considered within the planning layout and the foundation designs.*
- 10.2.3 *The cohesive clays within this site have been proven to be of low volume change potential as defined by the NHBC Handbook Chapter 4.2. It is therefore important to recognise that foundations within cohesive clay may be required to extend to greater depths than the specified 1.5m in locations due to tree roots effects.*

10.3 Ground Floor Construction

- 10.3.1 *It is recommended that all properties within this site should be provided with a suspended ground floor construction. This may be of a specialist manufactured precast concrete beam and block type arrangement, or of a designed cast insitu construction.*
- 10.3.2 *The site has been identified within a radon affected area and therefore full radon gas precautions should be incorporated into all structures on this development.*

10.4 SUDS

- 10.4.1 *Assessment of the ground conditions present within this site in terms of sustainable urban drainage suggests that the presence of effectively permeable granular sand and gravel deposits. Accordingly soakaway testing should be carried out within the site to determine likely infiltration rates achievable within the permeable superficial deposits.*

10.5 Precautions

- 10.5.1 *Excavations within the strata present upon this site are likely to be capable of remaining open for a significant period of time. It is however important to recognise that the sudden catastrophic collapse of any excavation made upon this site remains a significant hazard. It is therefore essential that suitable structural precautions should be adopted to all excavations to ensure the health and safety of all site operatives and visitors regardless of ground conditions. Reference should be made to HSE Publication HSG 150 "Health and Safety in Construction" for further guidance.*

10.6 Further Works

10.6.1 The topsoil material is considered to be unsuitable for use within the proposed residential development and therefore there will be a requirement for the importation of clean inert topsoil to the development to be used within the private garden areas of the site. Any imported material to this development will require a process of validation and chemical analysis to determine its suitability for use within the proposed residential development. These works should be carried out by a third party.

10.6.2 If any unusual or suspicious strata or ground conditions are encountered during the subsequent site stripping and preparation works it will be necessary for these areas to be brought to the attention of the appropriate authorities so that all necessary inspection, sampling and testing may be undertaken to determine whether these materials represent a hazard to human health. It is incumbent upon the site contractors to advise a responsible authority of any unusual findings within the site which may then be further investigated.

10.6.3 The utility records have identified the presence of a water main and overhead electricity line running centrally through the site and these will need to be considered within the proposed layout and foundation design. There will be a requirement to accurately locate the water main to determine its effect on this site layout.

11.0 NOTES

11.1 All reports are for advisory purposes only and all design decisions are the ultimate responsibility of others.

11.2 Unless stated otherwise the investigation has been undertaken in general accordance with the recommendations given in BS 5930 : 1999 "A Code of Practice for site Investigations" and the laboratory testing has been carried out in accordance with BS 1377 : 1990 "Methods of Test for Civil Engineering Purposes".

11.3 Soil and rock descriptions are generally based on the scales of strength and relative density within BS 5930 although it should be noted that in certain circumstances descriptions are based on site records or a qualitative assessment without the benefit of in-situ or laboratory test results.

11.4 The assessment of ground conditions given in this report is based on the results of the fieldwork and laboratory testing carried out and there may be other conditions at the site not encountered by these works, which have not been taken into account.

11.5 The scope of the investigation and information provided may not necessarily reflect all the geotechnical and environmental aspects related to the site, and the omission of certain items does not mean that the site is unaffected by such problems.

11.6 It should be noted that groundwater levels can vary and may at times be significantly different to those recorded during the investigation and attention is drawn to BS 5930 which indicates that measurements may be necessary over an extended period of time to investigate changes in groundwater pressures due to seasonal, tidal and other causes.

11.7 Any recommendations on construction methods within this report are for initial guidance only and all design proposals remain the responsibility of the appropriate contractor/consultant.

- 11.8** Further assessment, investigation, construction activities or time may reveal conditions that were not found during the period of investigation and, therefore, could not have been taken into account in the preparation of the report and where such information might impact upon the stated opinion R. E. Fry & Associates Ltd request the opportunity to review such information and modify the report if necessary.
- 11.9** Where information has been obtained from sources other than the direct findings of the investigation, R. E. Fry & Associates Ltd cannot and does not guarantee the authenticity or reliability of this information.
- 11.10** Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by R. E. Fry & Associates Ltd for the effects of any future changes to such guidelines and legislation.
- 11.11** This report has been prepared on the instructions and to the requirements of the named client and any unauthorised party using this information for any purpose does so at his own risk and any duty of care to that party is excluded.

Signed for and on behalf of
R E FRY & ASSOCIATES LIMITED

A handwritten signature in black ink, appearing to read "Mark Davies".

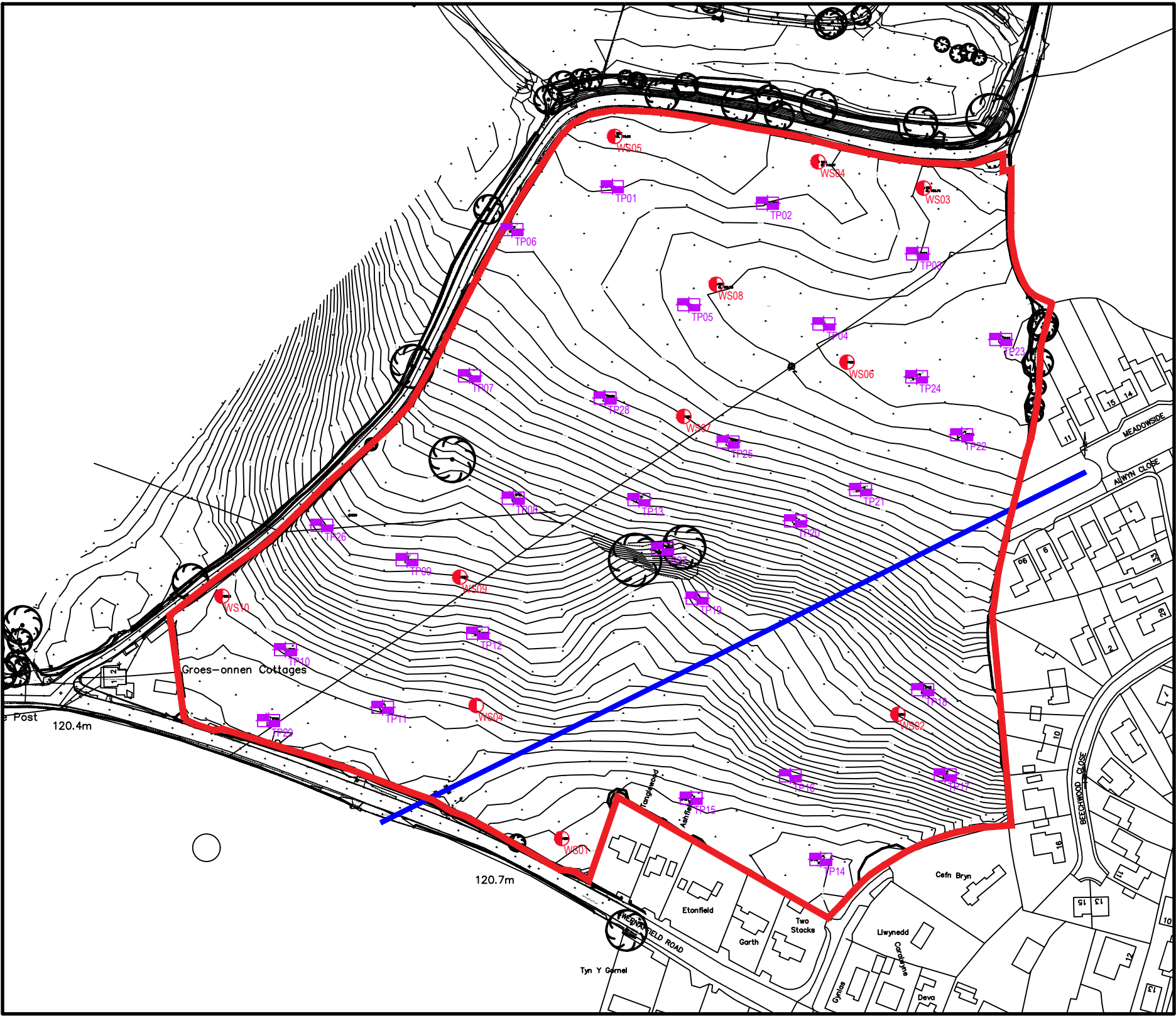
Mark Davies B Sc (Hons)

Signed for and on behalf of
R E FRY & ASSOCIATES LIMITED

A handwritten signature in blue ink, appearing to read "R. E. Fry".

R E FRY B Sc (Hons), C Eng., MI Struct.E., M.a.P.S.

APPENDIX A



LEGEND

Site boundary

Approx location of water main

TP01

Approx location of trial pit

WS03

Approx location of window sample borehole

REFA

CONSULTING ENGINEERS

CIVIL • STRUCTURAL

GEOTECHNICAL • ENVIRONMENTAL

45 Bridgeman Terrace

Wigan

Lancashire

WN1 1TT

(01942) 826 020

Email : info@refa.co.uk

Web: www.refa.co.uk

Client:	Anwyl Construction	Scale:	NTS	Drawn:	JT		
Project:	Gwernaffield Rd, Mold	Sheet Size:	A3	Date:	09.10.17		
Drawing Title:	Exploratory Hole Location Plan	Drawing No:	17136/02	Approved:	NA	Revision Details	
				Rev			Date

© This drawing is the property of REFA and should not be copied, used or its contents divulged without prior written consent
Any discrepancies to this drawing discovered on site should be reported to REFA immediately. IF IN DOUBT ASK!

APPENDIX B



LEGEND

Site boundary

Greenfield area

Overhead electricity lines

Approx location of water main

Approximate location of historic pond

Approximate direction of general slope 1:35

REFA

CONSULTING ENGINEERS

CIVIL • STRUCTURAL

GEOTECHNICAL • ENVIRONMENTAL

45 Bridgeman Terrace

Wigan

Lancashire

WN1 1TT

(01942) 826 020

Email : info@refa.co.uk

Web: www.refa.co.uk

Client:	Anwyl Construction	Scale:	NTS	Drawn:	JT		
Project:	Gwernaffield Rd, Mold	Sheet Size:	A3	Date:	09.10.17		
Drawing Title:	Walkover Survey Plan	Drawing No:	17136/01	Approved:	NA	Revision Details	
				Rev			Date

© This drawing is the property of REFA and should not be copied, used or its contents divulged without prior written consent
Any discrepancies to this drawing discovered on site should be reported to REFA immediately. IF IN DOUBT ASK!

APPENDIX C

Photographs of site during walk over survey



Photo 1 – Site access from Gwernaffield Rd



Photo 2 – General view north



Photo 3 – Southern corner of the site with Groes-onen Cottages located in the distance



Photo 4 – General view north



Photo 5 – General view east with properties relating to Meadowside and Alwyn Close



Photo 6 – General view south

APPENDIX D

All construction must visit the site and be responsible for taking and checking dimensions.
No construction should be undertaken until the planning permission is granted.
Any discrepancies between drawings, specifications and site conditions must be brought to the attention of the planning officer.
This drawing is for planning purposes only. It is not intended to be used for construction purposes. Whilst reasonable efforts are made to ensure drawings are accurate, Asst Planning and Design Ltd accept no responsibility for any errors or omissions in or on the drawing. It is the user's responsibility to ensure that the drawing is used for the intended purpose.

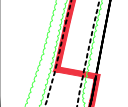
ACCOMMODATION SCHEDULE - COMBINED MIX									
Code	Name	Bed & Bath	Storey	Unit No	Unit No	Unit No	Unit No	Unit No	Unit No
Private									
CAERO	Caernarfon	4 Bed Detached	2	6	1507	9342			
OAKM	Oakmere	4 Bed Detached	2	10	1468	1480			
HENLG	Henley Grand	4 Bed Detached	2	10	1419	1419			
STRA	Stratford	4 Bed Detached	2	15	1311	1965			
LYMNG	Lynn Grand	4 Bed Detached	2	6	1219	1214			
FARN	Farnham	4 Bed Detached	2	23	1243	2699			
FARN	Farnham DA	4 Bed Detached	2	2	1243	248			
APPL	Appleton	3 Bed Detached	2	4	1050	4200			
PULF	Pulford	3 Bed Detached	2	10	1035	10350			
BUNB	Bunbury	3 Bed Detached	2	27	1032	27864			
EPDS	Epston	3 Bed Semi	2	2	900	1840			
BRET	Bretton	3 Bed Semi	2	36	889	35630			
BURT	Burton	2 Bed Semi	2	10	775	7750			
HAWA	Hawarden	2 Bed Detached	1	3	663	189			
Affordable									
CARM	Canarian	2 Bed	2	14	665	9590			
KINN	Kinnerton	3 Bed	2	40	755	30200			
DISL	Daisy	1 Bed	2	9	689	6201			
DISL	Daisy	1 Bed	2	9	542	4878			
Grand Total:				238 Units	234756 ft ²				
Gross Site Area:				11.068	27.40 ac				

Site Statistics:		
SSR	0.90 ha	2.23 ac
POS	3.14 ha	7.76 ac
Additional Drainage Works land	0.36 ha	0.88 ac
Extended gardens / existing track	0.36 ha	0.88 ac

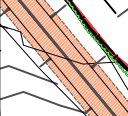
Nett Site Area:	6.34 ha	15.65 ac
Gross Density:	21.46 Un/ha	8.69 Un/ac
Nett Density:	37.57 Un/ha	15.20 Un/ac
Gross Footage:	1966.97 m ² /ha	8568.11 Un/ac
Nett Footage:	3442.74 m ² /ha	14996.56 ft ² /ac

Note: All Areas Approx.
Abbreviations: ac = Acres | ha = Hectares | ft² = square Feet | m² = square | Un = units Miles | SSR = Single Sided Road | POS = Public Open Space | Det = Detached | Apt = Apartment

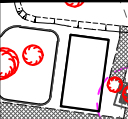
Layout Key

 Planning application boundary

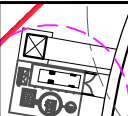
 Plot Number

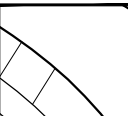
 Storm Water Connection to River Alyn

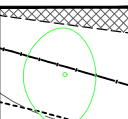
 Attenuation Basin

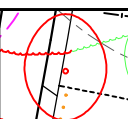
 NEAP for details refer to landscaping plans

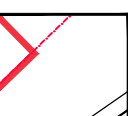
 MUGA for details refer to landscaping plans

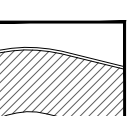
 Pumping & sub station

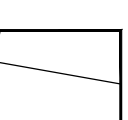
 Forward visibility splays refer to drawing

 Trees to be retained & root protection area

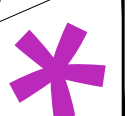
 Trees to be removed

 Indicative landscaping

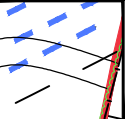
 Private Drives

 Overhead power line to be diverted

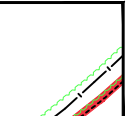
 Open Space refer to landscaping drawings for details

 Denotes affordable housing

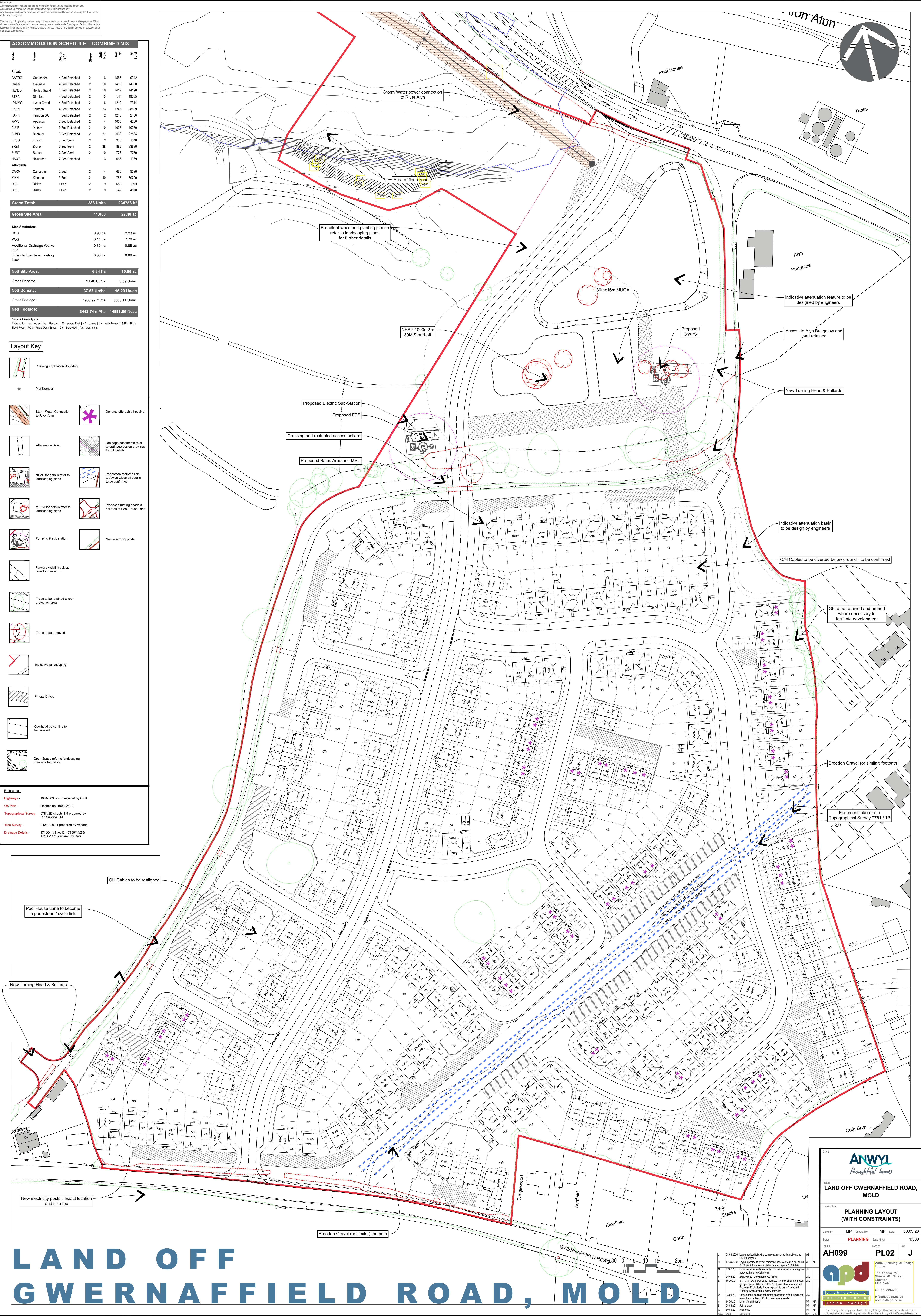
 Drainage easements refer to drainage design drawings for full details

 Pedestrian footpath link to Alyn Close all details to be confirmed

 Proposed turning heads & bollards to Pool House Lane

 New electricity posts

References	
Highways	1901-P03 rev 2 prepared by Croft
OS Plan	Licence no. 100022432
Topographical Survey	9/81/2D sheets 1-9 prepared by CD Surveys Ltd
Tree Survey	P1313.20.01 prepared by Ascorta
Drainage Details	17/10/14/1 rev B, 17/10/14/2 & 17/10/14/3 prepared by 985a



LAND OFF GWERNAFFIELD ROAD, MOLD

Client: **ANWYL**
thoughtful homes

Project: **LAND OFF GWERNAFFIELD ROAD, MOLD**

Drawing Title: **PLANNING LAYOUT (WITH CONSTRAINTS)**

Drawn by: **MP** | Checked by: **MP** | Date: **30.03.20**

Status: **PLANNING** | Scale: **@ A1** | 1:500

Job no.: **AH099** | Draw no.: **PL02** | Rev: **J**

anwyl **anwylplanning** **urban design**

The Siam Mill, Siam Mill Street, Chester, CH3 5AN
01244 856644
info@anwyl.co.uk
www.anwyl.co.uk

This drawing is the copyright of Anwyl Planning & Design Ltd and shall not be altered, copied, photocopied or reproduced in any way without the written authority of Anwyl Planning & Design Ltd.

APPENDIX E

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS01	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.30	Medium dense brown sandy fine to coarse sub-rounded GRAVEL. Clayey in parts.			
1.00-1.45	SPT(C) N=14		3,4/3,3,4,4		(2.60)				
1.00	D								
2.00-2.45	SPT(C) N=28		4,10/8,5,6,9						
2.00	D								
2.50-2.90	SPT(C) 50/250		5,7/10,15,15,10		2.90	Complete at 2.90m			
2.50	D								
Remarks Service pit excavated by hand to 1.00m								Scale (approx) 1:50	Logged By Dr J Crook
								Figure No. 17-1584.WS01	

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS02	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20 0.50	D D				(0.25) 0.25	Brown gravelly TOPSOIL with rootlets			
1.00-1.45 1.00	SPT(C) N=8 D		3,3/2,2,2,2			Loose becoming dense brown fine / medium SAND and fine / medium sub-rounded GRAVEL. Clayey in parts			
2.00-2.45 2.00	SPT(C) N=18 D		3,4/5,4,5,4		(3.70)				
3.00-3.45 3.00	SPT(C) N=38 D		3,6/8,10,10,10						
3.50-3.90 3.50	SPT(C) 50/250 D		10,10/15,14,17,4		3.95	Complete at 3.95m			
Remarks Service pit excavated by hand to 1.00m						Scale (approx) 1:50		Logged By Dr J Crook	
						Figure No. 17-1584.WS02			

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS03	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.30	Brown SILT / silty SAND			
1.00-1.45	SPT(C) N=14		2,3/3,3,4,4		(0.70)				
1.00	D				1.00	Brown clayey fine SAND			
					(0.80)				
2.00-2.45	SPT(C) N=25		4,4/6,6,7,6		1.80	Brown claybound medium / coarse SAND and fine / medium sub-rounded GRAVEL			
2.00	D				(0.40)				
					2.20	Medium dense brown sandy SILT / silty fine SAND			
3.00-3.45	SPT(C) N=28		3,3/6,6,8,8		(2.15)				
3.00	D								
4.00-4.35	SPT(C) 50/200		10,15/15,20,15		4.35	Complete at 4.35m			
4.00	D								
Remarks Service pit excavated by hand to 1.00m							Scale (approx) 1:50	Logged By Dr J Crook	
							Figure No. 17-1584.WS03		

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS04	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D				(0.25)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.25	Medium dense brown fine / medium SAND and fine / medium sub-rounded GRAVEL, Clayey below 2.00m			
1.00-1.45	SPT(C) N=27		2,4/6,6,7,8						
1.00	D								
2.00-2.45	SPT(C) N=12		3,3/4,4,2,2		(3.65)				
2.00	D								
3.00-3.45	SPT(C) N=21		3,3/4,5,6,6						
3.00	D								
3.60-3.90	SPT(C) 50/150		4,10/12,18,20		3.90				
3.60	D					Complete at 3.90m			
Remarks Service pit excavated by hand to 1.00m Borehole noted to be wet below 3.00m							Scale (approx) 1:50	Logged By Dr J Crook	
							Figure No. 17-1584.WS04		

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS06	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.30	Stiff brown sandy very gravelly CLAY / claybound sandy fine / medium sub-rounded GRAVEL			
1.00-1.45	SPT(C) N=17		2,3/3,4,5,5		(1.70)				
1.00	D								
2.00-2.15	SPT(C)		25,15/		2.00	Grey / brown coarse SAND and fine to coarse sub-rounded GRAVEL			
					2.15	Complete at 2.15m			
Remarks Service pit excavated by hand to 1.00m								Scale (approx) 1:50	Logged By Dr J Crook
								Figure No. 17-1584.WS06	

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS07	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.30	Stiff brown sandy very gravelly CLAY / claybound sandy fine / medium sub-rounded GRAVEL			
1.00-1.45	SPT(C) N=19		3,3/4,5,5,5		(1.20)				
1.50	D				1.50	Medium dense brown medium coarse SAND. Clayey in parts			
2.00-2.45	SPT(C) N=24		2,4/6,5,6,7		(1.50)				
3.00-3.45	SPT(C) N=24		3,4/5,5,6,8		3.00	Medium dense grey / brown sandy fine / medium GRAVEL			
					(0.45)				
					3.45	Complete at 3.45m			
Remarks Service pit excavated by hand to 1.00m								Scale (approx) 1:50	Logged By Dr J Crook
								Figure No. 17-1584.WS07	

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS08	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D				(0.25)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.25	Medium dense clayey sandy fine to coarse sub-rounded GRAVEL			
1.00-1.45	SPT(C) N=21		3,4/5,5,5,6						
1.00	D								
			Seepage (1) at 1.80m.						
2.00-2.45	SPT(C) N=27		3,5/6,7,7,7		(3.60)				
2.00	D								
3.00-3.45	SPT(C) N=20		2,4/4,5,5,6						
3.00	D								
3.50-3.80	SPT(C) 50/150		10,15/15,20,15						
3.50	D				3.85	Complete at 3.85m			
Remarks Service pit excavated by hand to 1.00m							Scale (approx)	Logged By	
							1:50	Dr J Crook	
							Figure No. 17-1584.WS08		

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS09	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.25)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.25	Medium dense brown medium / coarse SAND and fine / medium sub-angular GRAVEL. Clayey in parts.			
1.00-1.45	SPT(C) N=23		1,3/5,6,6,6		(2.75)				
1.00	D								
2.00-2.45	SPT(C) N=21		3,4/4,5,6,6		3.00	Medium dense / dense grey / brown medium coarse SAND and fine / medium sub-angular GRAVEL			
2.00	D				(1.45)				
3.00-3.45	SPT(C) N=26		4,4/6,6,7,7		4.45	Complete at 4.45m			
3.00	D								
4.00-4.45	SPT(C) N=39		5,8/9,10,10,10						
4.00	D								
Remarks Service pit excavated by hand to 1.00m						Scale (approx) 1:50		Logged By Dr J Crook	
						Figure No. 17-1584.WS09			

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS10	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.50	D				0.30	Brown fine SAND			
1.00-1.45	SPT(C) N=20		2,4/4,5,6,5		(0.70)				
1.00	D				1.00	Medium dense becoming dense brown clayey sandy fine to coarse sub-rounded GRAVEL			
2.00-2.45	SPT(C) N=32		3,4/8,8,8,8		(2.45)				
2.00	D								
3.00-3.45	SPT(C) N=37		4,8/8,9,10,10		3.45				
3.00	D					Complete at 3.45m			
Remarks Service pit excavated by hand to 1.00m						Scale (approx)		Logged By	
						1:50		Dr J Crook	
						Figure No. 17-1584.WS10			

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Number WS11	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.25)	Brown gravelly TOPSOIL			
0.50	D				0.25	Medium dense / dense brown becoming grey / brown sandy fine to coarse sub-angular GRAVEL			
1.00-1.45	SPT(C) N=23		3,6/6,7,5,5						
1.00	D								
					(3.20)				
2.00-2.45	SPT(C) N=33		4,6/8,8,9,8						
2.00	D								
3.00-3.45	SPT(C) N=37		4,8/9,9,9,10						
3.00	D				3.45	Complete at 3.45m			
Remarks Service pit excavated by hand to 1.00m						Scale (approx) 1:50		Logged By Dr J Crook	
						Figure No. 17-1584.WS11			

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>								Standard Penetration Test Results					
Site : Gwernaffield Road, Mold												Job Number 17-1584	
Client :												Sheet 1 / 1	
Engineer : Robert E Fry & Associates Limited													
Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments	
					1	2	1	2	3	4			
WS01	1.00	1.15	1.45	CPT	3	4	3	3	4	4	N=14	Refusal	
WS01	2.00	2.15	2.45	CPT	4	10	8	5	6	9	N=28		
WS01	2.50	2.65	2.90	CPT	5	7	10	15	15	10	50/250mm		
WS02	1.00	1.15	1.45	CPT	3	3	2	2	2	2	N=8	Refusal	
WS02	2.00	2.15	2.45	CPT	3	4	5	4	5	4	N=18		
WS02	3.00	3.15	3.45	CPT	3	6	8	10	10	10	N=38		
WS02	3.50	3.65	3.90	CPT	10	10	15	14	17	4	50/250mm		
WS03	1.00	1.15	1.45	CPT	2	3	3	3	4	4	N=14	Refusal	
WS03	2.00	2.15	2.45	CPT	4	4	6	6	7	6	N=25		
WS03	3.00	3.15	3.45	CPT	3	3	6	6	8	8	N=28		
WS03	4.00	4.15	4.35	CPT	10	15	15	20	15		50/200mm		
WS04	1.00	1.15	1.45	CPT	2	4	6	6	7	8	N=27	Refusal	
WS04	2.00	2.15	2.45	CPT	3	3	4	4	2	2	N=12		
WS04	3.00	3.15	3.45	CPT	3	3	4	5	6	6	N=21		
WS04	3.60	3.75	3.90	CPT	4	10	12	18	20		50/150mm		
WS05	1.00	1.15	1.45	CPT	4	4	6	4	5	6	N=21	Refusal	
WS05	2.00	2.15	2.45	CPT	4	8	10	12	12	12	N=46		
WS05	3.00	3.15	3.35	CPT	10	10	18	20	12		50/200mm		
WS06	1.00	1.15	1.45	CPT	2	3	3	4	5	5	N=17	Refusal	
WS06	2.00	2.15	2.15	CPT	25	15							
WS07	1.00	1.15	1.45	CPT	3	3	4	5	5	5	N=19		
WS07	2.00	2.15	2.45	CPT	2	4	6	5	6	7	N=24		
WS07	3.00	3.15	3.45	CPT	3	4	5	5	6	8	N=24		
WS08	1.00	1.15	1.45	CPT	3	4	5	5	5	6	N=21	Refusal	
WS08	2.00	2.15	2.45	CPT	3	5	6	7	7	7	N=27		
WS08	3.00	3.15	3.45	CPT	2	4	4	5	5	6	N=20		
WS08	3.50	3.65	3.80	CPT	10	15	15	20	15		50/150mm		
WS09	1.00	1.15	1.45	CPT	1	3	5	6	6	6	N=23		
WS09	2.00	2.15	2.45	CPT	3	4	4	5	6	6	N=21		
WS09	3.00	3.15	3.45	CPT	4	4	6	6	7	7	N=26		
WS09	4.00	4.15	4.45	CPT	5	8	9	10	10	10	N=39		
WS10	1.00	1.15	1.45	CPT	2	4	4	5	6	5	N=20		
WS10	2.00	2.15	2.45	CPT	3	4	8	8	8	8	N=32		
WS10	3.00	3.15	3.45	CPT	4	8	8	9	10	10	N=37		
WS11	1.00	1.15	1.45	CPT	3	6	6	7	5	5	N=23		
WS11	2.00	2.15	2.45	CPT	4	6	8	8	9	8	N=33		
WS11	3.00	3.15	3.45	CPT	4	8	9	9	9	10	N=37		

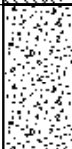
Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold							Borehole Number WS03																																																																																																																																																																																																																																																																															
Installation Type Single Installation			Dimensions Internal Diameter of Tube [A] = 35 mm Diameter of Filter Zone = 70 mm				Client								Job Number 17-1584																																																																																																																																																																																																																																																																													
			Location			Ground Level (mOD)		Engineer Robert E Fry & Associates Limited								Sheet 1/1																																																																																																																																																																																																																																																																												
<table border="1"><thead><tr><th rowspan="3">Legend</th><th rowspan="3">Water</th><th rowspan="3">Instr (A)</th><th rowspan="3">Level (mOD)</th><th rowspan="3">Depth (m)</th><th rowspan="3">Description</th><th colspan="9">Groundwater Strikes During Drilling</th></tr><tr><th rowspan="2">Date</th><th rowspan="2">Time</th><th rowspan="2">Depth Struck (m)</th><th rowspan="2">Casing Depth (m)</th><th rowspan="2">Inflow Rate</th><th colspan="4">Readings</th><th rowspan="2">Depth Sealed (m)</th></tr><tr><th>5 min</th><th>10 min</th><th>15 min</th><th>20 min</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td><td>0.10</td><td>Concrete</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="10">1.00</td><td>Bentonite Seal</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="9">Groundwater Observations During Drilling</td></tr><tr><td></td><td></td><td></td><td></td><td>Date</td><td colspan="5">Start of Shift</td><td colspan="5">End of Shift</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="15">Instrument Groundwater Observations</td></tr><tr><td colspan="15">Inst. [A] Type : Slotted Standpipe</td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="2"></td><td rowspan="2">Date</td><td colspan="3">Instrument [A]</td><td colspan="6" rowspan="2">Remarks</td></tr><tr><td></td><td></td><td></td><td></td><td>Time</td><td>Depth (m)</td><td>Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td>4.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>4.35</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>															Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling									Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)	5 min	10 min	15 min	20 min					0.10	Concrete														1.00	Bentonite Seal										Groundwater Observations During Drilling													Date	Start of Shift					End of Shift										Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)																																																																																											Instrument Groundwater Observations															Inst. [A] Type : Slotted Standpipe																				Date	Instrument [A]			Remarks										Time	Depth (m)	Level (mOD)					4.00															4.35										
Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling																																																																																																																																																																																																																																																																																						
						Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings										Depth Sealed (m)																																																																																																																																																																																																																																																																							
											5 min	10 min	15 min	20 min																																																																																																																																																																																																																																																																														
				0.10	Concrete																																																																																																																																																																																																																																																																																							
				1.00	Bentonite Seal																																																																																																																																																																																																																																																																																							
Groundwater Observations During Drilling																																																																																																																																																																																																																																																																																												
					Date	Start of Shift					End of Shift																																																																																																																																																																																																																																																																																	
						Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)																																																																																																																																																																																																																																																																													
Instrument Groundwater Observations																																																																																																																																																																																																																																																																																												
Inst. [A] Type : Slotted Standpipe																																																																																																																																																																																																																																																																																												
					Date	Instrument [A]			Remarks																																																																																																																																																																																																																																																																																			
						Time	Depth (m)	Level (mOD)																																																																																																																																																																																																																																																																																				
				4.00																																																																																																																																																																																																																																																																																								
				4.35																																																																																																																																																																																																																																																																																								
Remarks																																																																																																																																																																																																																																																																																												

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold				Borehole Number WS04																															
Installation Type Single Installation			Dimensions Internal Diameter of Tube [A] = 35 mm Diameter of Filter Zone = 70 mm			Client					Job Number 17-1584																														
			Location		Ground Level (mOD)	Engineer Robert E Fry & Associates Limited					Sheet 1/1																														
Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling																																			
			0.10	Concrete	<table><tr><td rowspan="2">Date</td><td rowspan="2">Time</td><td rowspan="2">Depth Struck (m)</td><td rowspan="2">Casing Depth (m)</td><td rowspan="2">Inflow Rate</td><td colspan="4">Readings</td><td rowspan="2">Depth Sealed (m)</td></tr><tr><td>5 min</td><td>10 min</td><td>15 min</td><td>20 min</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>										Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)	5 min	10 min	15 min	20 min													
					Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)																											
5 min	10 min	15 min	20 min																																						
			1.00	Bentonite Seal	Groundwater Observations During Drilling																																				
					<table><tr><td rowspan="2">Date</td><td colspan="5">Start of Shift</td><td colspan="5">End of Shift</td></tr><tr><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>										Date	Start of Shift					End of Shift					Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)						
Date	Start of Shift					End of Shift																																			
	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)																															
			3.60	Well Screen	Instrument Groundwater Observations																																				
					Inst. [A] Type : Slotted Standpipe																																				
			3.90	Bottom Fill	<table><tr><td rowspan="2">Date</td><td colspan="3">Instrument [A]</td><td colspan="6" rowspan="2">Remarks</td></tr><tr><td>Time</td><td>Depth (m)</td><td>Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>										Date	Instrument [A]			Remarks						Time	Depth (m)	Level (mOD)														
					Date	Instrument [A]			Remarks																																
Time	Depth (m)	Level (mOD)																																							
Remarks																																									

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>					Site Gwernaffield Road, Mold					Borehole Number WS05									
Installation Type Single Installation			Dimensions Internal Diameter of Tube [A] = 35 mm Diameter of Filter Zone = 70 mm			Client					Job Number 17-1584								
			Location		Ground Level (mOD)	Engineer Robert E Fry & Associates Limited					Sheet 1/1								
Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling													
				0.10	Concrete	Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)				
									5 min	10 min	15 min	20 min							
				1.00	Bentonite Seal	Groundwater Observations During Drilling													
						Date	Start of Shift					End of Shift							
							Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)			
						Instrument Groundwater Observations													
						Inst. [A] Type : Slotted Standpipe													
						Date	Instrument [A]			Remarks									
							Time	Depth (m)	Level (mOD)										
				</															

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold							Borehole Number WS08																																																																																																																																																																																																																																																																																																			
Installation Type Single Installation			Dimensions Internal Diameter of Tube [A] = 35 mm Diameter of Filter Zone = 70 mm				Client							Job Number 17-1584																																																																																																																																																																																																																																																																																																		
			Location			Ground Level (mOD)		Engineer Robert E Fry & Associates Limited							Sheet 1/1																																																																																																																																																																																																																																																																																																	
<table border="1"><thead><tr><th>Legend</th><th>Water</th><th>Instr (A)</th><th>Level (mOD)</th><th>Depth (m)</th><th>Description</th><th colspan="10">Groundwater Strikes During Drilling</th></tr><tr><th rowspan="2"></th><th rowspan="2"></th><th rowspan="2"></th><th rowspan="2"></th><th rowspan="2"></th><th rowspan="2"></th><th>Date</th><th>Time</th><th>Depth Struck (m)</th><th>Casing Depth (m)</th><th>Inflow Rate</th><th colspan="4">Readings</th><th>Depth Sealed (m)</th></tr><tr><th></th><th></th><th></th><th></th><th></th><th>5 min</th><th>10 min</th><th>15 min</th><th>20 min</th><th></th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td><td>0.10</td><td>Concrete</td><td>30/08/17</td><td></td><td>1.80</td><td></td><td>Seepage</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="9">1.00</td><td>Bentonite Seal</td><td colspan="10">Groundwater Observations During Drilling</td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="2">Date</td><td colspan="5">Start of Shift</td><td colspan="5">End of Shift</td></tr><tr><td></td><td></td><td></td><td></td><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td><td>Time</td><td>Depth Hole (m)</td><td>Casing Depth (m)</td><td>Water Depth (m)</td><td>Water Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="3">3.50</td><td>Well Screen</td><td colspan="10">Instrument Groundwater Observations</td></tr><tr><td></td><td></td><td></td><td></td><td colspan="10">Inst. [A] Type : Slotted Standpipe</td></tr><tr><td></td><td></td><td></td><td></td><td rowspan="2">Date</td><td colspan="3">Instrument [A]</td><td colspan="7" rowspan="2">Remarks</td></tr><tr><td></td><td></td><td></td><td></td><td>Time</td><td>Depth (m)</td><td>Level (mOD)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>3.85</td><td>Bottom Fill</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>															Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling																Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)						5 min	10 min	15 min	20 min						0.10	Concrete	30/08/17		1.80		Seepage										1.00	Bentonite Seal	Groundwater Observations During Drilling														Date	Start of Shift					End of Shift									Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)																																																																																																														3.50	Well Screen	Instrument Groundwater Observations														Inst. [A] Type : Slotted Standpipe														Date	Instrument [A]			Remarks											Time	Depth (m)	Level (mOD)																				3.85	Bottom Fill									
Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling																																																																																																																																																																																																																																																																																																										
						Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)																																																																																																																																																																																																																																																																																																	
											5 min	10 min	15 min	20 min																																																																																																																																																																																																																																																																																																		
				0.10	Concrete	30/08/17		1.80		Seepage																																																																																																																																																																																																																																																																																																						
				1.00	Bentonite Seal	Groundwater Observations During Drilling																																																																																																																																																																																																																																																																																																										
					Date	Start of Shift					End of Shift																																																																																																																																																																																																																																																																																																					
						Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)																																																																																																																																																																																																																																																																																																	
				3.50	Well Screen	Instrument Groundwater Observations																																																																																																																																																																																																																																																																																																										
					Inst. [A] Type : Slotted Standpipe																																																																																																																																																																																																																																																																																																											
					Date	Instrument [A]			Remarks																																																																																																																																																																																																																																																																																																							
				Time		Depth (m)	Level (mOD)																																																																																																																																																																																																																																																																																																									
				3.85	Bottom Fill																																																																																																																																																																																																																																																																																																											
Remarks																																																																																																																																																																																																																																																																																																																

APPENDIX F

Geo-Ventures (UK) Limited Geotechnical and Environmental Services							Site Gwernaffield Road, Mold			Trial Pit Number TP02	
Excavation Method Machine Excavation		Dimensions			Ground Level (mOD)		Client			Job Number 17-1584	
		Location			Dates 29/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D					(0.20) 0.20	Brown sandy gravelly TOPSOIL with rootlets				
0.50	D					(1.00)	Brown fine SAND and fine / medum sub-rounded GRAVEL				
0.80	D										
1.00	D					1.20	Brown clayey medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
1.50	D					(0.60)	Brown claybound medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
2.00	D					1.80					
2.70	D					(0.90)					
						2.70	Complete at 2.70m				
Plan							Remarks				
							Groundwater seepage below 2.50m Pit sides collapsing				
							Scale (approx)		Logged By		Figure No.
							1:50		Dr J Crook		17-1584.TP02

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP04		
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584		
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water			
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets					
0.50	D				(1.30)	Brown fine / medium SAND and fine / medium sub-rounded GRAVEL					
1.00	D				(1.50) 0.15	Grey / brown clayey fine / medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders					
1.60	D				(0.25) 0.25	Grey / brown coarse SAND and fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders					
1.70	D				1.90	Complete at 1.90m					
1.90	D										
Plan						Remarks					
.						Groundwater seepage at base of pit					
.						Pit sides collapsing					
.											
.											
.											
.											
.						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP04	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP05	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets				
0.50	D				(0.80)	Brown gravelly fine / medium SAND				
1.00	D				1.00 (0.60)	Grey / yellow slightly clayey medium / coarse SAND and fine / medium sub-rounded GRAVEL				
1.70	D				1.60 (0.50)	Brown claybound coarse SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
2.00	D				2.10	Complete at 2.10m				
Plan						Remarks				
						Groundwater seepage at base of pit Pit sides collapsing				
						Scale (approx)		Logged By		Figure No.
						1:50		Dr J Crook		17-1584.TP05

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP06			
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584			
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1			
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water		
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets					
0.50	D				(0.60) 0.60	Brown fine / medium SAND and fine / medium sub-rounded GRAVEL					
1.00	D				0.80 (0.80)	Brown slightly clayey medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles					
1.70	D				1.60 (0.50)	Brown clayey sandy fine to medium sub-rounded GRAVEL with occasional cobbles and boulders					
2.00	D				2.10	Complete at 2.10m					
Plan 						Remarks Pit sides collapsing Groundwater seepage at base of pit					
						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP06	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP10		
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584		
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water	
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets					
0.50	D					Brown sandy fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders					
1.20	D				(1.80)						
1.80	D				2.00	Complete at 2.00m					
Plan						Remarks					
.						Pit sides collapsing					
.						Trial pit dry					
.											
.											
.											
.											
						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP10	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP11	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets			
1.00	D				(1.80)	Brown medium SAND and fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders			
1.50	D								
2.00	D				2.00	Complete at 2.00m			
Plan						Remarks			
.						Pit sides collapsing			
.						Trial pit dry			
.									
.									
.									
.									
.						Scale (approx)		Logged By	
						1:50		Dr J Crook	
								Figure No.	
								17-1584.TP11	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP12	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 29/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets			
0.50	D					Brown medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders			
1.00	D				(1.80)				
1.50	D								
					2.00	Complete at 2.00m			
Plan						Remarks			
.						Pit sides collapsing			
.						Trial pit dry			
.									
.									
.									
.									
						Scale (approx)		Logged By	
						1:50		Dr J Crook	
								Figure No.	
								17-1584.TP12	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP15	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.15	D				(0.25) 0.25	Brown gravelly TOPSOIL with rootlets			
0.50	D					Brown fine / medium SAND and fine /medium sub-rounded GRAVEL with occasional cobbles and boulders			
1.00	D				(1.95)				
2.10	D				2.20	Complete at 2.20m			
Plan						Remarks			
						Pit sides collapsing Trial pit dry			
Scale (approx)						Logged By		Figure No.	
1:50						Dr J Crook		17-1584.TP15	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP16		
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584		
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water			
0.15	D				(0.30) 0.30	Brown gravelly TOPSOIL					
0.50	D					Brown medium / coarse SAND and fine /medium sub-rounded GRAVEL with occasional cobbles and boulders					
1.00	D				(1.40)						
1.50	D				1.70	Complete at 1.70m					
Plan .						Remarks Pit sides collapsing Trial pit dry					
						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP16	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP17		
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584		
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water	
0.10	D				(0.30)	Brown gravelly TOPSOIL with rootlets					
					0.30	Brown gravelly fine SAND					
0.50	D				(0.60)						
0.80	D				0.90	Brown fine / medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders					
1.10	D				(1.20)						
2.00	D				2.10	Complete at 2.10m					
Plan						Remarks					
						Trial pit dry Pit sides collapsing					
						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP17	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>										Site Gwernaffield Road, Mold			Trial Pit Number TP18	
Excavation Method Machine Excavation			Dimensions				Ground Level (mOD)		Client			Job Number 17-1584		
			Location				Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests		Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water		
0.10	D						(0.20) 0.20	Brown gravelly TOPSOIL with rootlets						
0.50	D							Brown medium SAND and fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders						
1.00	D						(1.90)							
2.00	D						2.10	Complete at 2.10m						
Plan							Remarks							
.							Trial pit dry							
.							Pit sides collapsing							
.														
.														
.														
.														
							Scale (approx)		Logged By		Figure No.			
							1:50		Dr J Crook		17-1584.TP18			

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>							Site Gwernaffield Road, Mold			Trial Pit Number TP19	
Excavation Method Machine Excavation		Dimensions			Ground Level (mOD)		Client			Job Number 17-1584	
		Location			Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D					(0.20)	Brown gravelly TOPSOIL with rootlets				
0.40	D					0.20	Brown medium / coarse SAND and fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders				
1.00	D					(2.00)					
2.00	D					2.20	Complete at 2.20m				
Plan							Remarks				
							Pit sides collapsing Trial pit dry				
							Scale (approx)		Logged By		Figure No.
							1:50		Dr J Crook		17-1584.TP19

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold			Trial Pit Number TP20	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets				
0.40	D				(0.40) 0.60	Light brown fine / medium SAND and fine sub-rounded GRAVEL				
1.00	D				(1.00) 1.60	Dark brown medium / coarse SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
1.80	D				(0.30) 1.90	Stiff brown gravelly CLAY				
2.10	D				(0.30) 2.20	Brown fine / medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
3.00	D					Complete at 3.00m				
Plan					Remarks					
					Trial pit dry Pit sides partially collapsing					
					Scale (approx)		Logged By		Figure No.	
					1:50		Dr J Crook		17-1584.TP20	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP21	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.15	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
0.40	D				0.30	Brown clayey silty SAND with fine / medium sub-rounded GRAVEL with occasional cobbles and boulders			
1.00	D				(1.90)				
2.00	D				2.20	Complete at 2.20m			
Plan						Remarks			
						Trial pit dry Pit sides partially collapsing			
Scale (approx)						Logged By		Figure No.	
1:50						Dr J Crook		17-1584.TP21	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold		Trial Pit Number TP22	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets			
0.40	D				(0.50) 0.70	Brown silty fine SAND			
1.00	D				(0.90)	Stiff brown gravelly CLAY			
1.50	D				1.60	Brown coarse SAND and fine /medium sub-rounded GRAVEL with occasional cobbles and boulders			
1.70	D				(0.40)				
2.00	D				2.00	Complete at 2.00m			
Plan						Remarks			
						Pit sides collapsing Slight seepage at base of pit			
				Scale (approx)		Logged By		Figure No.	
				1:50		Dr J Crook		17-1584.TP22	

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold			Trial Pit Number TP24	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584	
		Location							Dates 30/08/2017	Engineer Robert E Fry & Associates Limited
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL	[Pattern]			
0.40	D				(0.70)	Brown coarse SAND and fine / medium sub-rounded GRAVEL	[Pattern]			
1.00	D				0.90	Light grey / brown claybound fine / medium sub-rounded GRAVEL with occasional cobbles and boulders	[Pattern]			
1.90	D				(1.20)		[Pattern]			
		2.10	Complete at 2.10m							
Plan .					Remarks Seepage of water at 1.50m, collecting at base Pit sides collapsing					
					Scale (approx) 1:50		Logged By Dr J Crook		Figure No. 17-1584.TP24	

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold			Trial Pit Number TP25	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets				
0.50	D					Brown silty fine SAND / sandy SILT				
1.00	D				(1.40)					
					1.60	Firm brown sandy gravelly CLAY				
2.00	D				(0.70)					
					2.30	Brown coarse SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders				
2.60	D				(0.50)					
					2.80	Complete at 2.80m				
Plan						Remarks				
.	.	.	.	.	.	Pit sides partially collapsing Seepage of water at 2.60m				
.	.	.	.	.	.					
.	.	.	.	.	.					
.	.	.	.	.	.					
.	.	.	.	.	.					
.	.	.	.	.	.					
						Scale (approx)		Logged By		Figure No.
						1:50		Dr J Crook		17-1584.TP25

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP26		
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584		
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water	
0.10	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets					
0.40	D					Brown fine / medium SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders					
1.00	D				(2.30)						
2.00	D										
2.50	D				2.50	Complete at 2.50m					
Plan						Remarks					
						Pit sides partially collapsing Trial pit dry					
						Scale (approx)		Logged By		Figure No.	
						1:50		Dr J Crook		17-1584.TP26	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>							Site Gwernaffield Road, Mold			Trial Pit Number TP27	
Excavation Method Machine Excavation		Dimensions			Ground Level (mOD)		Client			Job Number 17-1584	
		Location			Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.15	D					(0.30)	Brown gravelly TOPSOIL with rootlets				
0.50	D					0.30	Brown fine / medium SAND with fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders				
1.00	D					(1.90)					
2.00	D					2.20	Complete at 2.20m				
Plan							Remarks				
.							Trial pit dry				
.							Pit sides collapsing				
.											
.											
.											
.											
							Scale (approx)		Logged By		Figure No.
							1:50		Dr J Crook		17-1584.TP27

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Gwernaffield Road, Mold		Trial Pit Number TP28	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client		Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.15	D				(0.30)	Brown gravelly TOPSOIL with rootlets			
					0.30	Light brown silty fine SAND with occasional fine sub-rounded gravel			
0.50	D				(0.40)	Brown silty fine SAND with occasional fine sub-rounded gravel			
					0.70				
1.00	D				(1.40)				
1.50	D								
2.30	D				2.10	Firm / stiff brown CLAY with occasional fine sub-rounded gravel			
					(0.40)				
					2.50	Brown clayey medium / coarse SAND and fine / medium sub-rounded GRAVEL with occasional cobbles and boulders			
					(0.50)				
3.00	D				3.00	Complete at 3.00m			
Plan						Remarks			
						Water enetering pit below 2.80m Pit sides partially collapsing			
Scale (approx)						Logged By		Figure No.	
1:50						Dr J Crook		17-1584.TP28	

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Gwernaffield Road, Mold			Trial Pit Number TP29	
Excavation Method Machine Excavation		Dimensions		Ground Level (mOD)		Client			Job Number 17-1584	
		Location		Dates 30/08/2017		Engineer Robert E Fry & Associates Limited			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.15	D				(0.20) 0.20	Brown gravelly TOPSOIL with rootlets				
0.60	D				(1.00)	Light brown fine / medium SAND and fine / medium sub-rounded GRAVEL				
1.30	D				1.20	Brown sandy fine to coarse sub-rounded GRAVEL with occasional cobbles and boulders				
2.00	D				(1.30)					
2.50	D				2.50	Complete at 2.50m				
Plan						Remarks				
						Pit sides partially collapsing Trial pit dry				
				Scale (approx)		Logged By		Figure No.		
				1:50		Dr J Crook		17-1584.TP29		

APPENDIX G

Trial Pit Photographs – Gwernaffield Rd, Mold



Photo 1 – Trial Pit 01



Photo 2 – Arising's from Trial Pit 01



Photo 3 – Trial Pit 02



Photo 4 – Arising's Trial Pit 02



Photo 5 – Trial Pit 03



Photo 6 – Arising's from Trial Pit 03



Photo 7 – Trial Pit 04



Photo 8 – Arising's from Trial Pit 04



Photo 9 – Trial Pit 05



Photo 10 – Arising's from Trial Pit 05



Photo 11 – Trial Pit 06



Photo 12 – Arising's from Trial Pit 06



Photo 13 – Trial Pit 07



Photo 14 – Arising's from Trial Pit 07



Photo 15 – Trial Pit 08



Photo 16 – Arising's from Trial Pit 08



Photo 17 – Trial Pit 09



Photo 18 – Arising's from Trial Pit 09



Photo 19 – Trial Pit 10



Photo 20 – Arising's from Trial Pit 10



Photo 21 – Trial Pit 11



Photo 22 – Arising's from Trial Pit 11



Photo 23 – Trial Pit 12



Photo 24 – Arising's from Trial Pit 12



Photo 25 – Trial Pit 13



Photo 26 – Arising's from Trial Pit 13



Photo 27 – Trial Pit 14



Photo 28 – Arising's from Trial Pit 14



Photo 29 – Trial Pit 15



Photo 30 – Arising's from Trial Pit 15



Photo 31 – Trial Pit 16



Photo 32 – Arising's from Trial Pit 16



Photo 33 – Trial Pit 17



Photo 34 – Arising's from Trial Pit 17



Photo 35 – Trial Pit 18



Photo 36 – Arising's from Trial Pit 18



Photo 37 – Trial Pit 19



Photo 38 – Arising's from Trial Pit 19



Photo 39 – Trial Pit 20



Photo 40 – Arising's from Trial Pit 20



Photo 41 – Trial Pit 21



Photo 42 – Arising's from Trial Pit 21



Photo 43 – Trial Pit 22



Photo 44 – Arising's from Trial Pit 22



Photo 45 – Trial Pit 23



Photo 46 – Arising's from Trial Pit 23



Photo 47 – Trial Pit 24



Photo 48 – Arising's from Trial Pit 24



Photo 49 – Trial Pit 25



Photo 50 – Arising's from Trial Pit 25



Photo 51 – Trial Pit 26



Photo 52 – Arising's from Trial Pit 26



Photo 53 – Trial Pit 27



Photo 54 – Arising's from Trial Pit 27



Photo 55 – Trial Pit 28



Photo 56 – Arising's from Trial Pit 28



Photo 57 – Trial Pit 29



Photo 58 – Arising's from Trial Pit 29

APPENDIX H



CENTREMAPS

Open Space, Upper Interfields,
Worcester, WR14 1UT

Groundsure Reference: CMAPS-CM-648937-30974-
210817EDR

Your Reference: 30974

Report Date 21 Aug 2017

Report Delivery Method: Email - pdf

Enviro Insight

Address: Gwernaffield Rd, Mold, CH7 1RR

Dear Sir/ Madam,

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

If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

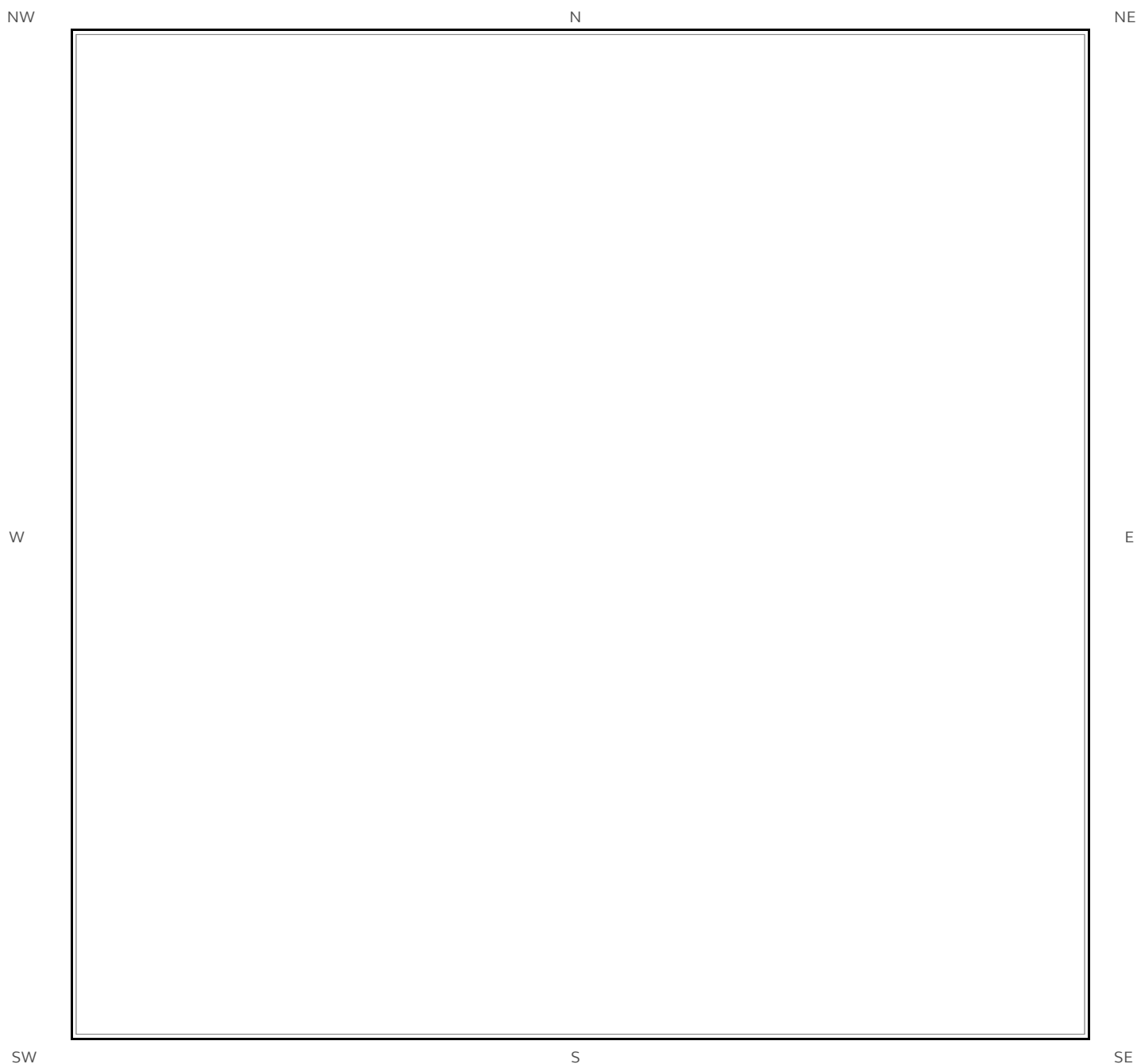
CENTREMAPS

Enc.
Groundsure Enviroinsight



Enviro Insight

Address: Gwernaffield Rd, Mold, CH7 1RR
Date: 21 Aug 2017
Reference: CMAPS-CM-648937-30974-210817EDR
Client: CENTREMAPS



Aerial Photograph Capture date: 04-Jun-2013
Grid Reference: 322898,364739
Site Size: 8.31ha

Report Reference: CMAPS-CM-648937-30974-210817EDR
Client Reference: 30974

Contents Page

Contents Page	3
Overview of Findings	6
Using this report	10
1. Historical Land Use	11
1. Historical Industrial Sites	12
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping	12
1.2 Additional Information – Historical Tank Database	13
1.3 Additional Information – Historical Energy Features Database	15
1.4 Additional Information – Historical Petrol and Fuel Site Database	16
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	16
1.6 Potentially Infilled Land	16
2. Environmental Permits, Incidents and Registers Map	18
2. Environmental Permits, Incidents and Registers	19
2.1 Industrial Sites Holding Licences and/or Authorisations	19
2.1.1 Records of historic IPC Authorisations within 500m of the study site	19
2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site	21
2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site	25
2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site	25
2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site	25
2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site	25
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	25
2.1.8 Records of Licensed Discharge Consents within 500m of the study site	26
2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site	26
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	26
2.2 Dangerous or Hazardous Sites	27
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents	27
2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site	27
2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site	28
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	28
3. Landfill and Other Waste Sites Map	29
3. Landfill and Other Waste Sites	30
3.1 Landfill Sites	30
3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site	30
3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site	30
3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site	31
3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site	31
3.2 Other Waste Sites	31
3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site	31
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site	32
4. Current Land Use Map	33
4. Current Land Uses	34
4.1 Current Industrial Data	34
4.2 Petrol and Fuel Sites	35
4.3 National Grid High Voltage Underground Electricity Transmission Cables	35
4.4 National Grid High Pressure Gas Transmission Pipelines	35

5. Geology	36
5.1 Artificial Ground and Made Ground.....	36
5.2 Superficial Ground and Drift Geology	36
5.3 Bedrock and Solid Geology	36
6 Hydrogeology and Hydrology	37
6a. Aquifer Within Superficial Geology	37
6b. Aquifer Within Bedrock Geology and Abstraction Licenses	38
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses	39
6d. Hydrogeology – Source Protection Zones within confined aquifer	40
6e. Hydrology – Detailed River Network and River Quality	41
6.Hydrogeology and Hydrology	42
6.1 Aquifer within Superficial Deposits.....	42
6.2 Aquifer within Bedrock Deposits.....	43
6.3 Groundwater Abstraction Licences.....	43
6.4 Surface Water Abstraction Licences.....	45
6.5 Potable Water Abstraction Licences.....	45
6.6 Source Protection Zones.....	45
6.7 Source Protection Zones within Confined Aquifer.....	45
6.8 Groundwater Vulnerability and Soil Leaching Potential.....	46
6.9 River Quality.....	46
6.9.1 Biological Quality:.....	46
6.9.2 Chemical Quality:.....	47
6.10 Detailed River Network.....	47
6.11 Surface Water Features.....	48
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)	49
7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS)	50
Map	50
7 Flooding	51
7.1 River and Coastal Zone 2 Flooding.....	51
7.2 River and Coastal Zone 3 Flooding.....	52
7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating.....	52
7.4 Flood Defences.....	52
7.5 Areas benefiting from Flood Defences.....	52
7.6 Areas benefiting from Flood Storage.....	53
7.7 Groundwater Flooding Susceptibility Areas.....	53
7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes.....	53
7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?.....	53
7.8 Groundwater Flooding Confidence Areas.....	53
8. Designated Environmentally Sensitive Sites Map	54
8. Designated Environmentally Sensitive Sites	55
8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:.....	55
8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:.....	55
8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:.....	55
8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:.....	55
8.5 Records of Ramsar sites within 2000m of the study site:.....	55
8.6 Records of Ancient Woodland within 2000m of the study site:	56
8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:.....	60
8.8 Records of World Heritage Sites within 2000m of the study site:.....	60
8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:	60

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:	60
8.11 Records of National Parks (NP) within 2000m of the study site:	61
8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:.....	61
8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:.....	61
8.14 Records of Green Belt land within 2000m of the study site:.....	61
9. Natural Hazards Findings	62
9.1 Detailed BGS GeoSure Data.....	62
9.1.1 Shrink Swell.....	62
9.1.2 Landslides.....	62
9.1.3 Soluble Rocks.....	62
9.1.4 Compressible Ground.....	63
9.1.5 Collapsible Rocks.....	63
9.1.6 Running Sand.....	63
9.2 Radon.....	63
9.2.1 Radon Affected Areas.....	63
9.2.2 Radon Protection.....	64
10. Mining	65
10.1 Coal Mining.....	65
10.2 Non-Coal Mining.....	65
10.3 Brine Affected Areas	65
Contact Details	66
Standard Terms and Conditions	68

Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	1	33	10
1.2 Additional Information – Historical Tank Database	0	0	37	29
1.3 Additional Information – Historical Energy Features Database	0	0	14	21
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	7
1.6 Potentially Infilled Land	0	5	15	10
Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	22	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	19	7
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	1	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	1	1
2.2 Records of COMAH and NIHHS sites	0	0	3	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	4	2
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
---	---------	-------	--------	---------	----------	-----------

3.1 Landfill Sites

3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	2	1	2
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	1
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	1	0

3.2 Landfill and Other Waste Sites Findings

3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
-----------------------------	---------	-------	--------	---------

4.1 Current Industrial Sites Data	0	0	12	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	1
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?

No

5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?

Yes

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

Section 6: Hydrogeology and Hydrology

0-500m

6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?

Yes

6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?

Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	10	0	1	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	2	0	1	1	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

0-500m

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	Yes
6.10 Detailed River Network entries within 500m of the site	0	1	6	10	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Yes					
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes					
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low					
7.4 Are there any Flood Defences within 250m of the study site?	Yes					
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	Yes					
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No					
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface					
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High					

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	3	18	72
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	1
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Very Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Negligible
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	Full radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	Yes
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	Yes
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

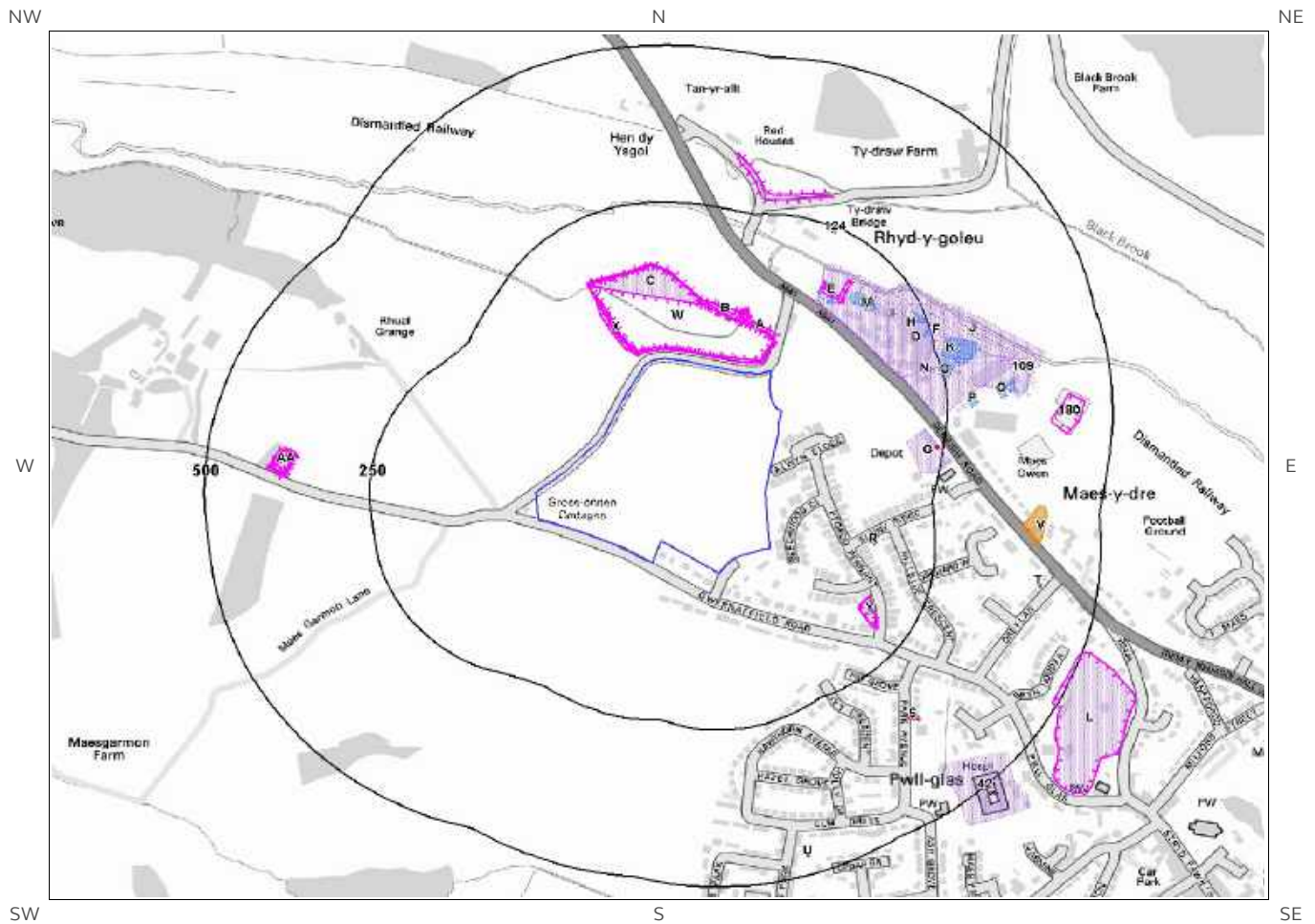
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Historical 1:10,000 and 1:10,560 scale mapping



Site Outline



Industrial Land Use



Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping



Search Buffers (m)



Energy Features



Petrol Stations



Tanks



Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 44

ID	Distance [m]	Direction	Use	Date
1X	18	NW	Unspecified Ground Workings	1979
2A	52	N	Unspecified Ground Workings	1992
3A	52	N	Unspecified Ground Workings	1964
4A	52	N	Unspecified Ground Workings	1979
5B	78	N	Unspecified Ground Workings	1992
6B	78	N	Unspecified Ground Workings	1964
7B	78	N	Unspecified Ground Workings	1979
8C	93	N	Unspecified Heap	1989
9C	93	N	Unspecified Heap	1959
10C	93	N	Unspecified Heap	1971
11D	124	NE	Unspecified Works	1910
12H	128	NE	Tin Plate Works	1914
13D	130	NE	Unspecified Works	1992
14D	130	NE	Unspecified Works	1964
15D	130	NE	Unspecified Works	1979
16D	131	NE	Tin Plate Works	1898
17D	131	NE	Tin Plate Works	1938
18E	149	NE	Unspecified Ground Workings	1914
19E	149	NE	Unspecified Ground Workings	1914
20E	150	NE	Unspecified Ground Workings	1959
21E	150	NE	Unspecified Ground Workings	1971
22K	176	E	Unspecified Factory	1872
23F	176	E	Railway Sidings	1938
24F	176	E	Railway Sidings	1898
25F	184	E	Railway Sidings	1910
26F	185	E	Railway Sidings	1914
27G	194	E	Unspecified Depot	1979

28G	194	E	Unspecified Depot	1992
29H	198	NE	Unspecified Tank	1992
30I	198	NE	Chimney	1964
31I	198	NE	Unspecified Tank	1979
32J	213	NE	Railway Sidings	1979
33J	213	NE	Railway Sidings	1964
34K	233	E	Unspecified Tanks	1910
35K	258	E	Unspecified Tanks	1992
36K	259	E	Unspecified Tanks	1979
37K	259	E	Unspecified Tanks	1964
38K	264	E	Unspecified Tanks	1910
39J	267	E	Unspecified Tanks	1992
40J	267	E	Unspecified Tanks	1979
41Z	273	N	Unspecified Ground Workings	1910
42	429	SE	Hospital	1992
43L	492	SE	Unspecified Ground Workings	1964
44L	492	SE	Unspecified Ground Workings	1979

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary:

66

ID	Distance (m)	Direction	Use	Date
45E	137	NE	Unspecified Tank	1991
46E	138	NE	Unspecified Tank	1991
47E	144	NE	Tanks	1991
48E	145	NE	Tanks	1991
49E	145	NE	Unspecified Tank	1991
50M	165	NE	Tanks	1994
51M	165	NE	Tanks	1991
52M	173	NE	Unspecified Tank	1991
53N	221	E	Unspecified Tank	1988
54N	221	E	Unspecified Tank	1989
55N	221	E	Unspecified Tank	1984
56N	221	E	Unspecified Tank	1988
57H	222	E	Tanks	1994
58N	228	E	Unspecified Tank	1970
59H	231	E	Tanks	1991
60H	231	E	Tanks	1988

61H	231	E	Tanks	1988
62H	231	E	Tanks	1984
63H	231	E	Tanks	1989
64H	234	E	Tanks	1970
65H	234	E	Tanks	1990
66H	234	E	Tanks	1960
67F	237	E	Tanks	1994
68F	241	E	Tanks	1988
69F	241	E	Tanks	1989
70F	241	E	Tanks	1988
71F	241	E	Tanks	1991
72F	241	E	Tanks	1984
73F	244	E	Tanks	1970
74F	244	E	Tanks	1990
75O	245	E	Tanks	1994
76O	246	E	Tanks	1991
77O	248	E	Unspecified Tank	1991
78O	248	E	Unspecified Tank	1988
79O	248	E	Unspecified Tank	1984
80O	248	E	Unspecified Tank	1989
81O	248	E	Unspecified Tank	1988
82O	251	E	Unspecified Tank	1994
83O	251	E	Unspecified Tank	1970
84O	251	E	Unspecified Tank	1990
85K	256	E	Tanks	1994
86K	256	E	Tanks	1988
87K	256	E	Tanks	1984
88K	256	E	Tanks	1988
89K	256	E	Tanks	1989
90K	259	E	Tanks	1970
91K	259	E	Tanks	1960
92K	259	E	Tanks	1991
93K	266	E	Tanks	1989
94K	266	E	Tanks	1988
95K	266	E	Tanks	1984
96K	266	E	Tanks	1988
97K	266	E	Tanks	1991
98K	268	E	Unspecified Tank	1990
99J	269	E	Tanks	1970
100J	269	E	Tanks	1960
101P	280	E	Tanks	1994
102P	281	E	Tanks	1991
103J	292	E	Unspecified Tank	1990
104Q	324	E	Tanks	1991
105Q	341	E	Tanks	1994
106Q	342	E	Tanks	1991

107Q	343	E	Unspecified Tank	1991
108Q	350	E	Tanks	1991
109	365	E	Unspecified Tank	1991
110V	408	E	Unspecified Tank	1970

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary:

35

ID	Distance (m)	Direction	Use	Date
111R	154	E	Electricity Substation	1991
112R	154	E	Electricity Substation	1989
113R	154	E	Electricity Substation	1988
114R	154	E	Electricity Substation	1984
115R	154	E	Electricity Substation	1988
116R	156	E	Electricity Substation	1970
117R	156	E	Electricity Substation	1990
118R	156	E	Electricity Substation	1994
119G	236	E	Electricity Substation	1984
120G	237	E	Electricity Substation	1970
121G	237	E	Electricity Substation	1990
122G	238	E	Electricity Substation	1994
123G	238	E	Electricity Substation	1991
124	241	NE	Electricity Substation	1991
125S	335	SE	Electricity Substation	1991
126S	335	SE	Electricity Substation	1988
127S	335	SE	Electricity Substation	1989
128S	335	SE	Electricity Substation	1984
129S	336	SE	Electricity Substation	1994
130S	337	SE	Electricity Substation	1970
131S	337	SE	Electricity Substation	1990
132T	406	E	Electricity Substation	1988
133T	406	E	Electricity Substation	1988
134T	406	E	Electricity Substation	1984
135T	409	E	Electricity Substation	1990
136T	409	E	Electricity Substation	1970
137T	409	E	Electricity Substation	1994
138T	409	E	Electricity Substation	1991
139U	464	S	Electricity Substation	1988
140U	464	S	Electricity Substation	1984
141U	464	S	Electricity Substation	1991

142U	464	S	Electricity Substation	1989
143U	465	S	Electricity Substation	1970
144U	465	S	Electricity Substation	1990
145U	465	S	Electricity Substation	1994

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 7

ID	Distance (m)	Direction	Use	Date
146V	381	E	Garage	1988
147V	381	E	Garage	1989
148V	381	E	Garage	1988
149V	381	E	Garage	1984
150V	383	E	Garage	1960
151V	383	E	Garage	1970
152V	383	E	Garage	1990

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 30

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
153W	14	N	Pond	1872
154W	15	N	Pond	1914
155W	17	N	Pond	1938
156W	17	N	Pond	1898
157X	18	NW	Unspecified Ground Workings	1979
158A	52	N	Unspecified Ground Workings	1979

159A	52	N	Unspecified Ground Workings	1964
160A	52	N	Unspecified Ground Workings	1992
161B	78	N	Unspecified Ground Workings	1964
162B	78	N	Unspecified Ground Workings	1992
163B	78	N	Unspecified Ground Workings	1979
164C	93	N	Unspecified Heap	1989
165C	93	N	Unspecified Heap	1971
166C	93	N	Unspecified Heap	1959
167E	149	NE	Unspecified Ground Workings	1914
168E	149	NE	Unspecified Ground Workings	1914
169E	150	NE	Unspecified Ground Workings	1959
170E	150	NE	Unspecified Ground Workings	1971
171Y	163	SE	Pond	1914
172Y	164	SE	Pond	1938
173Z	273	N	Unspecified Ground Workings	1910
174AA	365	W	Pond	1872
175AA	368	W	Pond	1964
176AA	368	W	Pond	1979
177AA	369	W	Pond	1938
178AA	370	W	Pond	1910
179AA	371	W	Pond	1914
180	407	E	Pond	1992
181L	492	SE	Unspecified Ground Workings	1964
182L	492	SE	Unspecified Ground Workings	1979

2. Environmental Permits, Incidents and Registers Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

- | | | |
|-------------------------------|---|--|
| Site Outline | Recorded Pollution Incident | RAS 3 & 4 Authorisations |
| Dangerous Substances (List 1) | Dangerous Substances (List 2) | Part A(1) Authorised Processes and Historic IPC Authorisations |
| Water Industry Referrals | Licenced Discharge Consents | Part A(2) and Part B Authorised Processes |
| Red List Discharge Consents | Sites Determined as Contaminated Land | COMAH / NIHHS Sites |
| | Hazardous Substance Consents and Enforcements | |

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

22

The following IPC Authorisations are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
89A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AS9747 Original Permit Number: IPCMINVAR Date Approved: 10-8-1995 Effective Date: 18-8-1995 Status: Superseded By Variation
90A	210	E	323260 364880	Operator: Dyno Industries (UK) Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: BE1739 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Superseded By Variation
91A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AU9187 Original Permit Number: IPCMINVAR Date Approved: 12-2-1996 Effective Date: 19-2-1996 Status: Superseded By Variation
92A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AK9062 Original Permit Number: IPCAIRAPP Date Approved: 21-2-1994 Effective Date: 25-2-1994 Status: Superseded By Variation
93A	210	E	323260 364880	Operator: Synthite Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: BE0236 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Revoked - Now Ippc
94A	210	E	323260 364880	Operator: Synthite Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AM8288 Original Permit Number: IPCMINVAR Date Approved: 22-5-1995 Effective Date: 27-5-1995 Status: Superseded By Variation

ID	Distance (m)	Direction	NGR	Details	
95A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: BD5062 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Revoked - Now Ippc
96A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AQ8972 Original Permit Number: IPCMINVAR Date Approved: 10-4-1995 Effective Date: 13-4-1995 Status: Superseded By Variation
97A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AI6053 Original Permit Number: IPCAPP Date Approved: 21-7-1993 Effective Date: 21-7-1993 Status: Surrendered
98A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AR1442 Original Permit Number: IPCMINVAR Date Approved: 22-5-1995 Effective Date: 27-5-1995 Status: Superseded By Variation
99A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: BD2748 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Revoked - Now Ippc
100A	210	E	323260 364880	Operator: Synthite Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AK8848 Original Permit Number: IPCAIRAPP Date Approved: 1-3-1994 Effective Date: 2-3-1994 Status: Superseded By Variation
101A	210	E	323260 364880	Operator: Synthite Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AV2889 Original Permit Number: IPCMINVAR Date Approved: 18-3-1996 Effective Date: 25-3-1996 Status: Superseded By Variation
102A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AG5641 Original Permit Number: IPCAIRAPP Date Approved: 1-5-1993 Effective Date: 1-5-1993 Status: Superseded By Variation
103A	210	E	323260 364880	Operator: Synthite Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AZ1639 Original Permit Number: IPCMINVAR Date Approved: 7-11-1997 Effective Date: 14-11-1997 Status: Superseded By Variation
104A	210	E	323260 364880	Operator: Dyno Industries (UK) Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals	Permit Number: AV8356 Original Permit Number: IPCAJVAR Date Approved: 25-11-1996 Effective Date: 1-12-1996 Status: Superseded By Variation

ID	Distance (m)	Direction	NGR	Details
105A	210	E	323260 364880	Operator: Dyno Industries (UK) Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AR9044 Original Permit Number: IPCAIRAPP Date Approved: 20-10-1995 Effective Date: 20-10-1995 Status: Superseded By Variation
106A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AR1418 Original Permit Number: IPCMINVAR Date Approved: 25-5-1995 Effective Date: 27-5-1995 Status: Surrendered
107A	210	E	323260 364880	Operator: Dyno Industries (UK) Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: BA0102 Original Permit Number: IPCAJVAR Date Approved: 3-2-1998 Effective Date: 3-2-1998 Status: Superseded By Variation
108A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: AK9054 Original Permit Number: IPCAIRAPP Date Approved: 21-2-1994 Effective Date: 25-2-1994 Status: Superseded By Variation
109A	210	E	323260 364880	Operator: Synthite Ltd Address: Alynworks, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Inorganic Chemical Processes Permit Number: BI2036 Original Permit Number: IPCAPP Date Approved: 20-10-2000 Effective Date: 27-10-2000 Status: Revoked - Now Ippc
110A	210	E	323260 364880	Operator: Dyno Industries (UK) Ltd Address: Alyn Works, Denbigh Road, Mold, Clwyd, CH7 1BT Process: Manufacture And Use Of Organic Chemicals Permit Number: BU0974 Original Permit Number: IPCMINVAR Date Approved: 17-1-2003 Effective Date: 20-1-2003 Status: Revoked - Now Ippc

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

26

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
63D	160	NE	323200 364900	Operator: Dynea Uk Ltd Installation Name: - Process: ORGANIC CHEMICALS; PLASTIC MATERIALS EG POLYMERS Permit Number: BU2322 Original Permit Number: BU2322 EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2004-10-01 Status: Superseded By Pas

ID	Distance (m)	Direction	NGR	Details	
64A	210	E	323260 364880	Operator: Synthite Ltd Installation Name: - Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS	Permit Number: BU2349 Original Permit Number: BU2349 EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2004-10-01 Status: Superseded By Pas
65A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Mold Chemicals (alyn Works) Process: Producing organic chemicals such as:	Permit Number: BU2349IL Original Permit Number: BU2349IL EPR Reference: - Issue Date: 5/10/2004 Effective Date: 5/10/2004 Last date noted as effective: 2017-04-01 Status: Superseded
66A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 21/4/2009 Effective Date: 21/4/2009 Last date noted as effective: 2017-04-01 Status: Effective
67A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Mold Chemicals (alyn Works) Process: -	Permit Number: BU2349IL Original Permit Number: BU2349IL EPR Reference: - Issue Date: 5/10/2004 Effective Date: 5/10/2004 Last date noted as effective: 2017-04-01 Status: Superseded
68A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 21/4/2009 Effective Date: 21/4/2009 Last date noted as effective: 2017-04-01 Status: Effective
69A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Mold Chemicals (alyn Works) Process: -	Permit Number: BU2349IL Original Permit Number: BU2349IL EPR Reference: - Issue Date: 5/10/2004 Effective Date: 5/10/2004 Last date noted as effective: 2017-04-01 Status: Superseded
70A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS	Permit Number: EP3039GC Original Permit Number: BU2349IL EPR Reference: - Issue Date: 21/4/2009 Effective Date: 21/4/2009 Last date noted as effective: 2017-04-01 Status: Effective
71A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Mold Chemicals (alyn Works) Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS	Permit Number: BU2349IL Original Permit Number: BU2349IL EPR Reference: - Issue Date: 5/10/2004 Effective Date: 5/10/2004 Last date noted as effective: 2017-04-01 Status: Superseded

ID	Distance (m)	Direction	NGR		Details
72A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 21/4/2009 Effective Date: 21/4/2009 Last date noted as effective: 2017-04-01 Status: Effective
73A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: Producing organic chemicals such as:	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 21/4/2009 Effective Date: 21/4/2009 Last date noted as effective: 2017-04-01 Status: Effective
74A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
75A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
76A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: Producing organic chemicals such as:	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
77A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
78A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
79A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: -	Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued

ID	Distance (m)	Direction	NGR	Details
80A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: Producing organic chemicals such as: Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
81A	210	E	323260 364880	Operator: Synthite Limited Installation Name: Alyn Works Epr/bu2349il Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS Permit Number: BU2349IL Original Permit Number: - EPR Reference: - Issue Date: 24/11/2016 Effective Date: 24/11/2016 Last date noted as effective: 2017-04-01 Status: Issued
82B	277	E	323330 364790	Operator: Ts Resins Ltd Installation Name: Alyn Works Epr/up3831es Process: - Permit Number: UP3831ES Original Permit Number: UP3831ES EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Transfer Effective
83B	277	E	323330 364790	Operator: Ts Resins Ltd Installation Name: Alyn Works Epr/up3831es Process: ORGANIC CHEMICALS; PLASTIC MATERIALS EG POLYMERS Permit Number: UP3831ES Original Permit Number: UP3831ES EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Transfer Effective
84B	277	E	323330 364790	Operator: Ts Resins Ltd Installation Name: Alyn Works Epr/up3831es Process: Producing organic chemicals such as: Permit Number: UP3831ES Original Permit Number: UP3831ES EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Transfer Effective
85B	277	E	323330 364790	Operator: T S Resins Limited Installation Name: Mold Chemicals (alyn Works) Process: ORGANIC CHEMICALS; PLASTIC MATERIALS EG POLYMERS Permit Number: UP3831ES Original Permit Number: - EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Effective
86B	277	E	323330 364790	Operator: T S Resins Limited Installation Name: Mold Chemicals (alyn Works) Process: Producing organic chemicals such as: Permit Number: UP3831ES Original Permit Number: - EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Effective
87B	277	E	323330 364790	Operator: T S Resins Limited Installation Name: Mold Chemicals (alyn Works) Process: - Permit Number: UP3831ES Original Permit Number: - EPR Reference: - Issue Date: 13/3/2014 Effective Date: 13/3/2014 Last date noted as effective: 2017-04-01 Status: Effective

ID	Distance (m)	Direction	NGR	Details	
88B	277	E	323330 364790	Operator: Dynea Uk Ltd Installation Name: Mold Chemicals (alyn Works) Process: ORGANIC CHEMICALS; PLASTIC MATERIALS EG POLYMERS	Permit Number: BU2322IF Original Permit Number: BU2322IF EPR Reference: - Issue Date: 5/10/2004 Effective Date: 5/10/2004 Last date noted as effective: 2017-04-01 Status: Superseded

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

3

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
7	192	NE	323190 365010	Address: ALYN WORKS MOLD, ALYN WORKS MOLD, MOLD, UNKNOWN, UNKNOWN, UNKNOWN Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: CM0100101 Permit Version: 1 Receiving Water: ALYN Status: REVOKED AND REPLACED BY IPC AUTHORISATION Issue date: 31/05/1984 Effective Date: 31-May-1984 Revocation Date: 03/05/1994
8	266	E	323320 364860	Address: ALYN WORKS MOLD, ALYN WORKS MOLD, UNKNOWN, UNKNOWN, UNKNOWN, UNKNOWN Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: CM0100201 Permit Version: 1 Receiving Water: ALYN Status: CONSENT EXPIRED - TIME LIMIT Issue date: 08/11/1962 Effective Date: 08-Nov-1962 Revocation Date: 18/02/1993
9	445	SE	323300 364250	Address: MOLD COMMUNITY HOSPITAL (HEADW, MOLD COMMUNITY HOSPITAL (HEADW, UNKNOWN, UNKNOWN, UNKNOWN, UNKNOWN Effluent Type: UNSPECIFIED Permit Number: CM0092501 Permit Version: 1 Receiving Water: UN-NAMED TRIB. OF ALYN Status: CONSENT EXPIRED - TIME LIMIT Issue date: 13/01/1982 Effective Date: 13-Jan-1982 Revocation Date: 18/02/1993

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

2

The following records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
111A	224	E	HS/0006	323274 364883	Approved	13/10/1999	Synthite Ltd, Alyn Works, Denbigh Road, Mold, CH7 1BT	Toxic Part B2 - 3400 Tonnes, Mcsa 1 - 100 Tonnes, Mcsa 2 - 200 Tonnes	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
112B	281	E	HS/0007	323334 364791	Approved	13/10/1999	TS Resins Ltd (Dynea), Alyn Works, Denbigh Road, Mold, CH7 1BF	Toxic Part B2 - 200 Tonnes	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site:

3

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
58C	127	NE	TS Resins Limited	TS Resins Limited, Mold, Alyn Works, Denbigh Road, Mold, Flintshire, CH7 1BT	Current COMAH Site	COMAH Lower Tier Operator
59C	129	NE	Synthite Ltd	Synthite Ltd, Mold, Alyn Works, Denbigh Road, Mold, Flintshire, CH7 1BT	Current COMAH Site	COMAH Upper Tier Operator
60	130	NE	Dynochem	Dynochem, Alyn Works, Denbigh Road, Mold, CH7 1BT	Historical NIHHS Site	-

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

6

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
1	174	E	323210 364643	Incident Date: 07-May-2001 Incident Identification: 4694 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	177	N	323000 365070	Incident Date: 26-Sep-2003 Incident Identification: 192770 Pollutant: Oils and Fuel Pollutant Description: Mixed/Waste Oils Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
3A	215	E	323265 364880	Incident Date: 08-Sep-2003 Incident Identification: 188192 Pollutant: Organic Chemicals/Products Pollutant Description: Alcohols/Aldehydes Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

ID	Distance (m)	Direction	NGR	Details	
4	225	N	323108 365105	Incident Date: 30-Sep-2002 Incident Identification: 111384 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
5	284	E	323340 364830	Incident Date: 22-Sep-2002 Incident Identification: 109689 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
6	290	N	322900 365200	Incident Date: 02-Mar-2003 Incident Identification: 140408 Pollutant: Oils and Fuel Pollutant Description: Petrol	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site?

0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

- | | | |
|--|---|---|
|  Site Outline |  EA/NRW Active Landfill |  Historic and Planned Waste Sites |
|  250 Search Buffers (m) |  EA/NRW Historic Landfill |  EA/NRW Licensed Waste Site |
|  500 |  BGS / DoE Survey Landfill |  Local Authority/Historical Mapping Landfill Records |

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

5

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details
2	273	N	323000 365100	Site Address: Rhyd Y Goleu, Mold Waste Licence: Yes Site Reference: NOW-415-L Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 18-Jul-1993 Licence Surrendered: 15-Dec-1995 Licence Holder Address: - Operator: - Licence Holder: Clwyd County Council First Recorded: 31-Dec-1993 Last Recorded: 31-Dec-1994
3	290	N	323100 365200	Site Address: Ty Draw, Rhydygoleu, Mold Waste Licence: Yes Site Reference: - Waste Type: Inert, Industrial, Household Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 19-Jul-1993 Licence Surrendered: - Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	851	W	321700 364900	Site Address: Rhual Controlled Refuse Tip, Gwenaffield Road, Mold, Flintshire Waste Licence: Yes Site Reference: - Waste Type: Inert, Industrial, Commercial, Household, Special Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: 01-Jun-1981 Licence Holder Address: - Operator: Mold Urban District Council Licence Holder: Delyn Borough Council First Recorded: 31-Dec-1967 Last Recorded: 31-Dec-1980
Not shown	1311	E	324300 364300	Site Address: Leadmills, Mold Waste Licence: Yes Site Reference: - Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Clwyd County Council First Recorded: 01-Mar-1991 Last Recorded: 01-Jul-1991

ID	Distance (m)	Direction	NGR	Details	
Not shown	1466	NW	321200 365300	Site Address: Rhydymwyn MOD Site No.2, Rhydymwyn Waste Licence: - Site Reference: - Waste Type: Industrial, Special Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Ministry of Defence First Recorded: 13-Dec-1939 Last Recorded: 31-Dec-1959

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

1

The following landfill records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1271	SW	321600.0 364000.0	Address: Rhual Tip, Gwenaffield Road, Mold, Wales BGS Number: 403.0	Risk: Risk to minor aquifer Waste Type: N/A

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

1

The following landfill records are represented as points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
Not shown	854	W	321769 364924	Refuse Tip	1970 mapping	Polygon

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

0

Database searched and no data found.

The map shows the Maes-y-dre area with the proposed development site outlined in blue. Two concentric black circles represent search radii of 500m and 250m from the site. Key features include:

- Roads:** A505, A506, A507, A508, A509, A510, A511, A512, A513, A514, A515, A516, A517, A518, A519, A520, A521, A522, A523, A524, A525, A526, A527, A528, A529, A530, A531, A532, A533, A534, A535, A536, A537, A538, A539, A540, A541, A542, A543, A544, A545, A546, A547, A548, A549, A550, A551, A552, A553, A554, A555, A556, A557, A558, A559, A560, A561, A562, A563, A564, A565, A566, A567, A568, A569, A570, A571, A572, A573, A574, A575, A576, A577, A578, A579, A580, A581, A582, A583, A584, A585, A586, A587, A588, A589, A590, A591, A592, A593, A594, A595, A596, A597, A598, A599, A600.
- Railways:** Discontinued Railway, Maesgarmon Lane, Maes-y-dre Railway.
- Landmarks:** Maesgarmon Farm, Maes-y-dre, Pwll-glas, Rhyd-y-goleu, Ty-draw Farm, Black Brook, Black Brook Farm, Football Ground, Car Park, Maesgarmon Lane, Maes-y-dre, Pwll-glas, Rhyd-y-goleu, Ty-draw Farm, Black Brook, Black Brook Farm, Football Ground, Car Park.

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

12

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1A	142	NE	Tank	323115 365011	CH7	Tanks (Generic)	Industrial Features
2A	144	NE	Tank	323108 365018	CH7	Tanks (Generic)	Industrial Features
3A	145	NE	Tank	323105 365020	CH7	Tanks (Generic)	Industrial Features
4A	149	NE	Tank	323110 365022	CH7	Tanks (Generic)	Industrial Features
5A	150	NE	Tank	323123 365015	CH7	Tanks (Generic)	Industrial Features
6A	155	NE	Tank	323114 365027	CH7	Tanks (Generic)	Industrial Features
7	159	E	Electricity Sub Station	323196 364621	CH7	Electrical Features	Infrastructure and Facilities
8	163	NE	Works	323132 365025	CH7	Unspecified Works Or Factories	Industrial Features
9	215	E	Synthite	323265 364880	Alyn Works, Denbigh Road, Mold, CH7 1BT	Colours, Chemicals and Water Softeners and Supplies	Industrial Products
10	221	E	Depot	323270 364765	CH7	Container and Storage	Transport, Storage and Delivery
11	248	NE	Electricity Sub Station	323136 365119	CH7	Electrical Features	Infrastructure and Facilities
12	248	N	Philip Wheldon	323084 365134	Holland Farm, Rhyd y Goleu, Mold, CH7 6LU	Vehicle Repair, Testing and Servicing	Repair and Servicing

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

1

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
13	388	E	323425 364634	Unbranded	Bailey View Garage, Denbigh Road, Denbigh Road, Mold, Flintshire, CH7 1BP	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site:

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site:

0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
GFSD-D-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
GFSD-D-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL

5.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
ETM-MDSC	ETRURIA FORMATION	MUDSTONE, SANDSTONE AND CONGLOMERATE
PLCM-MDSS	PENNINE LOWER COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
ETM-MDSC	ETRURIA FORMATION	MUDSTONE, SANDSTONE AND CONGLOMERATE

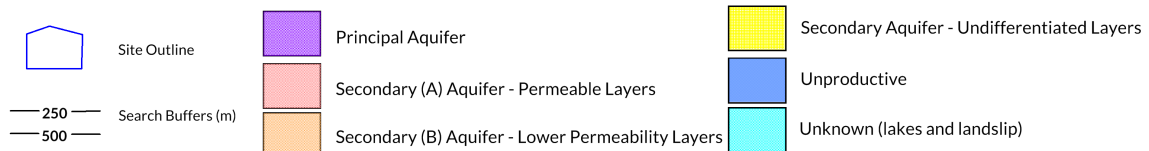
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



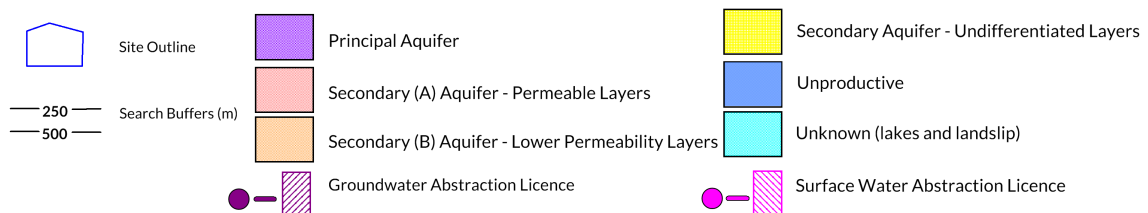
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



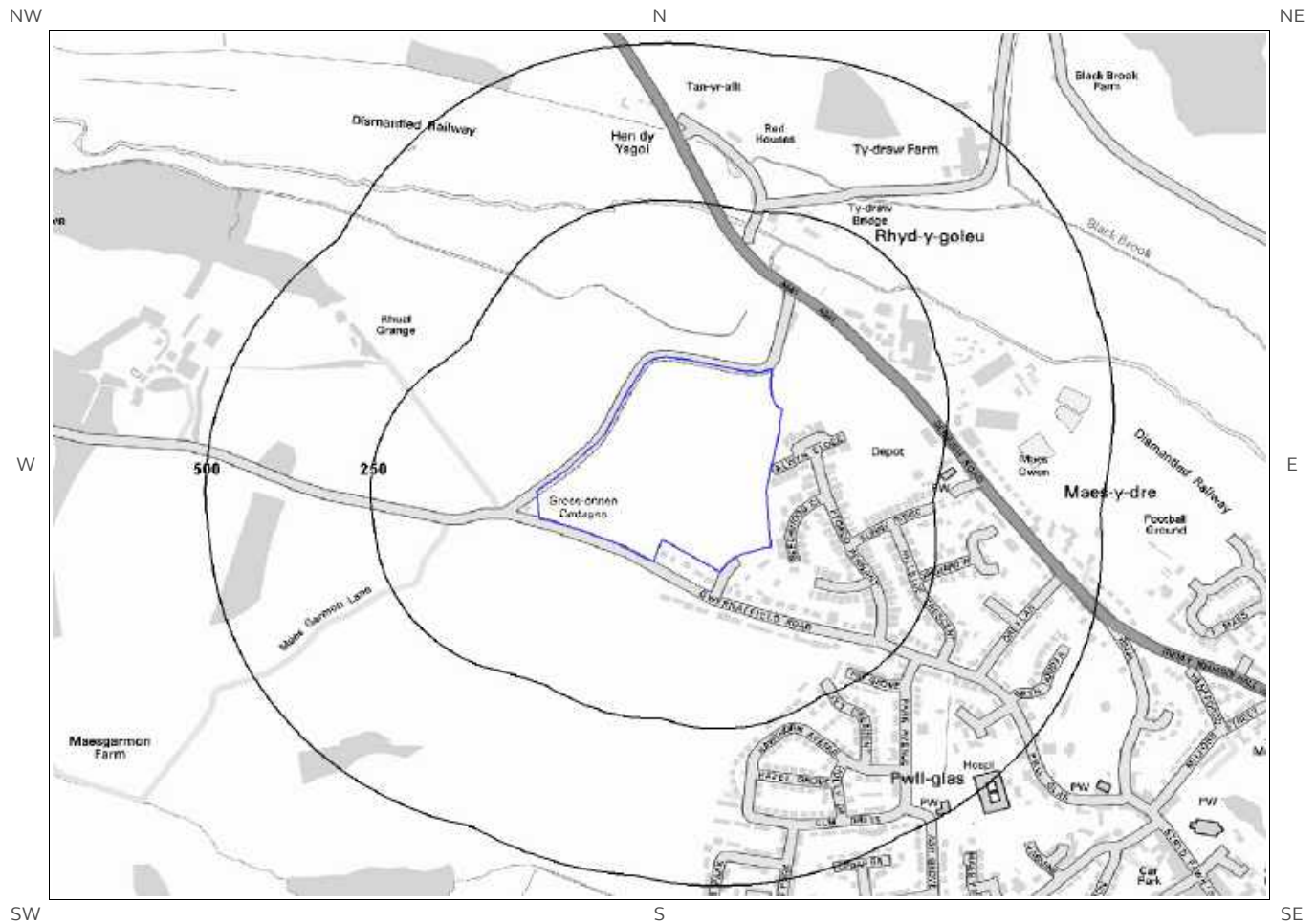
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



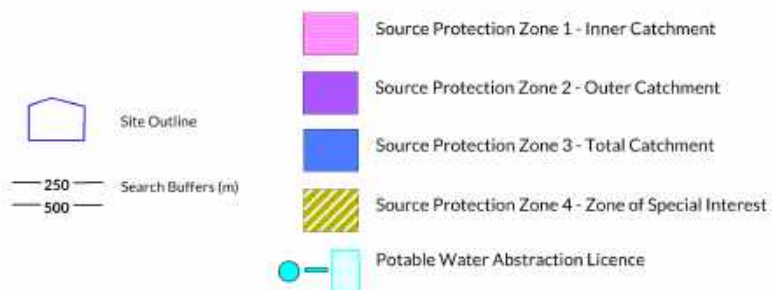
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



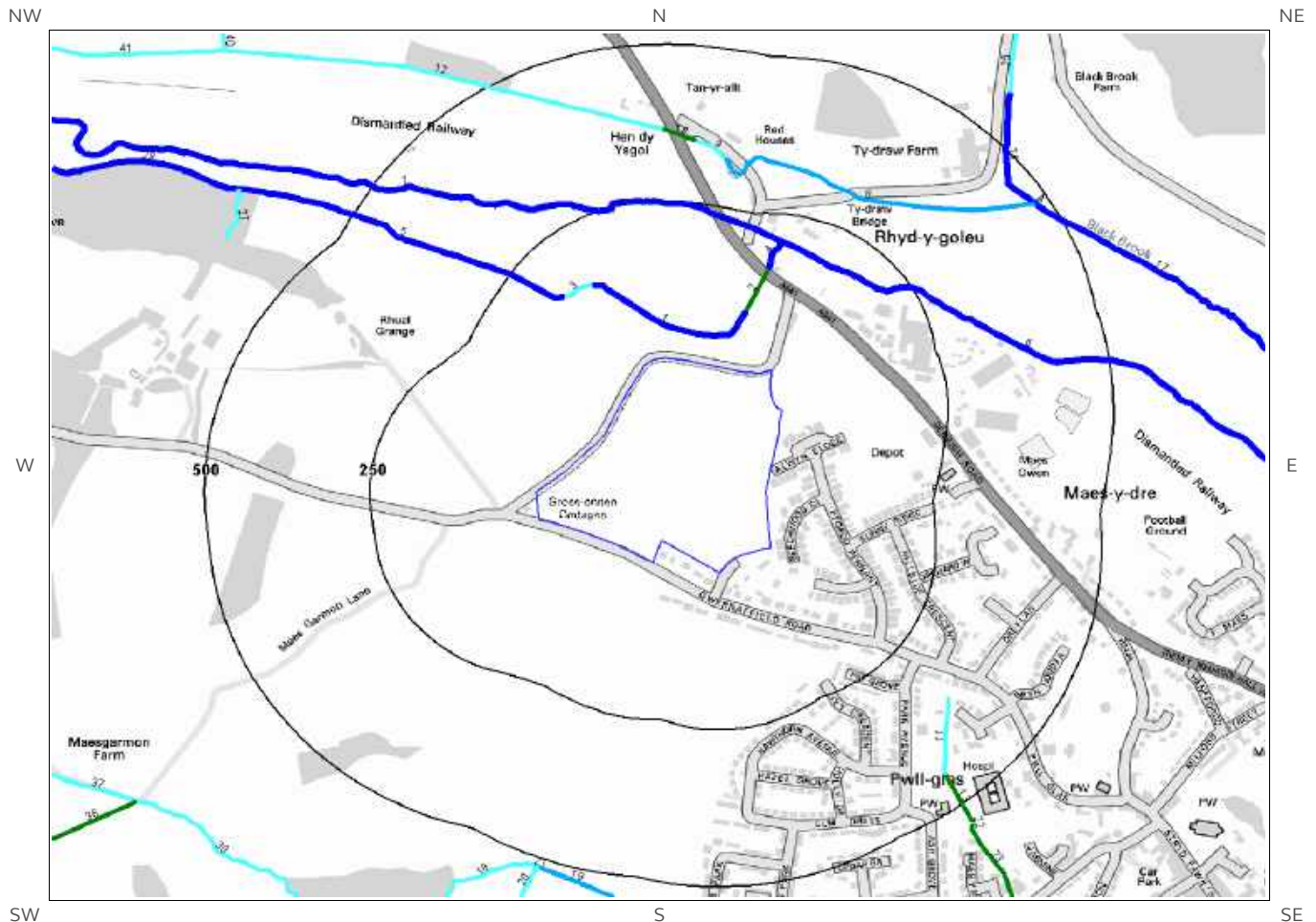
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



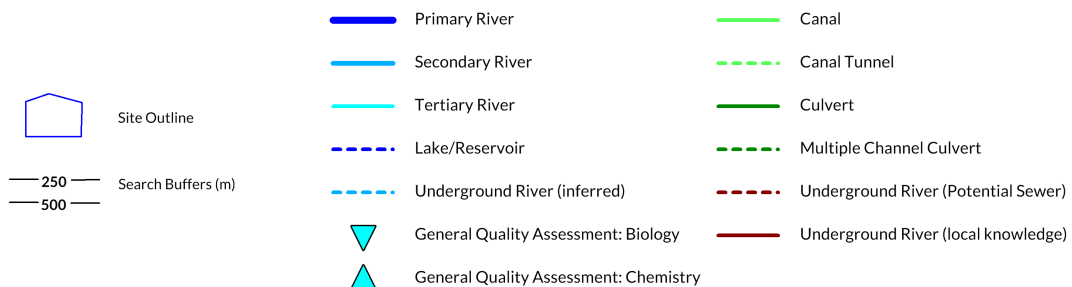
Legend:

- Site Outline
- Search Buffers (m)
 - 250
 - 500
- Source Protection Zone 1 - Inner Catchment
- Source Protection Zone 2C - Outer Catchment within Confined Aquifer
- Source Protection Zone 3C - Total Catchment within Confined Aquifer
- Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property?
Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	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	0	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
11	0	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
22	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
23	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
3	89	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
12	121	S	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
13	131	NW	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	232	NW	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
24	243	NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
25	298	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	351	W	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
6	354	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
7	440	NW	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

ID	Distance (m)	Direction	Designation	Description
14	458	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
15	461	NE	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
26	486	NE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	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	89	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

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
5A	127	E	323160 364930	Status: Historical Licence No: 24/67/8/0051 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: 200mm Dia., 8m Deep Borehole Data Type: Point Name: Synthite Ltd Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 475 SP Original Start Date: 12/1/1968 Expiry Date: - Issue No: 100 Version Start Date: 30/6/1998 Version End Date:
6A	127	E	323160 364930	Status: Active Licence No: WA/067/0008/006 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: Underground Strata Alyn Works Point A Data Type: Point Name: Synthite Ltd Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: WPCC2778 Original Start Date: 1/4/2015 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/4/2015 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
7A	127	E	323160 364930	Status: Historical Licence No: 24/67/8/0111 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: 200mm Dia., 8m Deep Borehole Data Type: Point Name: Synthite Ltd	Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: WANA3063 Original Start Date: 1/4/2008 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 1/4/2008 Version End Date:
8A	127	E	323160 364930	Status: Historical Licence No: 24/67/8/0105 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: 200mm Dia., 8m Deep Borehole Data Type: Point Name: Synthite Ltd	Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: 1922 Original Start Date: 15/10/2003 Expiry Date: 31/3/2008 Issue No: 1 Version Start Date: 7/3/2007 Version End Date:
9B	148	NE	323110 365021	Status: Historical Licence No: 24/67/8/0050 Details: Non-Evaporative Cooling Direct Source: Eaw Groundwater Point: Borehole 1 Data Type: Point Name: Synthite Ltd	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 475 UG Original Start Date: 12/1/1968 Expiry Date: - Issue No: 100 Version Start Date: 12/1/1968 Version End Date:
10B	149	NE	323110 365022	Status: Historical Licence No: 24/67/8/0050 Details: Non-Evaporative Cooling Direct Source: Eaw Groundwater Point: Borehole 3 Data Type: Point Name: Synthite Ltd	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 475 UG Original Start Date: 12/1/1968 Expiry Date: - Issue No: 100 Version Start Date: 12/1/1968 Version End Date:
11C	173	E	323210 364920	Status: Historical Licence No: 24/67/8/0051 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: Borehole 11m Deep, 250mm Dia Data Type: Point Name: Synthite Ltd	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 475 SP Original Start Date: 12/1/1968 Expiry Date: - Issue No: 100 Version Start Date: 30/6/1998 Version End Date:
12C	173	E	323210 364920	Status: Historical Licence No: 24/67/8/0111 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: Borehole 11m Deep, 250mm Dia Data Type: Point Name: Synthite Ltd	Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: WANA3063 Original Start Date: 1/4/2008 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 1/4/2008 Version End Date:
13C	173	E	323210 364920	Status: Historical Licence No: 24/67/8/0105 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: Borehole 11m Deep, 250mm Dia Data Type: Point Name: Synthite Ltd	Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: 1922 Original Start Date: 15/10/2003 Expiry Date: 31/3/2008 Issue No: 1 Version Start Date: 7/3/2007 Version End Date:
14C	174	E	323211 364921	Status: Active Licence No: WA/067/0008/006 Details: Evaporative Cooling Direct Source: Eaw Groundwater Point: Underground Strata At Alyn Works Point B Data Type: Point Name: Synthite Ltd	Annual Volume (m³): 110000 Max Daily Volume (m³): 327 Original Application No: WPCC2778 Original Start Date: 1/4/2015 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/4/2015 Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	886	SW	322470 363790	Status: Historical Licence No: 24/67/8/0014 Details: General Farming & Domestic Direct Source: Eaw Groundwater Point: Well Data Type: Point Name: Booth Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 516 Original Start Date: 9/8/1966 Expiry Date: - Issue No: 100 Version Start Date: 13/6/1995 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
211	N	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
408	NE	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Database searched and no data found.

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAH). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Chemical Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1067	E	324100 364506	River Name: Alyn Reach: Conf.unnamed Trib.- conf.dolfechlas Bk. End/Start of Stretch: Sample Point NGR	B	B	B	C	-

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	45	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
2	96	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
3	148	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	162	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
5	163	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
6	188	NE	River Name: River Alyn Welsh River Name: Afon Alun Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
7	204	N	River Name: River Alyn Welsh River Name: Afon Alun Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
8	305	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
9	327	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
10	349	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
11	359	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
12	365	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
13	446	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
14	465	NE	River Name: Black Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
15A	480	NE	River Name: Black Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
16A	481	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
17	481	NE	River Name: Black Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

6.11 Surface Water Features

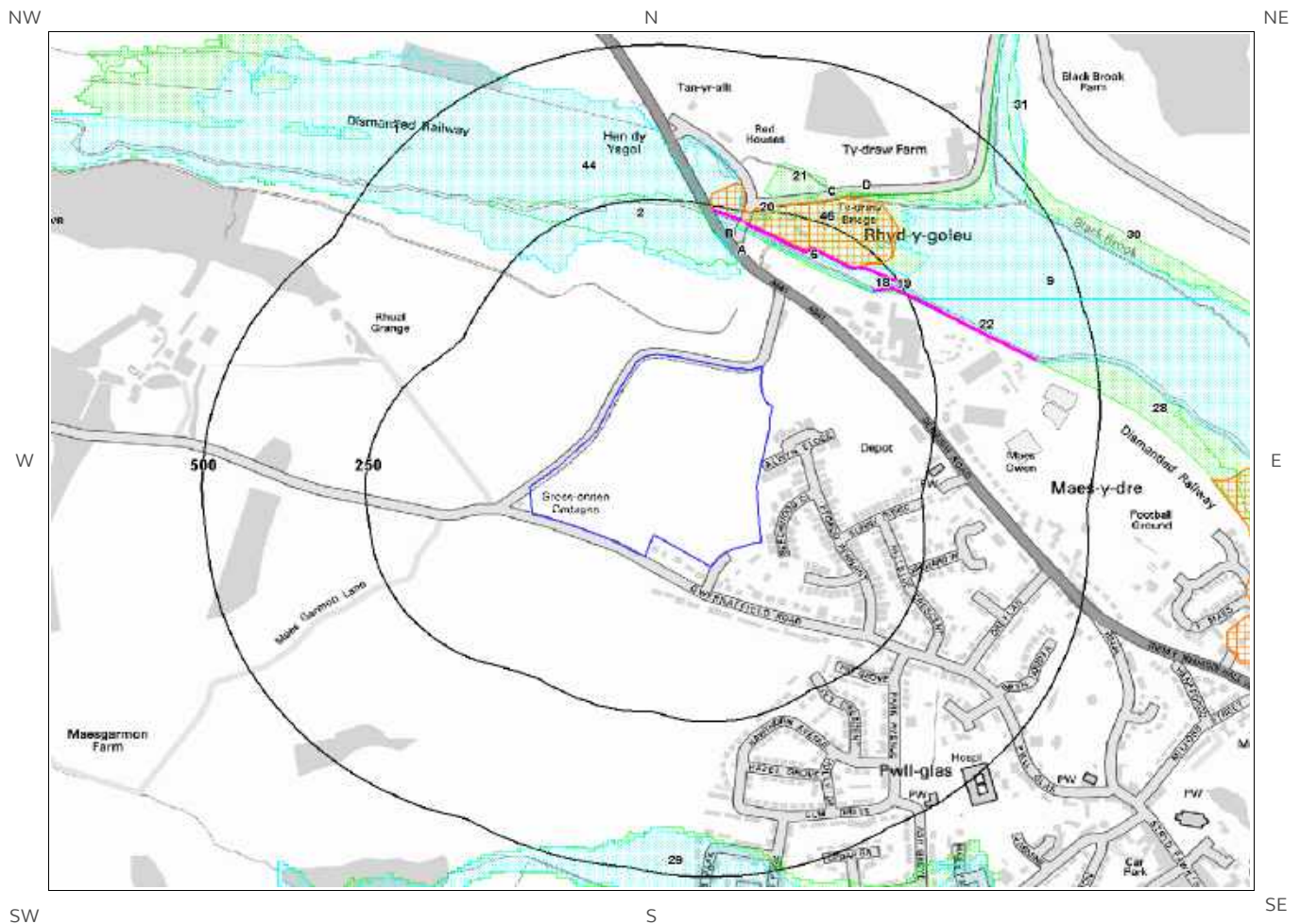
Are there any surface water features within 250m of the study site?

Yes

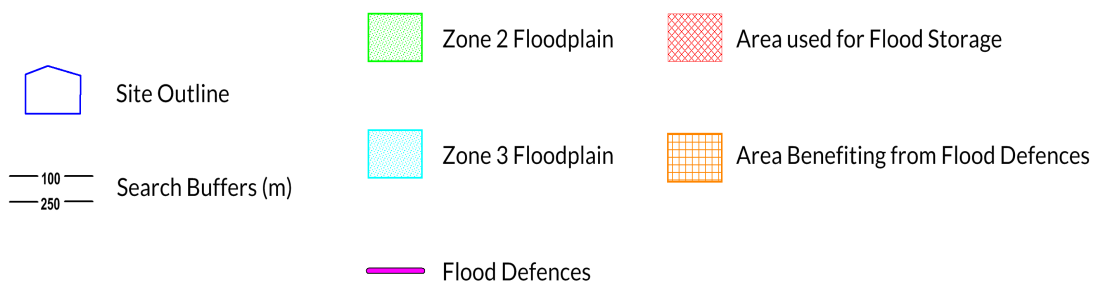
The following surface water records are not represented on mapping:

Distance (m)	Direction
45	N
92	N
148	NW
161	N
163	NW
225	N
234	N

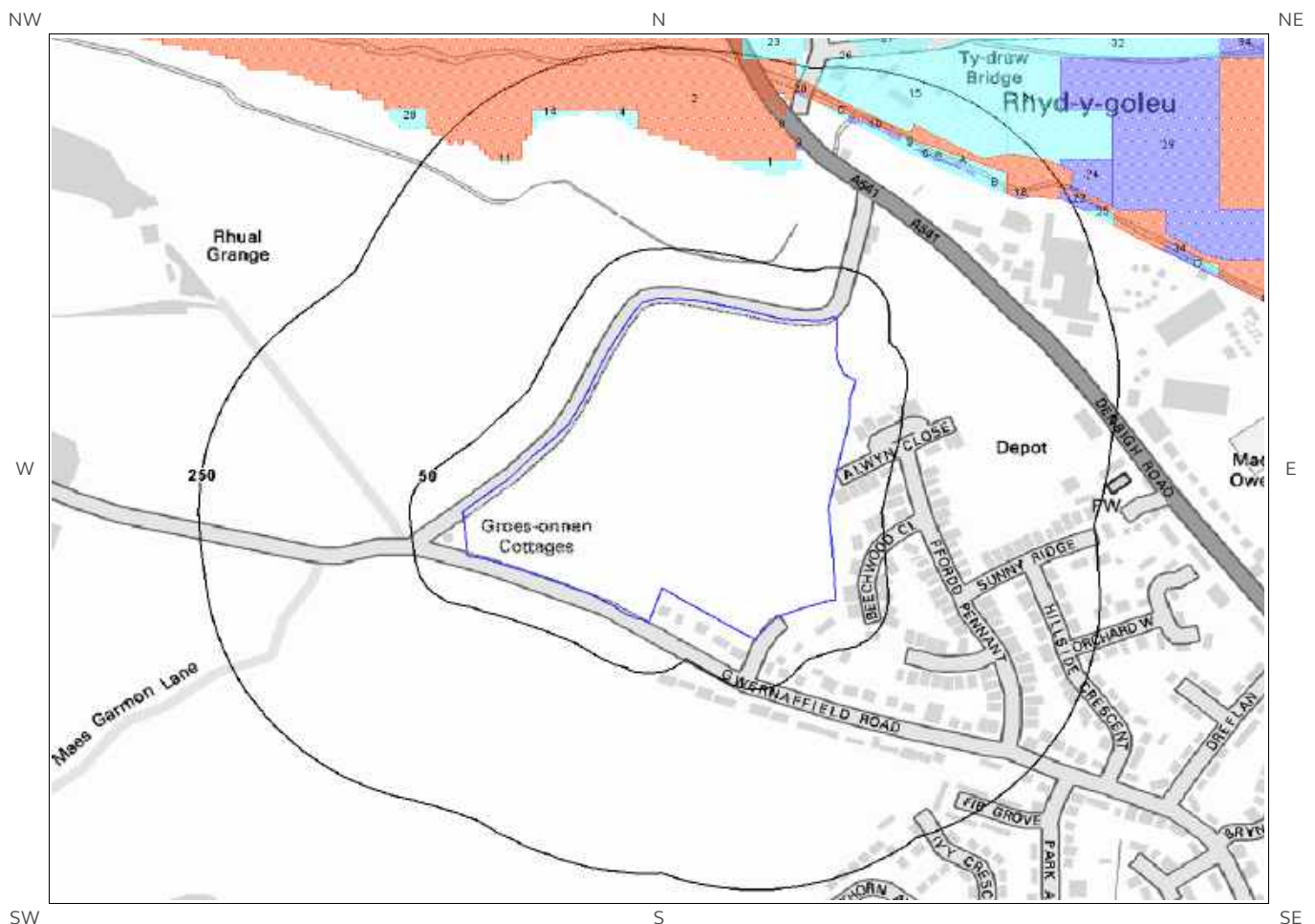
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



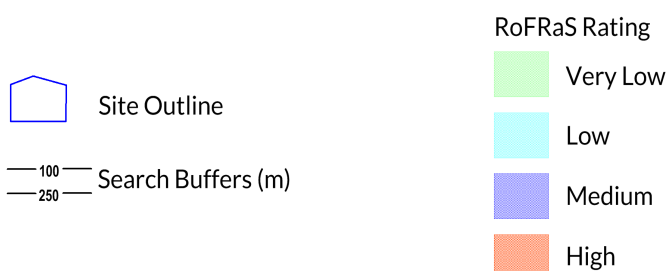
© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	136	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
2	153	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
3A	172	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
4A	175	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
5A	176	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
6	179	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
7A	180	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
8A	180	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
9	182	NE	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
10A	183	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
11A	184	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
12A	189	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
13B	192	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
14B	194	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
15B	196	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
16B	199	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
17B	200	N	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
18	207	NE	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
19	221	NE	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? **Yes**

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	136	N	19-Jun-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? **Very Low**

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? **Yes**

The following flood defence records are represented as lines on the Flood Map:

ID	Distance (m)	Direction	Update
48	197	N	16-Jun-2017
49	205	NE	16-Jun-2017
50	210	NE	16-Jun-2017
51	211	N	16-Jun-2017
52	236	N	16-Jun-2017

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? **Yes**

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site?

No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding?

Clearwater & Superficial
Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

7.8 Groundwater Flooding Confidence Areas

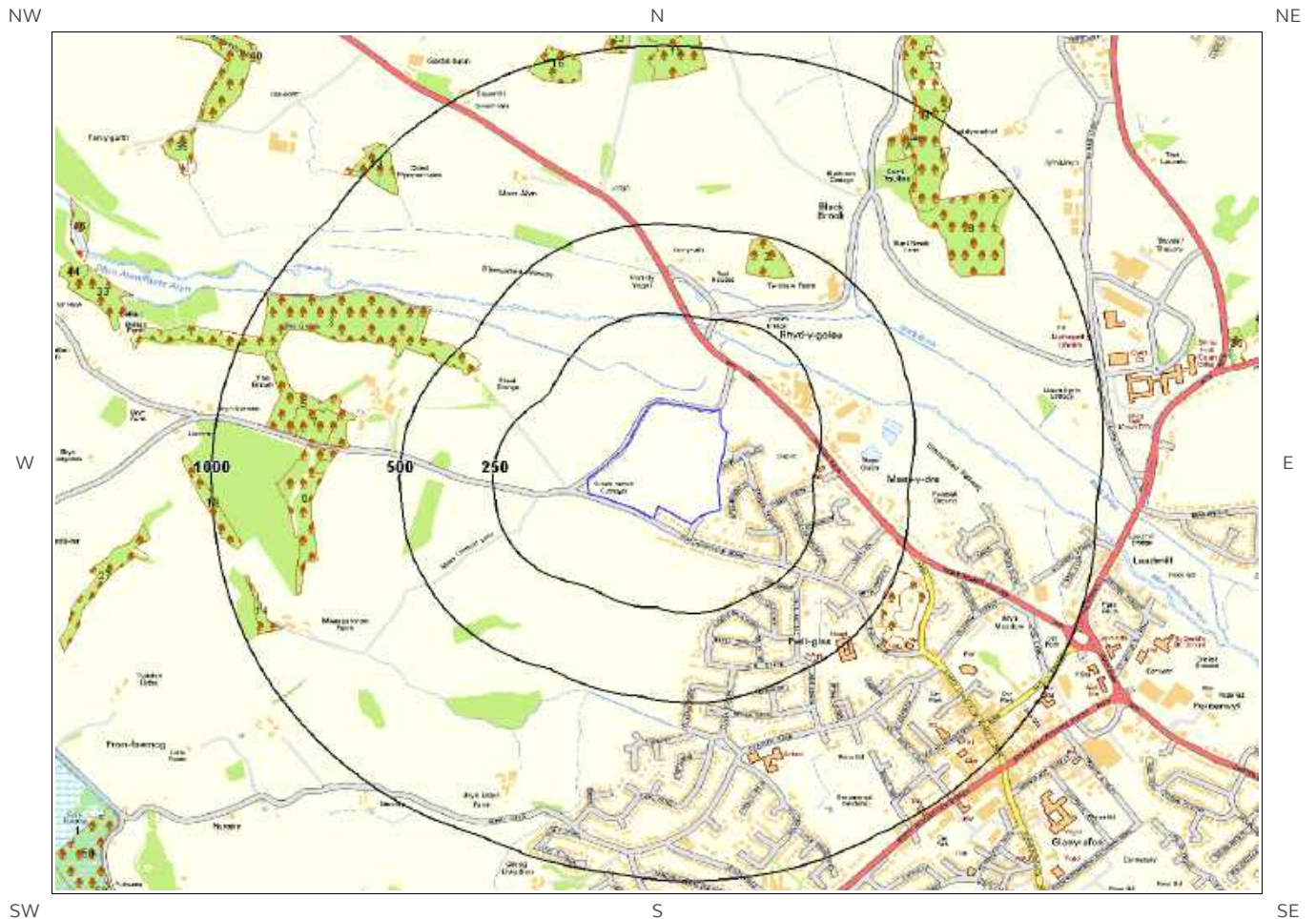
What is the British Geological Survey confidence rating in this result?

High

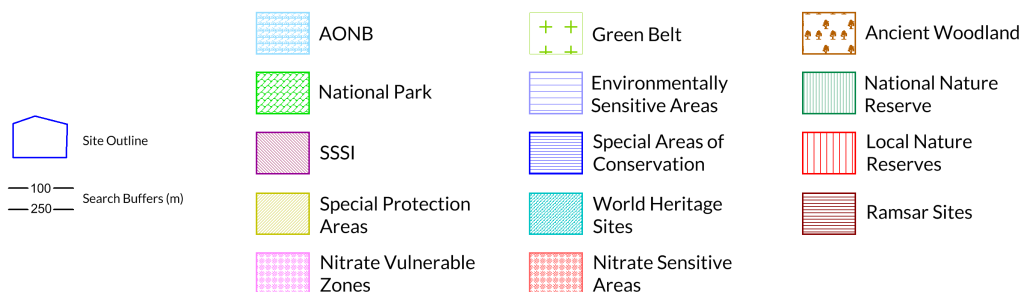
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?

Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

93

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
2	389	N	Unknown	Restored Ancient Woodland Site
3	420	NW	Unknown	Ancient Replanted Woodland
4	493	SE	Unknown	Ancient and Semi-Natural Woodland
5	639	W	Unknown	Restored Ancient Woodland Site
6	666	W	Unknown	Ancient Replanted Woodland
7	683	W	Unknown	Ancient Replanted Woodland
8	732	NE	Unknown	Ancient and Semi-Natural Woodland
9B	769	NE	Unknown	Ancient and Semi-Natural Woodland
10A	769	NE	Unknown	Ancient and Semi-Natural Woodland
11A	824	NE	Unknown	Restored Ancient Woodland Site
12	864	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
13	895	NW	Unknown	Ancient and Semi-Natural Woodland
14	897	SW	Unknown	Ancient and Semi-Natural Woodland
15	904	N	Unknown	Ancient Replanted Woodland
16	926	N	Unknown	Ancient and Semi-Natural Woodland
17	926	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
18	933	W	Unknown	Ancient Replanted Woodland
19B	968	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
20B	975	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
21	983	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
22	985	N	Unknown	Ancient and Semi-Natural Woodland
23	1097	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
24C	1139	NE	COED FFOULKES	Ancient and Semi-Natural Woodland
25C	1144	NE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1161	N	Unknown	Ancient Replanted Woodland
27	1173	W	Unknown	Ancient and Semi-Natural Woodland
Not shown	1241	NE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1262	NE	Unknown	Restored Ancient Woodland Site
Not shown	1292	NE	Unknown	Ancient and Semi-Natural Woodland

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1298	NW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1305	NE	Unknown	Ancient Replanted Woodland
33	1311	W	Unknown	Ancient Replanted Woodland
Not shown	1319	N	Unknown	Ancient and Semi-Natural Woodland
35	1353	NW	Unknown	Ancient and Semi-Natural Woodland
36	1355	E	Unknown	Ancient and Semi-Natural Woodland
Not shown	1366	NW	Unknown	Ancient Replanted Woodland
38	1394	NW	Unknown	Ancient and Semi-Natural Woodland
39	1406	NW	Unknown	Ancient Replanted Woodland
40	1414	NW	Unknown	Ancient Replanted Woodland
Not shown	1418	N	Unknown	Ancient and Semi-Natural Woodland
42	1434	E	Unknown	Restored Ancient Woodland Site
Not shown	1446	N	Unknown	Restored Ancient Woodland Site
44	1448	NW	Unknown	Restored Ancient Woodland Site
Not shown	1458	NE	Unknown	Ancient Replanted Woodland
46	1469	NW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1496	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1517	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1519	N	Unknown	Ancient Replanted Woodland
50	1540	SW	Unknown	Ancient Replanted Woodland
Not shown	1552	N	Unknown	Restored Ancient Woodland Site
Not shown	1555	NW	Unknown	Ancient Replanted Woodland
Not shown	1555	N	Unknown	Restored Ancient Woodland Site
Not shown	1593	N	Unknown	Restored Ancient Woodland Site
Not shown	1607	N	Unknown	Ancient Replanted Woodland
56	1615	NW	Unknown	Ancient Replanted Woodland
Not shown	1662	NW	Unknown	Ancient Replanted Woodland
Not shown	1672	N	Unknown	Ancient Replanted Woodland
59	1689	SW	Unknown	Restored Ancient Woodland Site

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1690	NW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1699	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1720	NW	Unknown	Ancient Replanted Woodland
Not shown	1722	E	Unknown	Ancient and Semi-Natural Woodland
Not shown	1724	NW	Unknown	Ancient Replanted Woodland
Not shown	1736	NW	Unknown	Ancient Replanted Woodland
Not shown	1741	E	Unknown	Ancient and Semi-Natural Woodland
Not shown	1743	NW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1748	NW	COED SHIFNA-HIR	Ancient Replanted Woodland
Not shown	1756	NW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1756	N	BIG WOOD	Ancient Replanted Woodland
Not shown	1757	N	Unknown	Restored Ancient Woodland Site
Not shown	1758	N	COED SHIFNA-HIR	Ancient Replanted Woodland
Not shown	1762	N	Unknown	Restored Ancient Woodland Site
Not shown	1766	SW	Unknown	Restored Ancient Woodland Site
Not shown	1772	NW	Unknown	Restored Ancient Woodland Site
Not shown	1797	NW	COED SHIFNA-HIR	Ancient Replanted Woodland
Not shown	1800	N	Unknown	Restored Ancient Woodland Site
Not shown	1835	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1839	N	Unknown	Ancient Replanted Woodland
Not shown	1846	N	Unknown	Ancient Replanted Woodland
Not shown	1856	N	Unknown	Ancient Replanted Woodland
Not shown	1865	S	Unknown	Ancient and Semi-Natural Woodland
Not shown	1881	SW	Unknown	Restored Ancient Woodland Site
Not shown	1886	N	Unknown	Ancient Replanted Woodland
Not shown	1891	N	Unknown	Ancient Replanted Woodland
Not shown	1895	N	Unknown	Restored Ancient Woodland Site

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1906	N	Unknown	Ancient Replanted Woodland
Not shown	1911	N	Unknown	Restored Ancient Woodland Site
Not shown	1916	N	Unknown	Ancient Replanted Woodland
Not shown	1921	N	Unknown	Restored Ancient Woodland Site
Not shown	1945	N	Unknown	Ancient Replanted Woodland
Not shown	1947	S	Unknown	Ancient and Semi-Natural Woodland
Not shown	1965	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1975	N	Unknown	Ancient Replanted Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

1

The following Area of Outstanding Natural Beauty (AONB) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
1	1540	SW	BRYNIAU CLWYD A DYFFRYN DYFRDWY/CLWYDIAN RANGE AND DEE VALLEY	Natural Resources Wales

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

0

Database searched and no data found.

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a **Groundsure Geo Insight**, available from our **website**. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site?

Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand** hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing

ones as described in publication BR211 by the Building Research Establishment? Full radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site?

Yes

The following coal mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary?

Yes

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

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

Past underground mine workings may occur. The rock types present in these areas are such that small mineral veins may be present on which it is possible that small scale mining has been undertaken and/or it is possible that limited underground extraction of other materials may have occurred. All such occurrences are likely to be of minor localised extent and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site?

No

Guidance: No Guidance Required.

Contact Details

CENTREMAPS

Telephone: 01886 832972
Groundsure@centremaps.co.uk
Open Space, Upper Interfields, Malvern, Worcester, WR14 1UT



British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:

Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Natural Resources Wales

Ty Cambria
29 Newport Road
Cardiff
CF24 0TP
Tel: 0300 065 3000
Email: enquiries@naturalresourceswales.gov.uk



**Cyfoeth
Naturiol
Cymru
Natural
Resources
Wales**

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000



**Public Health
England**

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk



**The Coal
Authority**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505



Local Authority

Authority: Sir y Fflint - Flintshire County Council
Phone: 01352 752 121
Web: <http://www.flintshire.gov.uk>
Address: County Hall, Mold, Flintshire, CH7 6NB

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444



Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.

PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].

This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
<https://www.groundsure.com/terms-and-conditions-sept-2016>

APPENDIX I



CENTREMAPS

Open Space, Upper Interfields,
Worcester, WR14 1UT

Report Reference: CMAPS-CM-648937-30974-
210817GEO

Your Reference: 30974

Report Date 21 Aug 2017

Report Delivery Email - pdf
Method:

Geo Insight

Address: Gwernaffield Rd, Mold, CH7 1RR

Dear Sir/ Madam,

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

If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

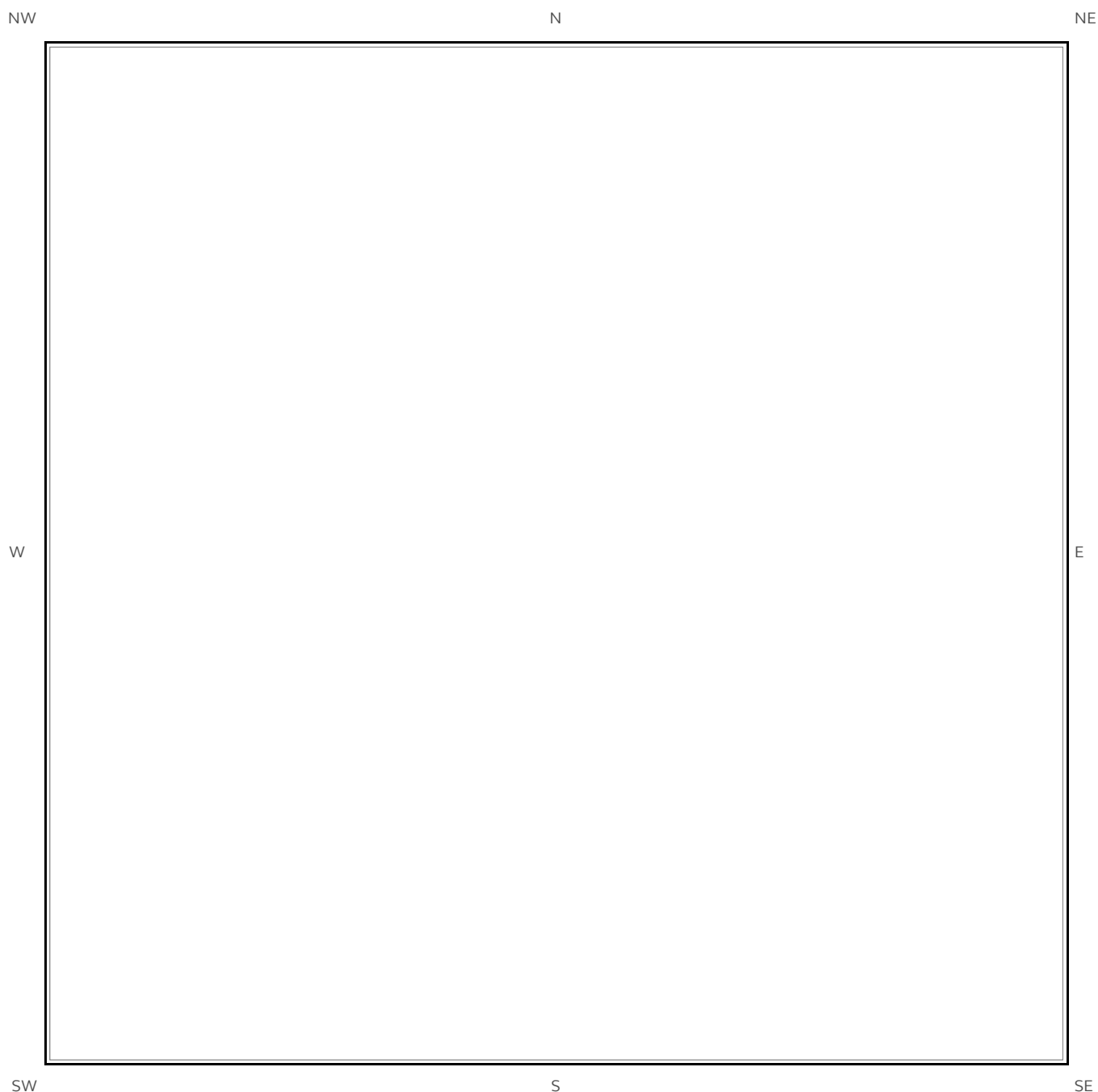
CENTREMAPS

Enc.
Groundsure Geo Insight



Geo Insight

Address: Gwernaffield Rd, Mold, CH7 1RR
Date: 21 Aug 2017
Reference: CMAPS-CM-648937-30974-210817GEO
Client: CENTREMAPS



Aerial Photograph Capture date: 04-Jun-2013
Grid Reference: 322898,364739
Site Size: 8.31ha

Contents Page

Contents Page.....	3
Overview of Findings.....	5
1:10,000 Scale Availability.....	8
Availability of 1:10,000 Scale Geology Mapping.....	9
1 Geology (1:10,000 scale).....	10
1.1 Artificial Ground Map (1:10,000 scale).....	10
1. Geology 1:10,000 scale.....	11
1.1 Artificial Ground.....	11
1.2 Superficial Deposits and Landslips Map (1:10,000 scale).....	12
1.2 Superficial Deposits and Landslips.....	13
1.2.1 Superficial Deposits/ Drift Geology.....	13
1.2.2 Landslip.....	13
1.3 Bedrock and Faults Map (1:10,000 scale).....	14
1.3 Bedrock and Faults.....	15
1.3.1 Bedrock/ Solid Geology.....	15
1.3.2 Faults.....	15
2 Geology 1:50,000 Scale.....	16
2.1 Artificial Ground Map.....	16
2. Geology 1:50,000 scale.....	17
2.1 Artificial Ground.....	17
2.1.1 Artificial/ Made Ground	17
2.1.2 Permeability of Artificial Ground.....	17
2.2 Superficial Deposits and Landslips Map (1:50,000 scale).....	18
2.2 Superficial Deposits and Landslips.....	19
2.2.1 Superficial Deposits/ Drift Geology.....	19
2.2.2 Permeability of Superficial Ground	19
2.2.3 Landslip.....	20
2.2.4 Landslip Permeability.....	20
2.3 Bedrock and Faults Map (1:50,000 scale).....	21
2.3 Bedrock, Solid Geology & Faults.....	22
2.3.1 Bedrock/Solid Geology.....	22
2.3.2 Permeability of Bedrock Ground.....	22
2.3.3 Faults.....	22
3 Radon Data.....	24
3.1 Radon Affected Areas.....	24
3.2 Radon Protection.....	24
4 Ground Workings Map.....	25
4 Ground Workings.....	26
4.1 Historical Surface Ground Working Features derived from Historical Mapping.....	26
4.2 Historical Underground Working Features derived from Historical Mapping.....	27
4.3 Current Ground Workings.....	27
5 Mining, Extraction & Natural Cavities.....	29
5.1 Historical Mining.....	29
5.2 Coal Mining.....	29
5.3 Johnson Poole and Bloomer.....	30
5.4 Non-Coal Mining.....	30
5.5 Non-Coal Mining Cavities.....	31
5.6 Natural Cavities.....	31
5.7 Brine Extraction.....	31
5.8 Gypsum Extraction.....	32
5.9 Tin Mining.....	32
5.10 Clay Mining.....	32
6 Natural Ground Subsidence.....	33
6.1 Shrink-Swell Clay Map.....	33
6.2 Landslides Map.....	34
6.3 Ground Dissolution of Soluble Rocks Map.....	35
6.4 Compressible Deposits Map.....	36
6.5 Collapsible Deposits Map.....	37
6.6 Running Sand Map.....	38

6 Natural Ground Subsidence.....	39
6.1 Shrink-Swell Clays.....	39
6.2 Landslides.....	39
6.3 Ground Dissolution of Soluble Rocks.....	40
6.4 Compressible Deposits.....	40
6.5 Collapsible Deposits.....	40
6.6 Running Sands.....	40
7 Borehole Records.....	42
8 Estimated Background Soil Chemistry.....	44
9 Railways and Tunnels Map.....	45
9 Railways and Tunnels.....	46
9.1 Tunnels	46
9.2 Historical Railway and Tunnel Features	46
9.3 Historical Railways.....	47
9.4 Active Railways.....	47
9.5 Railway Projects.....	48

Overview of Findings

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

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

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

Section 1: Geology 1:10,000 Scale

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

Section 2: Geology 1:50,000 Scale

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

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults

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

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

Yes

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

Yes

Section 3: Radon

3. Radon

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

The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.

3.2 Radon Protection

Full radon protective measures are necessary.

Section 4: Ground Workings

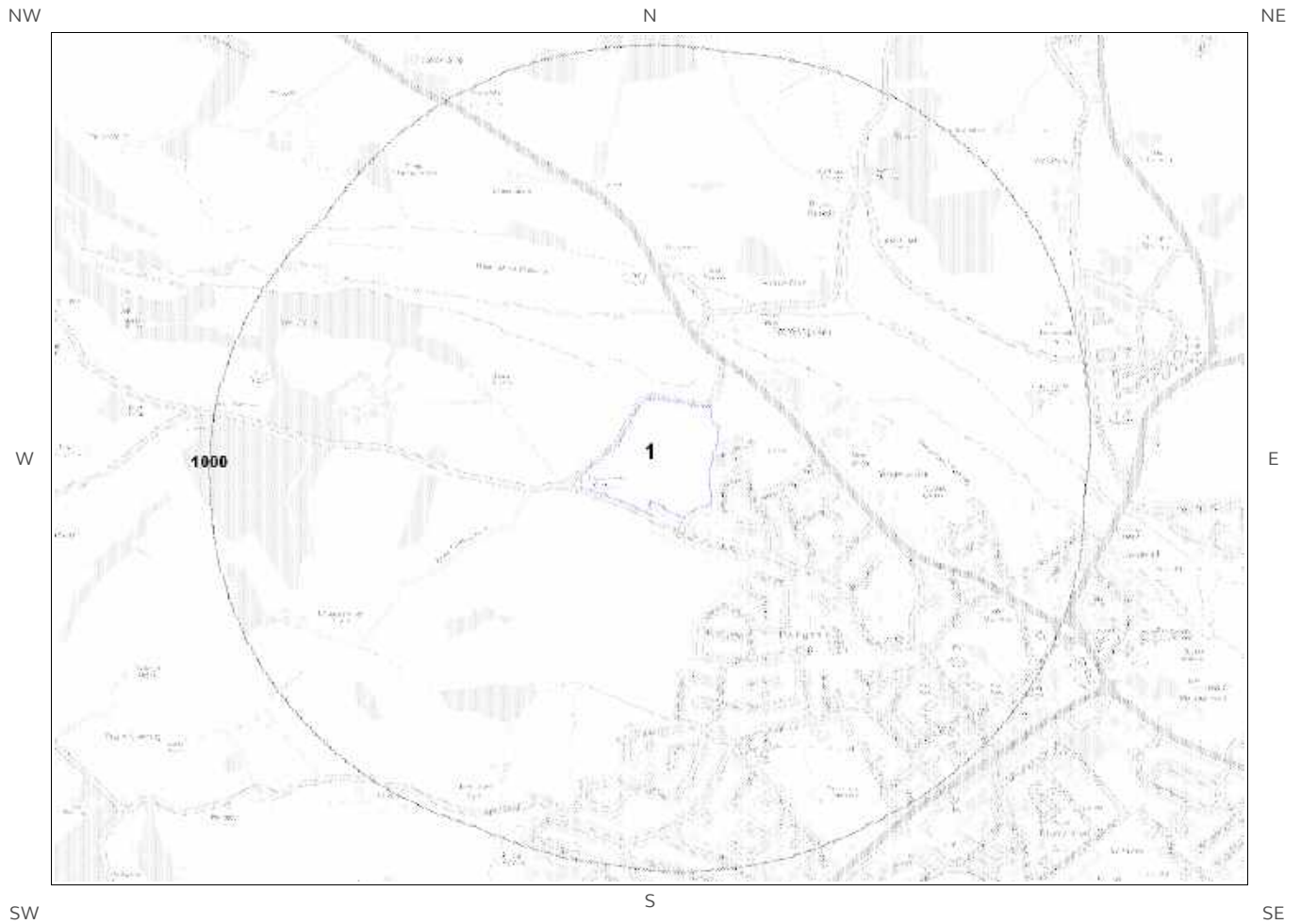
	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	4	12	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	9
4.3 Current Ground Workings	0	0	0	0	2

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	9
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	2	0	2	0	7
5.4 Non-Coal Mining*	2	0	4	2	6
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

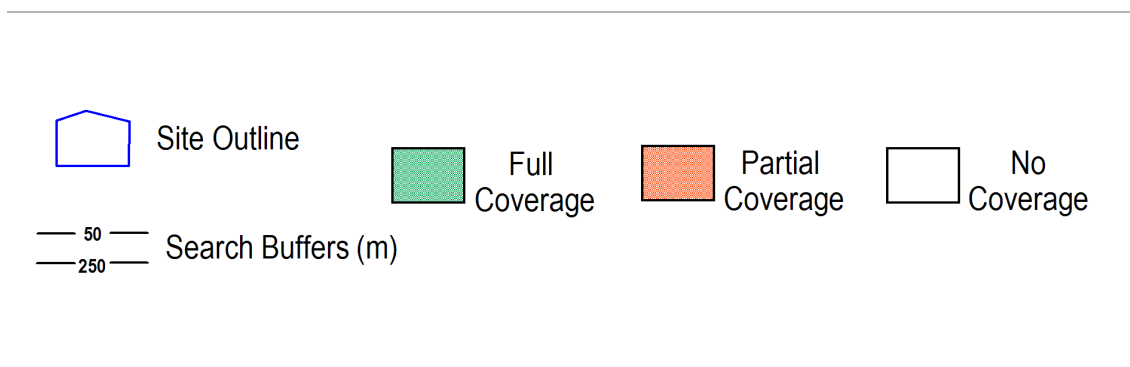
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Very Low				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Negligible				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Very Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	0	0	13		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	15	0	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	14	Not Searched	
9.3 Historical Railways	0	0	1	Not Searched	
9.4 Active Railways	0	0	0	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



Availability of 1:10,000 Scale Geology Mapping

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

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

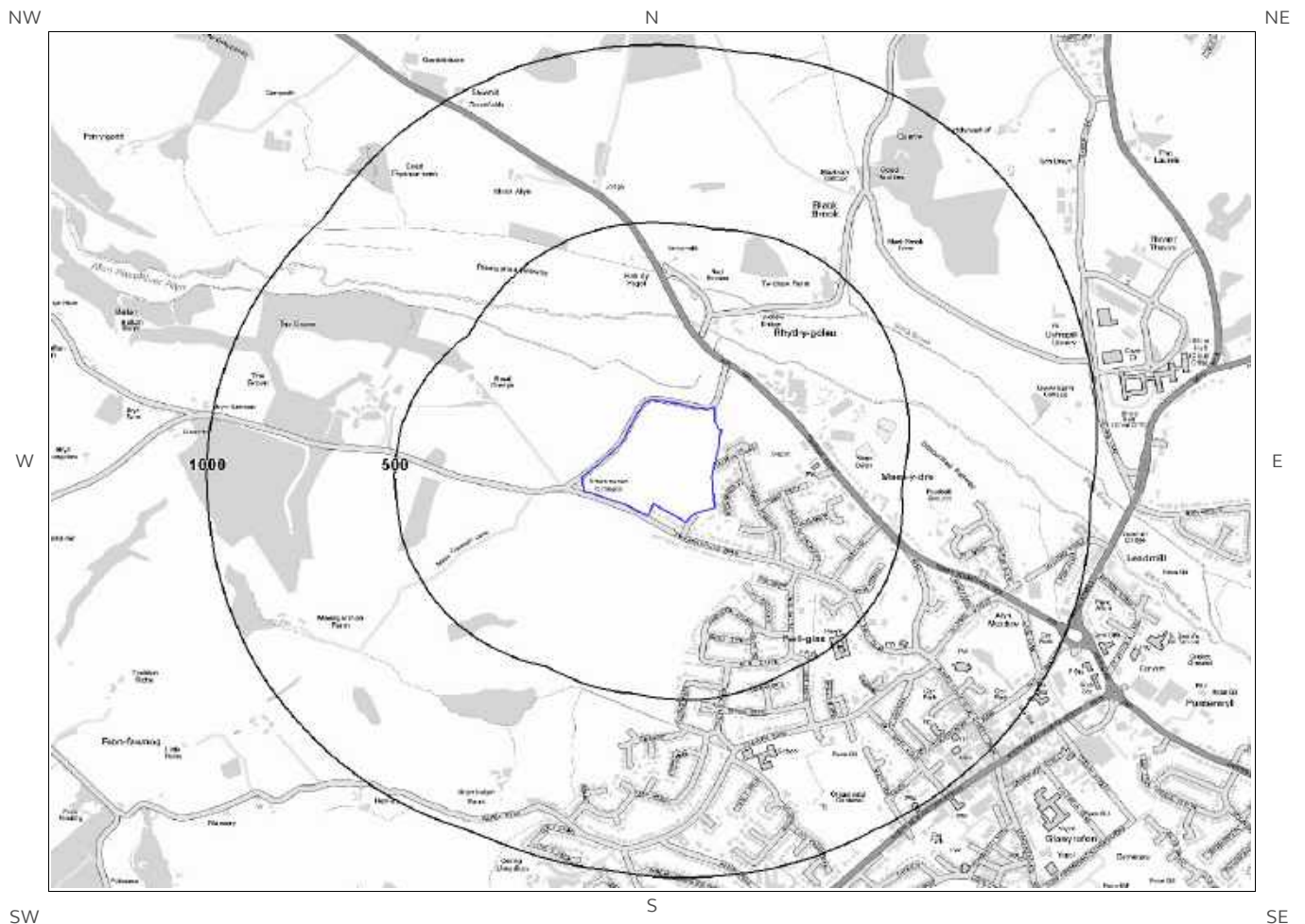
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not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

The definitions of coverage are as follows:

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

1 Geology (1:10,000 scale).

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



Artificial Ground Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

	Site Outline		Made Ground (undivided)		Disturbed Ground (undivided)
	Search Buffers (m)		Worked Ground (undivided)		Landscaped Ground (undivided)
			Infilled Ground		Reclaimed Ground

1. Geology 1:10,000 scale

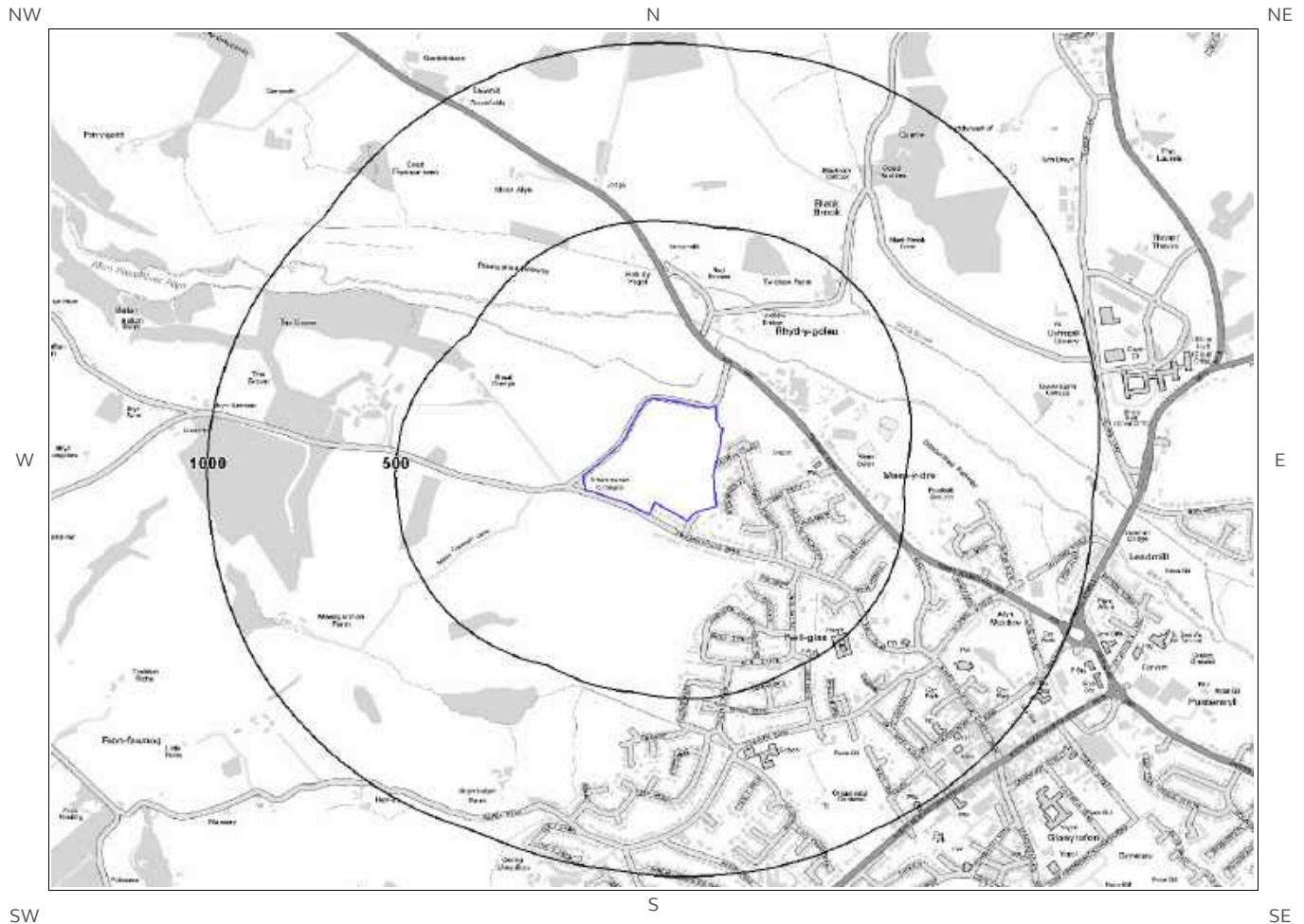
1.1 Artificial Ground

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

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

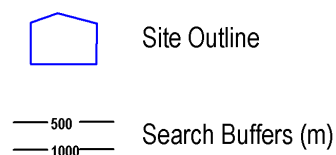
Database searched and no data found.

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



Artificial Ground Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



1.2 Superficial Deposits and Landslips

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

1.2.1 Superficial Deposits/ Drift Geology

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

Database searched and no data found.

1.2.2 Landslip

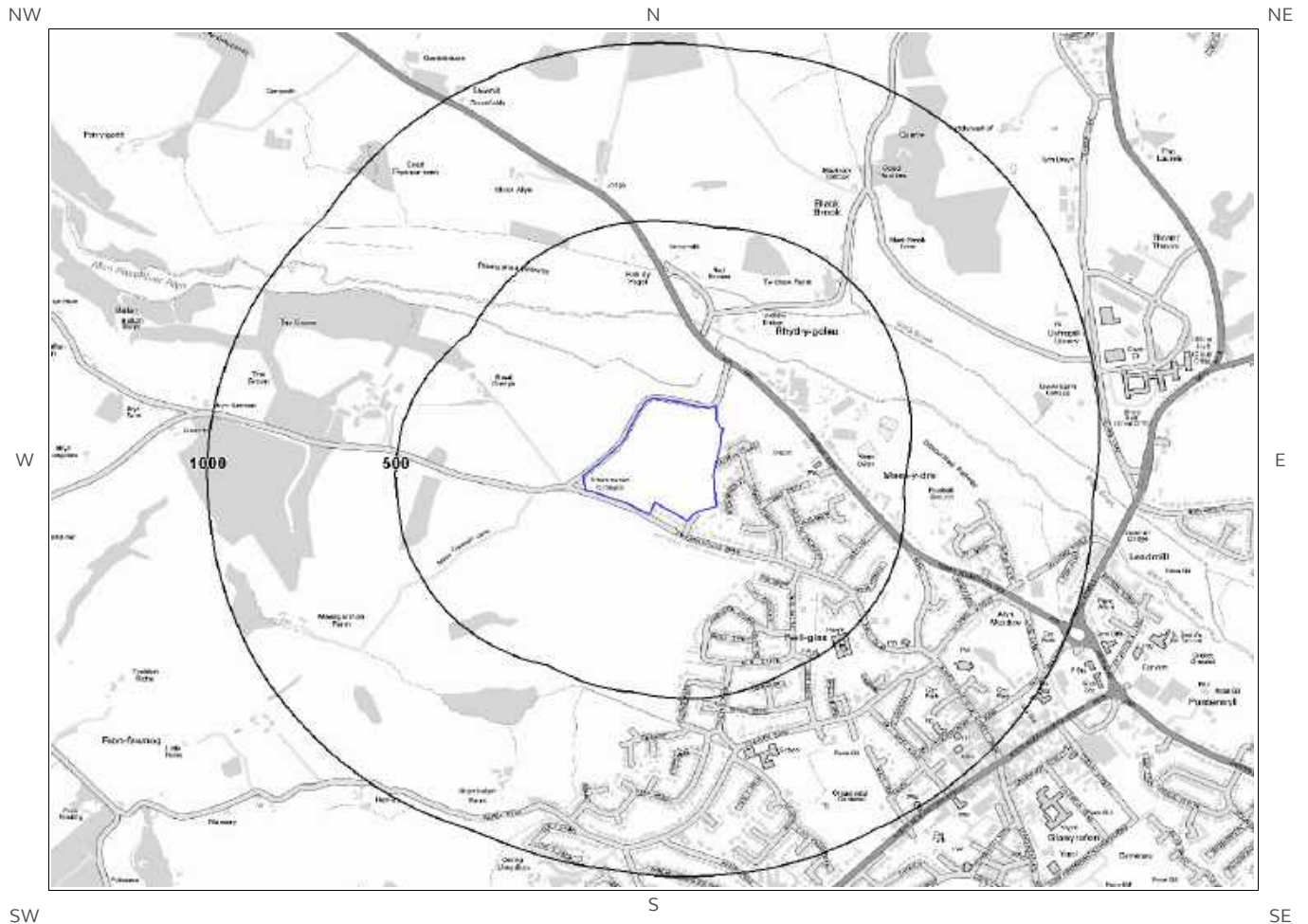
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

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

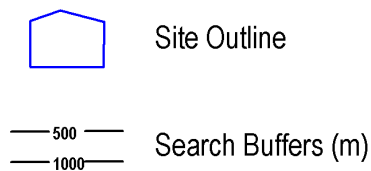
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)



Bedrock and Faults Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



1.3 Bedrock and Faults

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

1.3.1 Bedrock/ Solid Geology

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

Database searched and no data found at this scale.

1.3.2 Faults

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

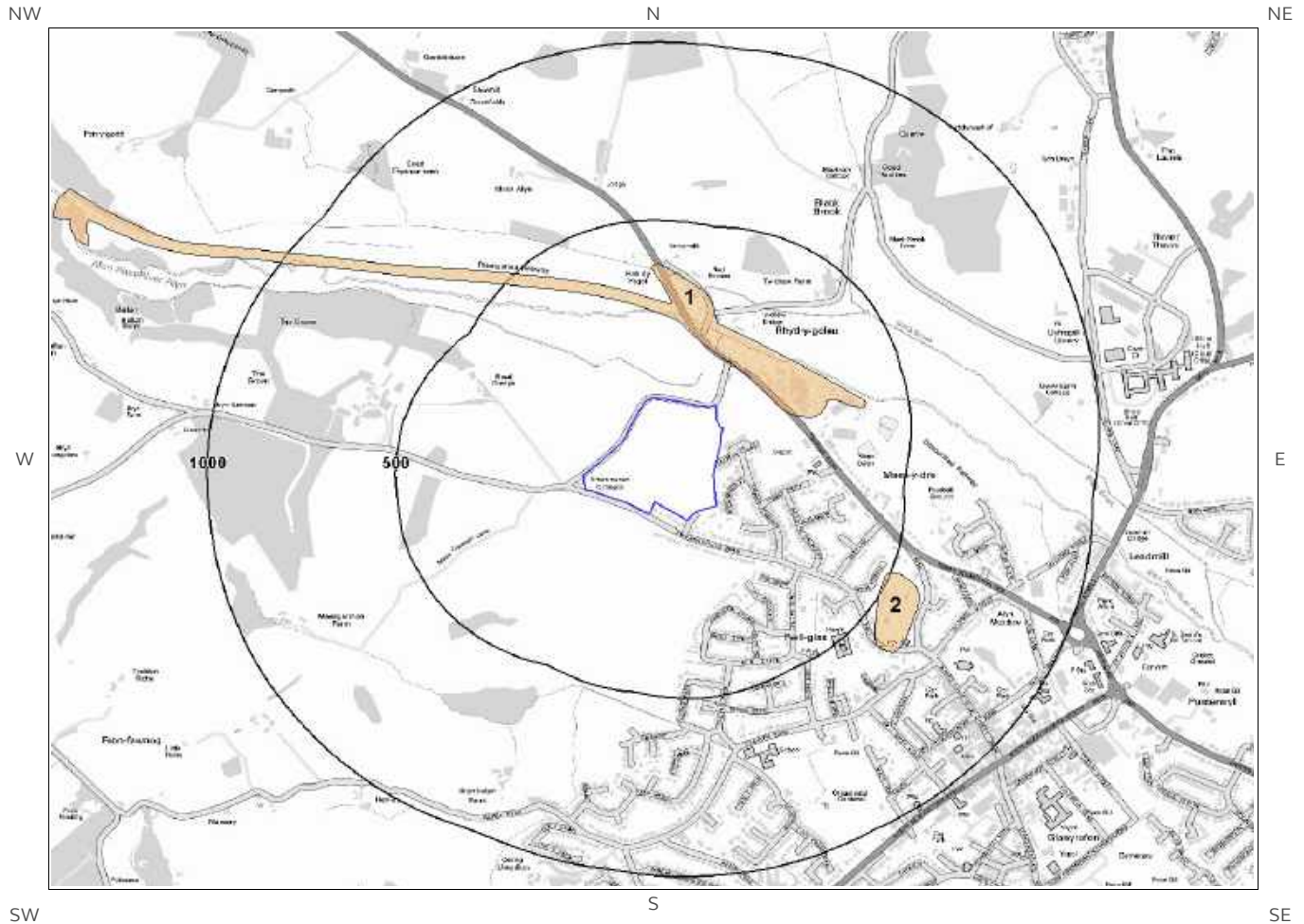
Database searched and no data found at this scale.

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

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

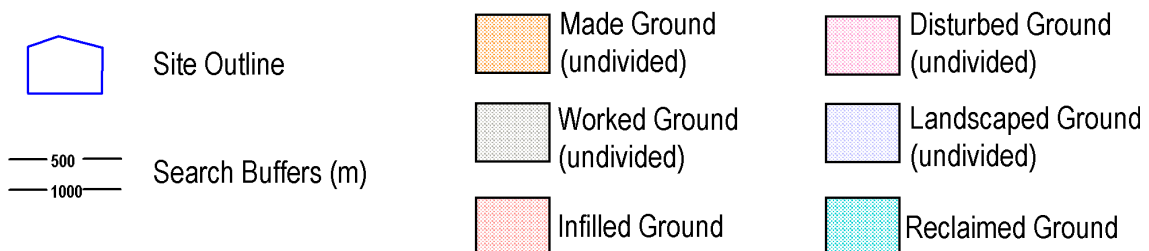
2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 108

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

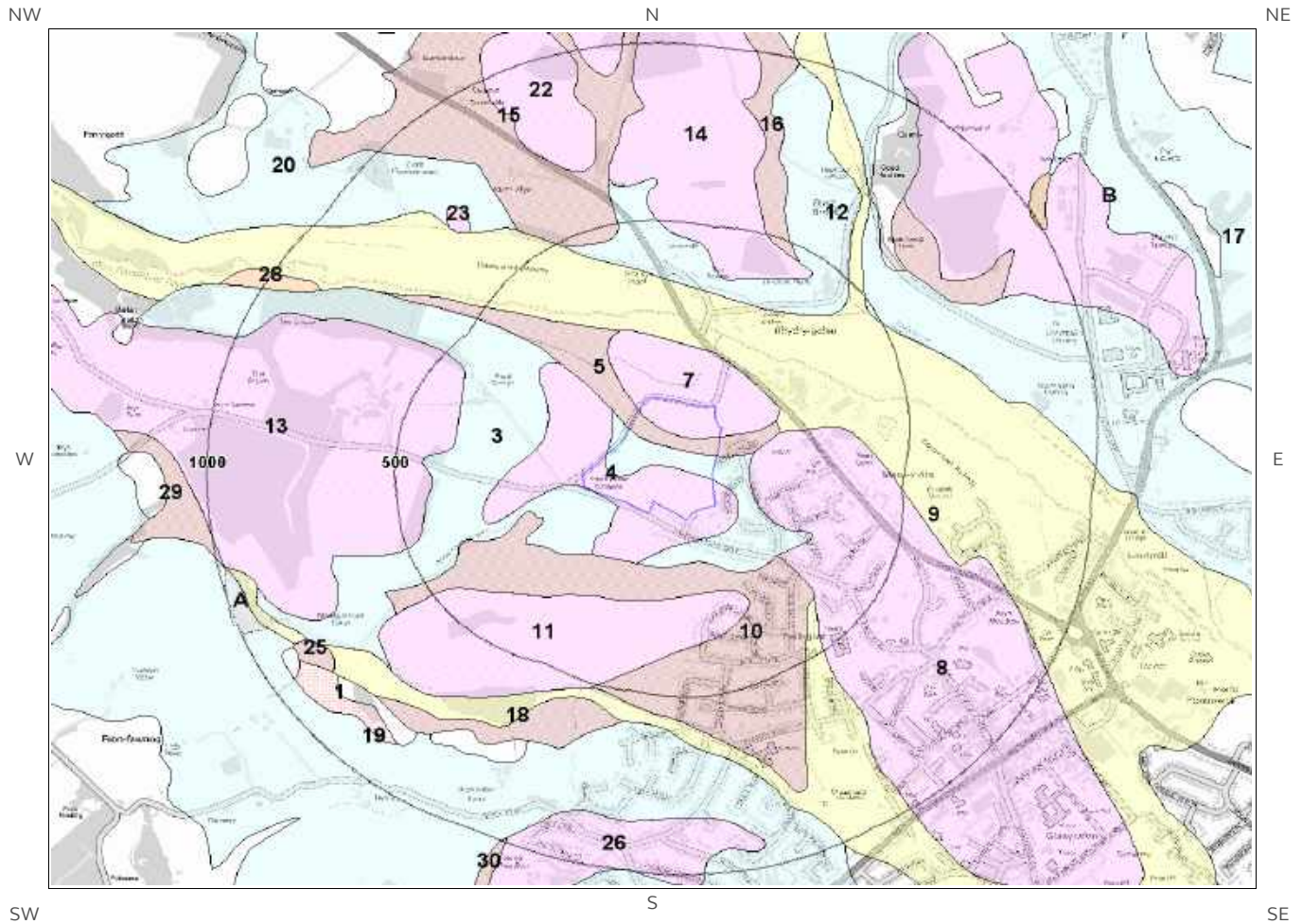
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	116.0	NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	490.0	SE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

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

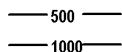


Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



Site Outline



Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
3	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
4	0.0	On Site	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
5	0.0	On Site	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
6	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
7	0.0	On Site	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
8	91.0	E	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
9	116.0	NE	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
10	121.0	S	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
11	211.0	S	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
12	298.0	N	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
13	351.0	W	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
14	354.0	N	GFSDDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
15	458.0	N	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
16	461.0	NE	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
17	486.0	NE	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

2.2.2 Permeability of Superficial Ground

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

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

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary?

No

Database searched and no data found.

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

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

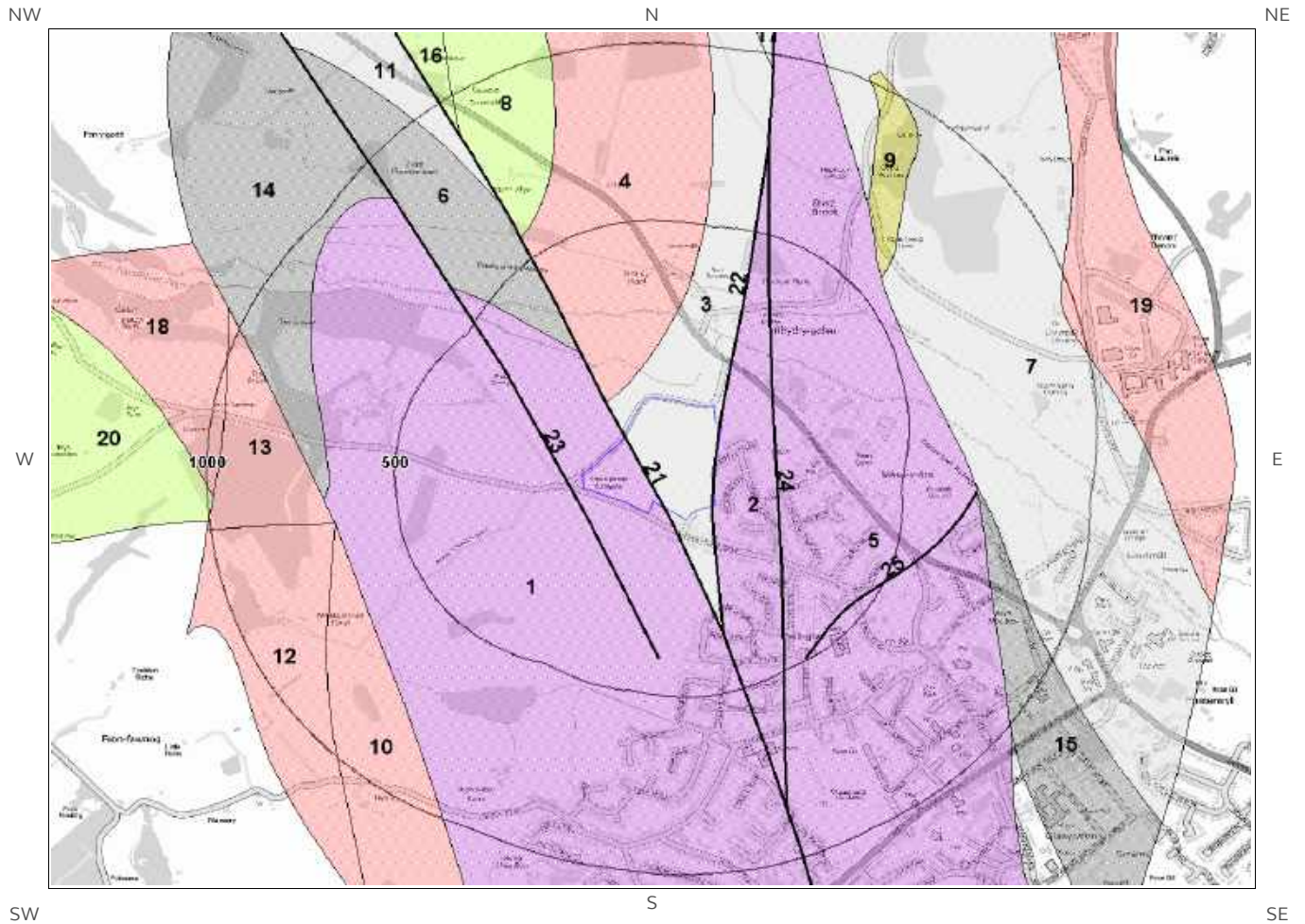
2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary?

No

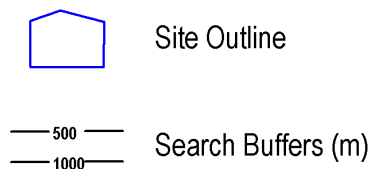
Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 108

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	ETM-MDSC	ETRURIA FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE	WESTPHALIAN
2	0.0	On Site	ETM-MDSC	ETRURIA FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE	WESTPHALIAN
3	0.0	On Site	PLCM-MDSS	PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
4	65.0	NW	GS-SDAR	GWESPYR SANDSTONE - SANDSTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED	NAMURIAN
5	139.0	E	ETM-MDSC	ETRURIA FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE	WESTPHALIAN
6	216.0	NW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN

2.3.2 Permeability of Bedrock Ground

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

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

2.3.3 Faults

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

ID	Distance	Direction	Category Description	Feature Description
21	0.0	On Site	FAULT	Fault, inferred, displacement unknown
22	0.0	On Site	FAULT	Fault, inferred, displacement unknown
23	30.0	SW	FAULT	Fault, inferred, displacement unknown
24	139.0	E	FAULT	Fault, inferred, displacement unknown
25	455.0	SE	FAULT	Fault, inferred, displacement unknown

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

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

3 Radon Data

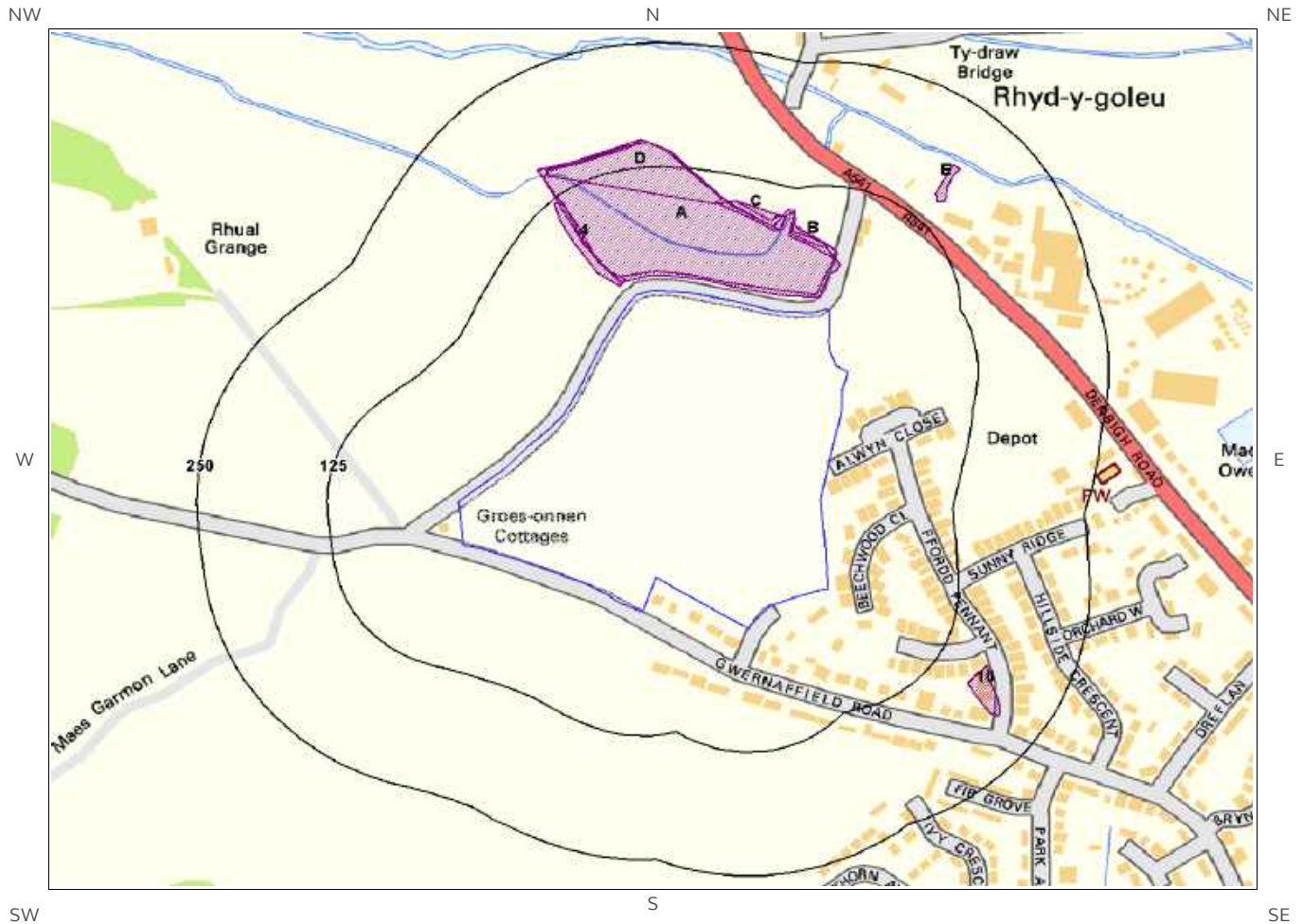
3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.

3.2 Radon Protection

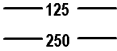
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? Full radon protective measures are necessary.

4 Ground Workings Map



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

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

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

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

ID	Distance (m)	Direction	NGR	Use	Date
1A	14.0	N	322908 364983	Pond	1872
2A	17.0	N	322902 364985	Pond	1938
3A	17.0	N	322902 364985	Pond	1898
4	18.0	NW	322801 364958	Unspecified Ground Workings	1979
5B	52.0	N	323023 364960	Unspecified Ground Workings	1964
6B	52.0	N	323023 364960	Unspecified Ground Workings	1979
7B	52.0	N	323023 364960	Unspecified Ground Workings	1992
8C	78.0	N	322965 364987	Unspecified Ground Workings	1964
9C	78.0	N	322965 364987	Unspecified Ground Workings	1992
10C	78.0	N	322965 364987	Unspecified Ground Workings	1979
11D	93.0	N	322782 365030	Unspecified Heap	1971
12D	93.0	N	322782 365030	Unspecified Heap	1959
13D	93.0	N	322782 365030	Unspecified Heap	1989
14E	150.0	NE	323153 365020	Unspecified Ground Workings	1959
15E	150.0	NE	323153 365020	Unspecified Ground Workings	1971
16	164.0	SE	323187 364507	Pond	1938

4.2 Historical Underground Working Features derived from Historical Mapping

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

Are there any Historical Underground Working Features within 1000m of the study site boundary? Yes

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
Not shown	703.0	E	323743 364540	Unspecified Disused Shafts	1979
Not shown	703.0	E	323743 364540	Unspecified Disused Shafts	1964
Not shown	704.0	E	323740 364539	Old Coal Shafts	1938
Not shown	704.0	E	323742 364535	Unspecified Disused Shafts	1992
Not shown	732.0	E	323766 364500	Old Coal Shafts	1938
Not shown	732.0	E	323766 364500	Old Coal Shafts	1898
Not shown	732.0	E	323765 364498	Unspecified Disused Shafts	1992
Not shown	734.0	E	323770 364503	Unspecified Disused Shafts	1979
Not shown	734.0	E	323770 364503	Unspecified Disused Shafts	1964

4.3 Current Ground Workings

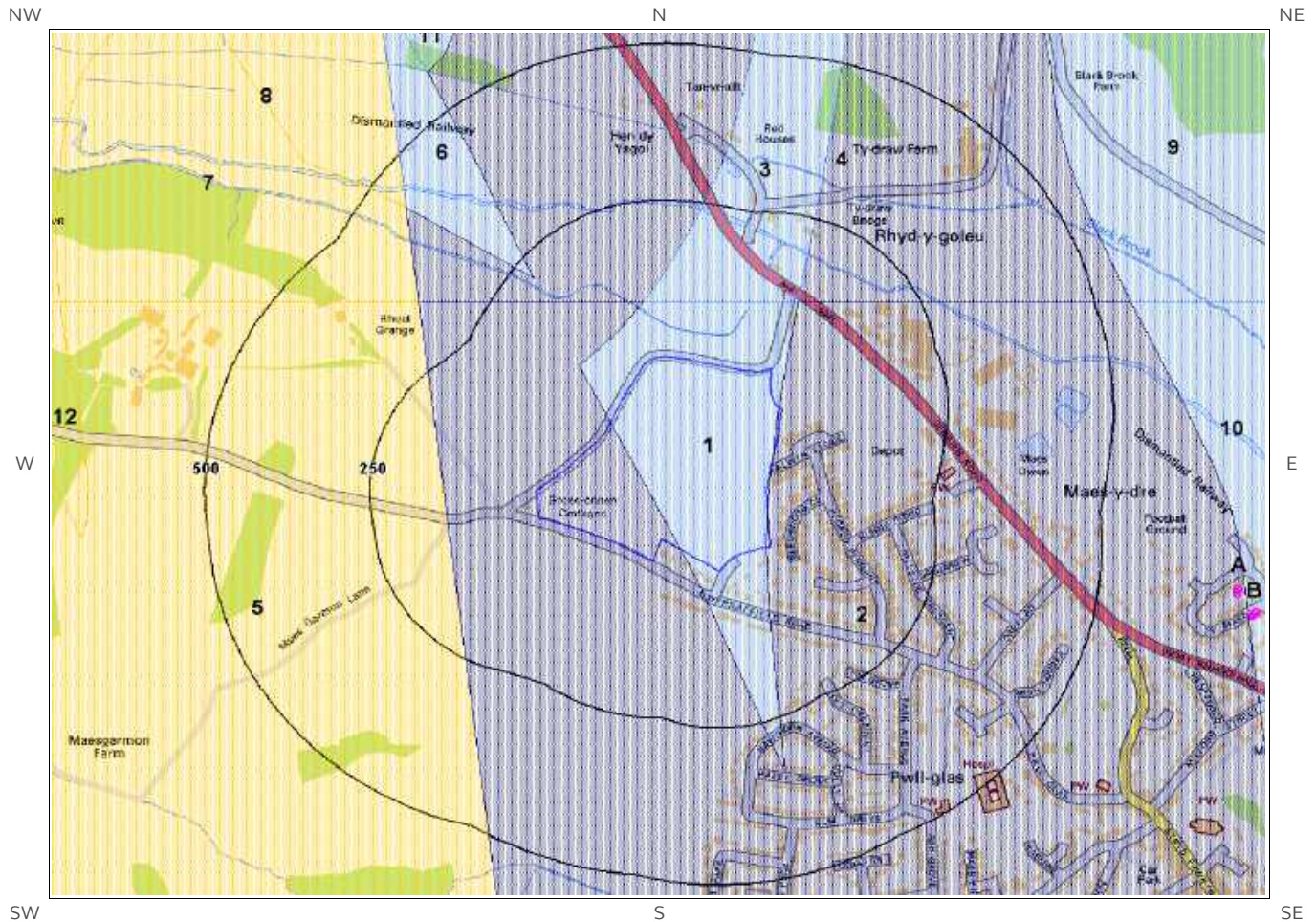
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	746.0	E	323775 364496	Coal, Deep	Maes-y-dre	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	867.0	NE	323529 365606	Sandstone	Tyddyn-uchaf	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



**Mining, Extraction and
Natural Cavities Legend**

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

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

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

The following Historical Mining information is provided by Groundsure:

ID	Distance (m)	Direction	NGR	Details	Date
15A	703.0	E	323743 364540	Unspecified Disused Shafts	1979
16A	703.0	E	323743 364540	Unspecified Disused Shafts	1964
17A	704.0	E	323740 364539	Old Coal Shafts	1938
18A	704.0	E	323742 364535	Unspecified Disused Shafts	1992
19B	732.0	E	323766 364500	Old Coal Shafts	1938
20B	732.0	E	323766 364500	Old Coal Shafts	1898
21B	732.0	E	323765 364498	Unspecified Disused Shafts	1992
22B	734.0	E	323770 364503	Unspecified Disused Shafts	1979
23B	734.0	E	323770 364503	Unspecified Disused Shafts	1964

5.2 Coal Mining

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

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

The following Coal Mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0.0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

5.3 Johnson Poole and Bloomer

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

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

Yes

The following information provided by JPB is not represented on mapping: In addition to being located inside an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property which may supplement this information. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.

5.4 Non-Coal Mining

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

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

Yes

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	0.0	On Site	Not available	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
3	89.0	N	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	92.0	N	Not available	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
5	138.0	W	North Wales (Halkyn)	Vein Mineral	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
6	216.0	NW	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	345.0	NW	North Wales (Halkyn)	Vein Mineral	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
8	438.0	NW	North Wales (Halkyn)	Iron Ore (Bedded)\Vein Mineral	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
9	539.0	NE	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
10	552.0	E	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
11	568.0	NW	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
12	676.0	W	North Wales (Halkyn)	Iron Ore (Bedded)\Vein Mineral	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
Not shown	722.0	NW	North Wales (Halkyn)	Vein Mineral	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
Not shown	965.0	E	Not available	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

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

Database searched and no data found.

5.7 Brine Extraction

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

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

Database searched and no data found.

5.8 Gypsum Extraction

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

Are there any Gypsum Extraction areas within 1000m of the study site boundary?

No

Database searched and no data found.

5.9 Tin Mining

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

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

No

Database searched and no data found.

5.10 Clay Mining

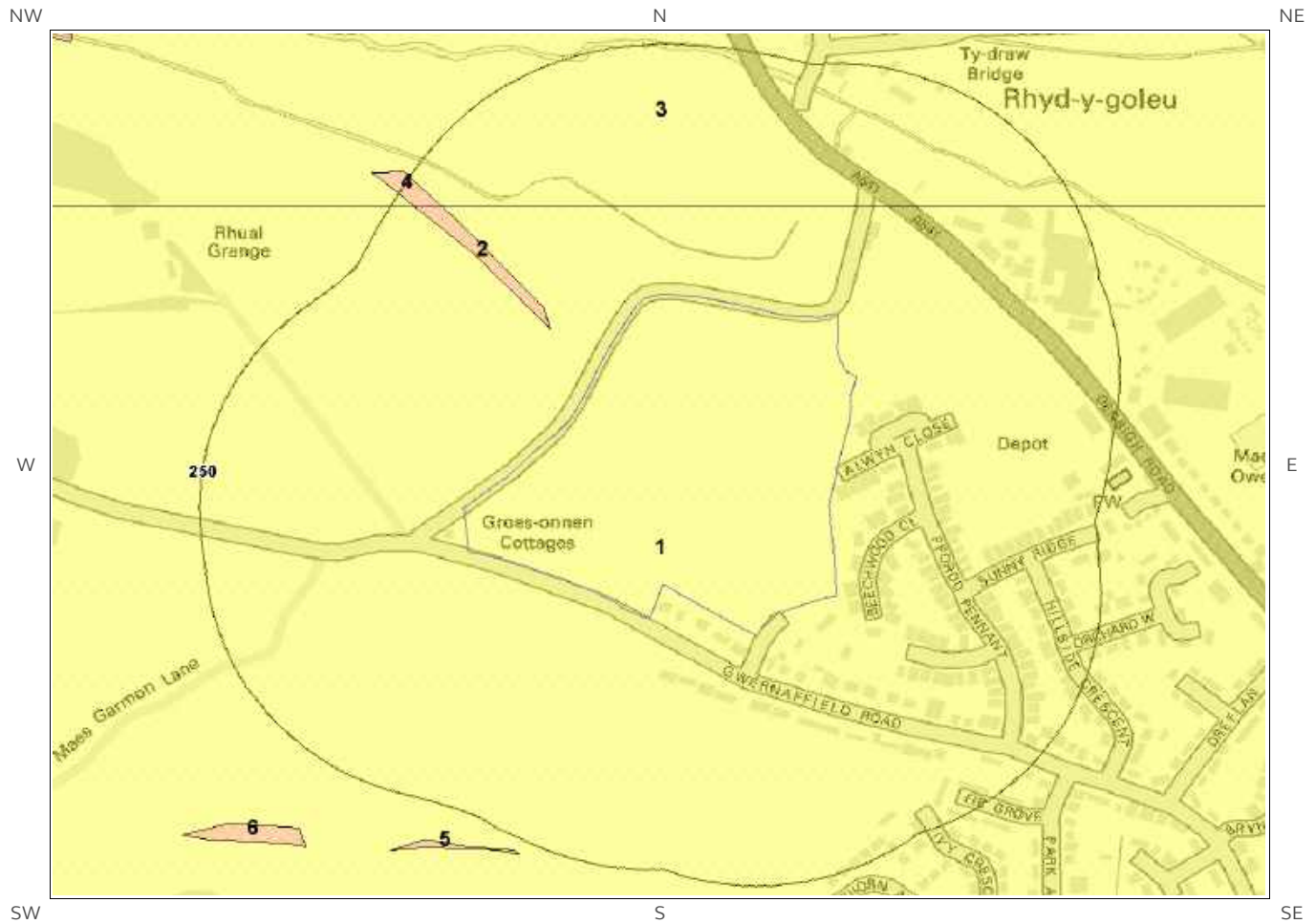
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

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

No

Database searched and no data found.

6.2 Landslides Map

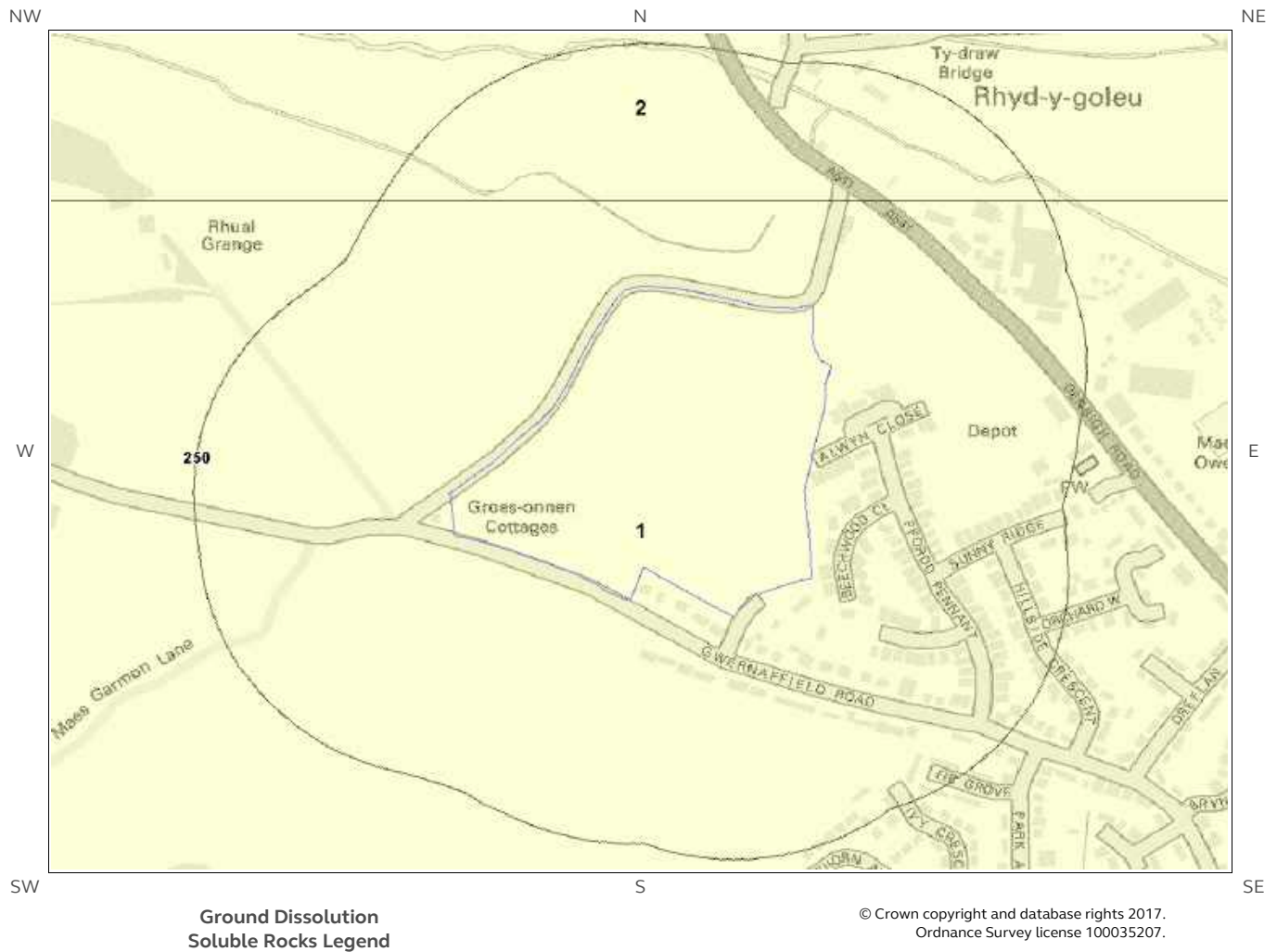


Landslides Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



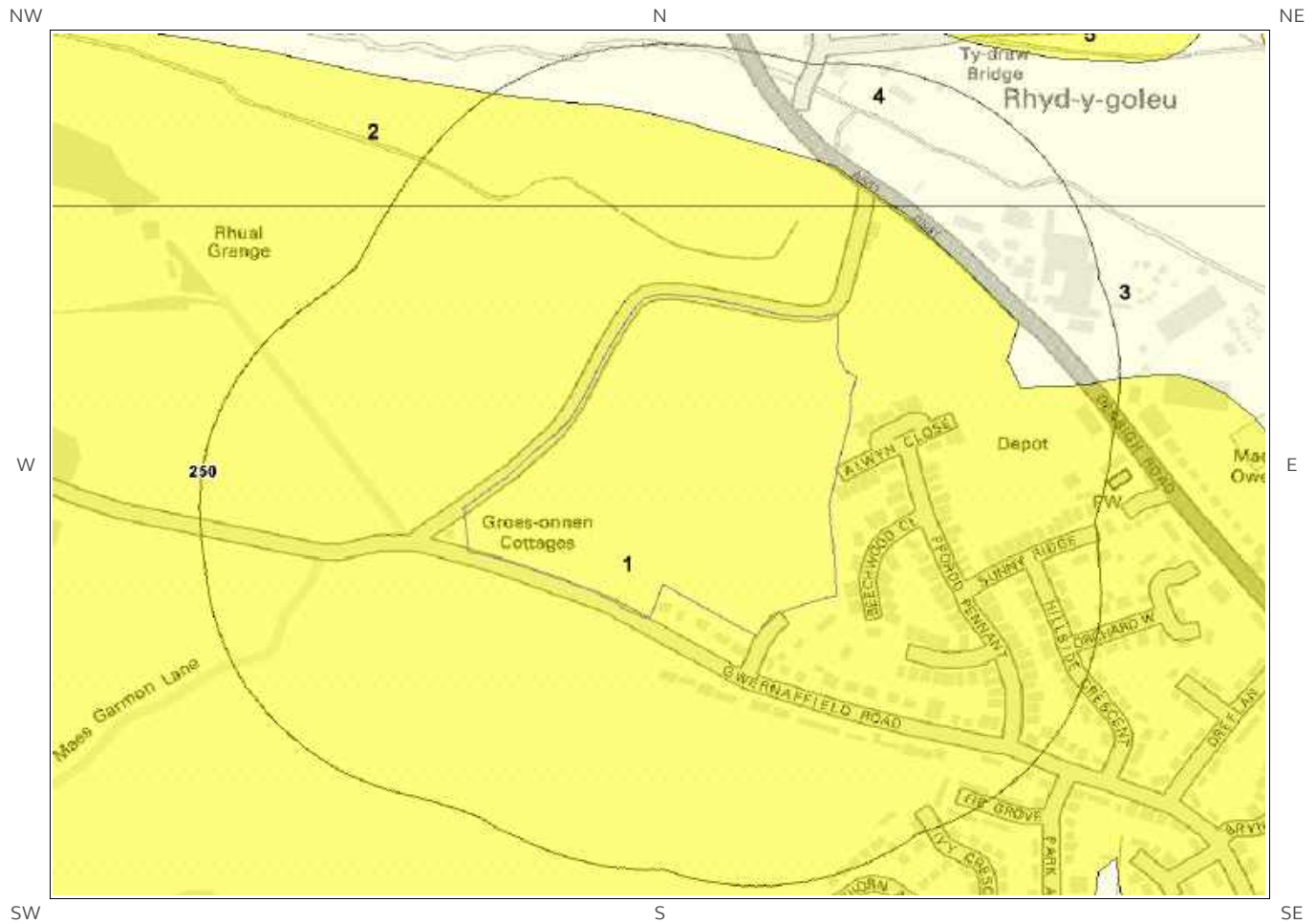
6.3 Ground Dissolution of Soluble Rocks Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



6.5 Collapsible Deposits Map



Collapsible Deposits Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? **Very Low**

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
3	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

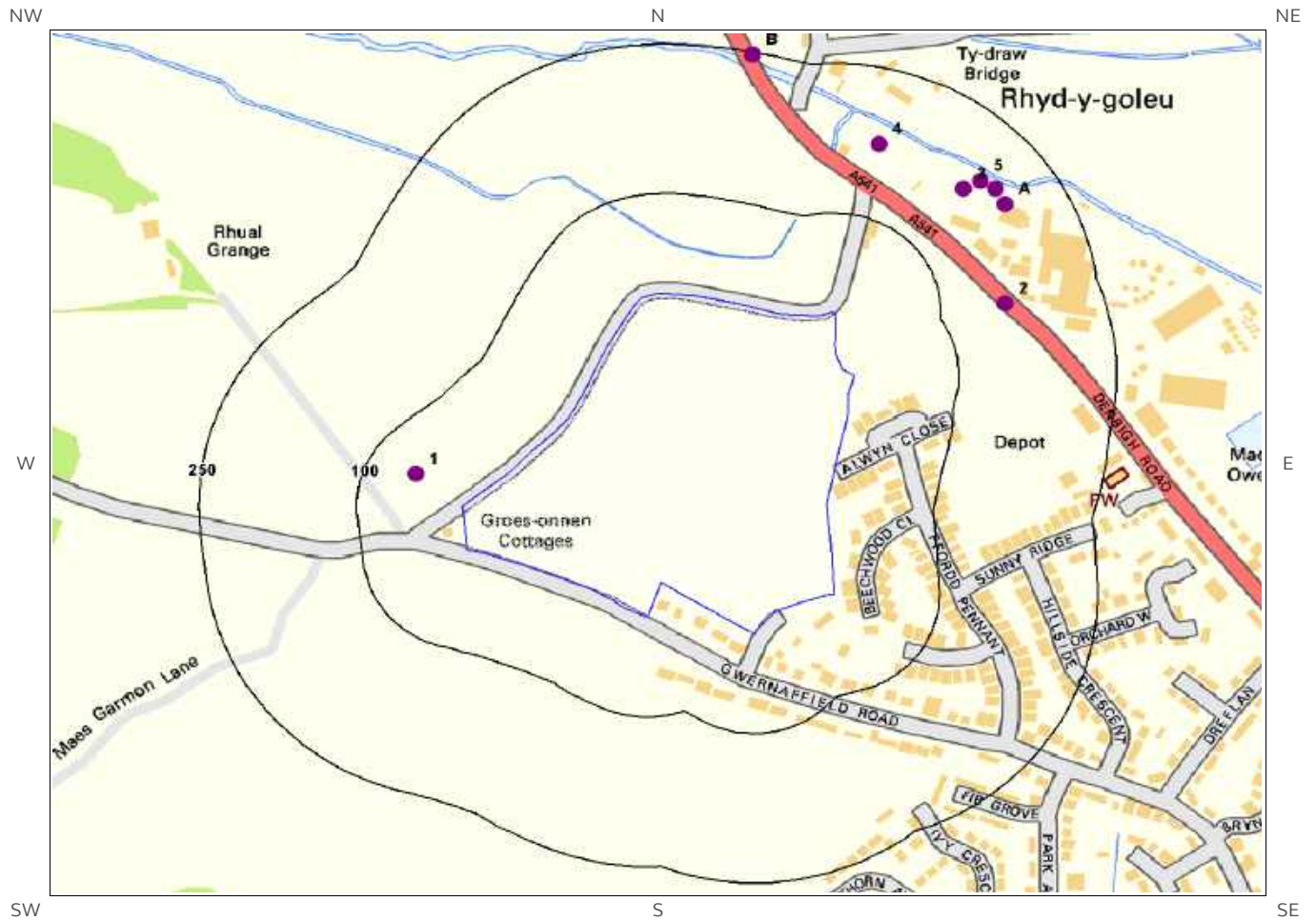
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

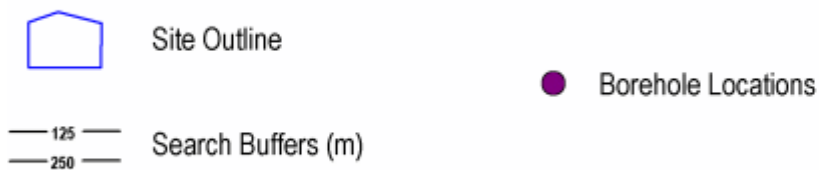
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records Map



Borehole Records Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary:

13

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	55.0	NW	322640 364730	SJ26SW22	17.8	RHUAL-ISA
2	160.0	NE	323200 364900	SJ26SW498	-1.0	ALYN WORKS
3	173.0	NE	323160 365015	SJ26NW5	30.48	ALYN WORKS NO.1
4	174.0	N	323080 365060	SJ26NW133	20.0	ALYN WORKS LTD
5	190.0	NE	323176 365023	SJ26NW6	35.35	ALYN WORKS, NO.2 (A)
6A	194.0	NE	323200 365000	SJ26NW220	8.0	SYNTHITE, ALYN WORKS
7A	196.0	NE	323191 365015	SJ26NW7	36.35	ALYN WORKS, NO.3 (B)
8B	247.0	N	322960 365150	SJ26NW219	23.8	RHYD-Y-GOLEU, 6
9B	247.0	N	322960 365150	SJ26NW218	23.7	RHYD-Y-GOLEU, 5
10B	247.0	N	322960 365150	SJ26NW215	10.4	RHYD-Y-GOLEU, 2
11B	247.0	N	322960 365150	SJ26NW217	15.9	RHYD-Y-GOLEU, 4
12B	247.0	N	322960 365150	SJ26NW216	15.7	RHYD-Y-GOLEU, 3
13B	247.0	N	322960 365150	SJ26NW214	11.7	RHYD-Y-GOLEU, 1

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/149885
#2: scans.bgs.ac.uk/sobi_scans/boreholes/150395
#3: scans.bgs.ac.uk/sobi_scans/boreholes/148437
#4: scans.bgs.ac.uk/sobi_scans/boreholes/148565
#5: scans.bgs.ac.uk/sobi_scans/boreholes/148438
#6A: scans.bgs.ac.uk/sobi_scans/boreholes/1136364
#7A: scans.bgs.ac.uk/sobi_scans/boreholes/148439
#8B: scans.bgs.ac.uk/sobi_scans/boreholes/148651
#9B: scans.bgs.ac.uk/sobi_scans/boreholes/148650
#10B: scans.bgs.ac.uk/sobi_scans/boreholes/148647
#11B: scans.bgs.ac.uk/sobi_scans/boreholes/148649
#12B: scans.bgs.ac.uk/sobi_scans/boreholes/148648
#13B: scans.bgs.ac.uk/sobi_scans/boreholes/148646

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

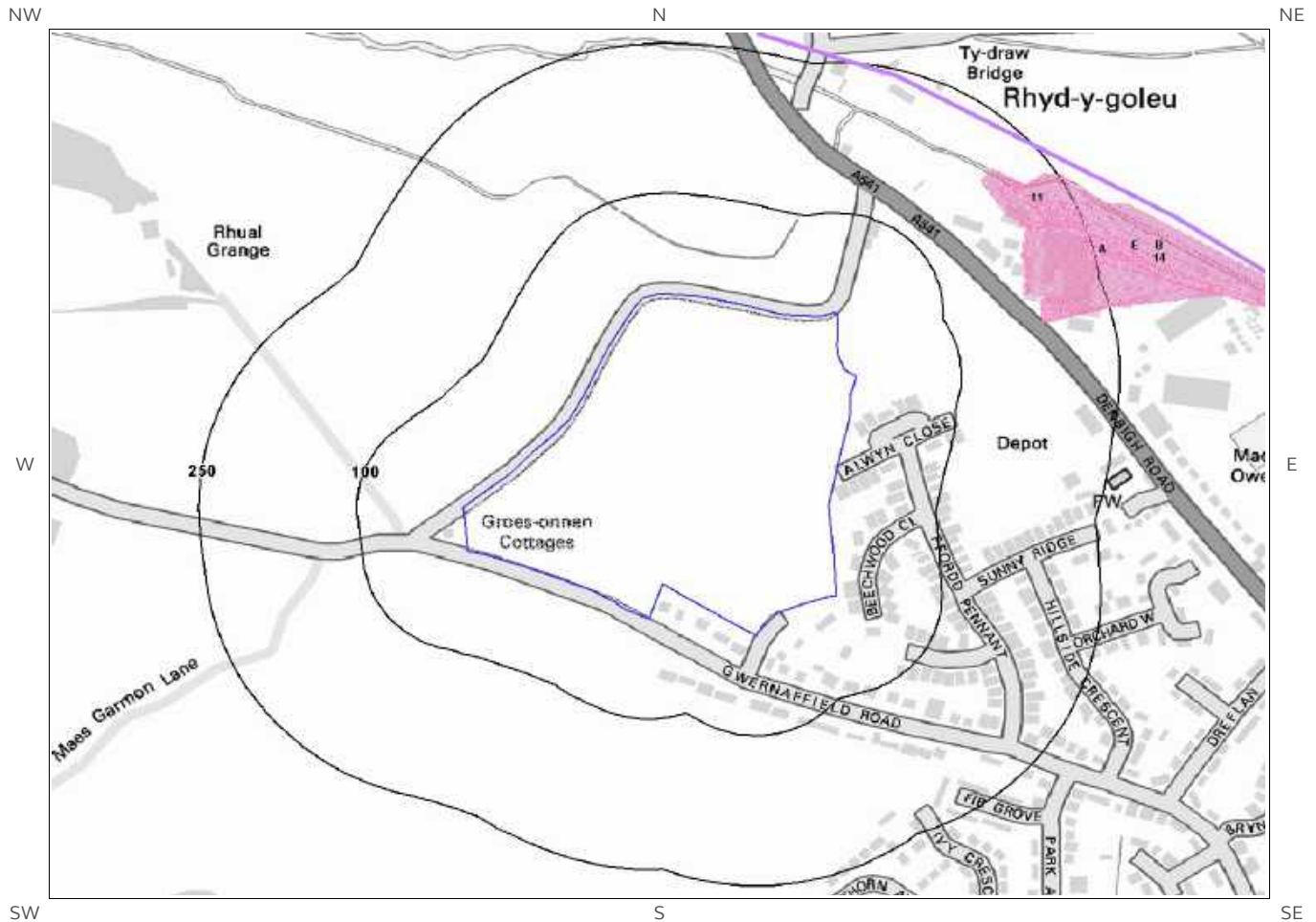
15

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	RuSoilExAs	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	300 - 600 mg/kg

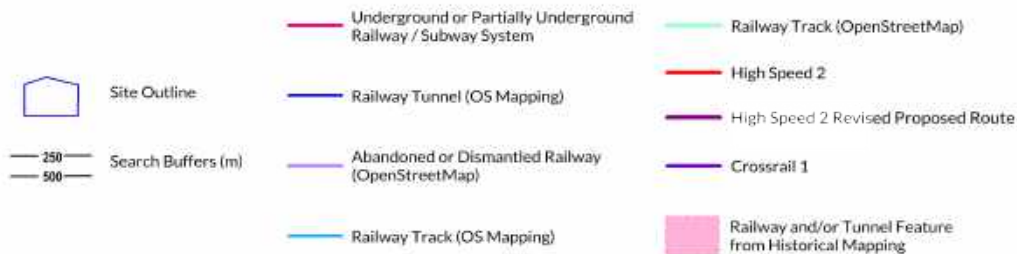
*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map



Railways and Tunnels Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.
© OpenStreetMapContributors



9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1A	176	E	323307 364962	Railway Sidings	1938
2A	176	E	323307 364962	Railway Sidings	1898
7C	179	E	323222 364964	Railway Sidings	1899
8C	180	E	323223 364966	Railway Sidings	1912
3A	184	E	323292 364966	Railway Sidings	1910
4A	185	E	323317 364957	Railway Sidings	1914

ID	Distance (m)	Direction	NGR	Details	Date
9D	185	E	323301 364900	Railway Sidings	1899
10D	187	E	323301 364902	Railway Sidings	1912
11	212	NE	323230 365005	Railway Sidings	1960
5B	213	NE	323338 364949	Railway Sidings	1979
6B	213	NE	323338 364949	Railway Sidings	1964
12E	219	NE	323331 364945	Railway Sidings	1960
13E	229	NE	323315 364956	Railway Sidings	1984
14	230	NE	323332 364945	Railway Sidings	1970

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Status
236	NE	Abandoned

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

*Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a **Groundsure HS2 and Crossrail 1 Report**.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

CENTREMAPS

Telephone: 01886 832972
Groundsure@centremaps.co.uk
Open Space, Upper Interfields, Malvern, Worcester, WR14 1UT



British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email: enquiries@bgs.ac.uk
Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries



**British
Geological Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX



The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk



**The Coal
Authority**

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
<https://www.gov.uk/government/organisations/public-health-england>
Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000



Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettell Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email: enquiries.gs@jpb.co.uk
Website: www.jpb.co.uk



Ordnance Survey

Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505
Website: <http://www.ordnancesurvey.co.uk/>



Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website: <http://www.1.getmapping.com/>



Peter Brett Associates

Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN

Tel: +44 (0)118 950 0761 E-mail: reading@pba.co.uk
Website: <http://www.peterbrett.com/home>



Acknowledgements: Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028]. This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
<https://www.groundsure.com/terms-and-conditions-sept-2016/>

APPENDIX J

These Ordnance Survey maps are not printed to scale and have been reduced to A4 size

A3 1/10,000 plans are available upon request



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: County Series

Map date: 1874

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1874
Revised 1874
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

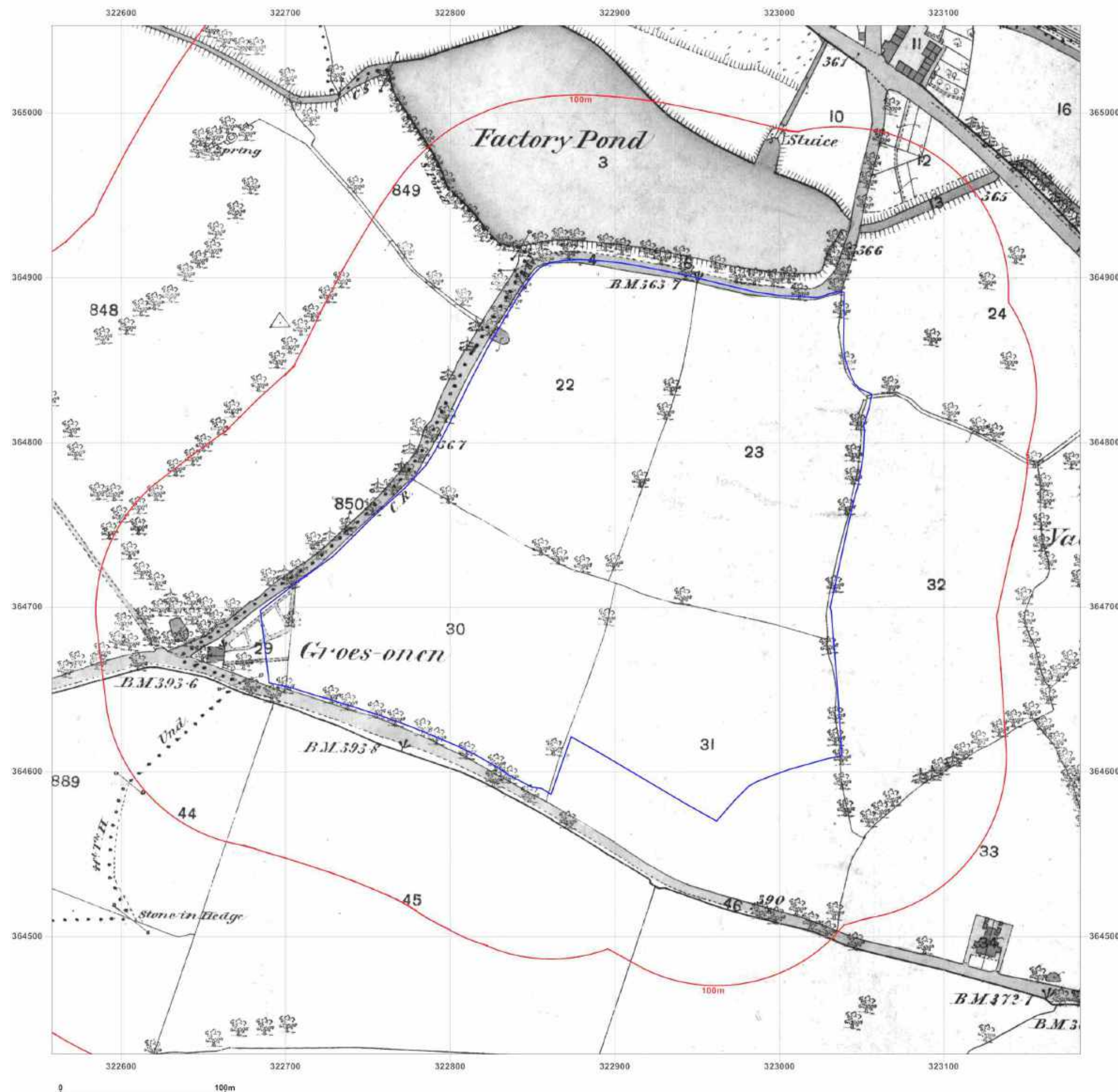


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

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
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

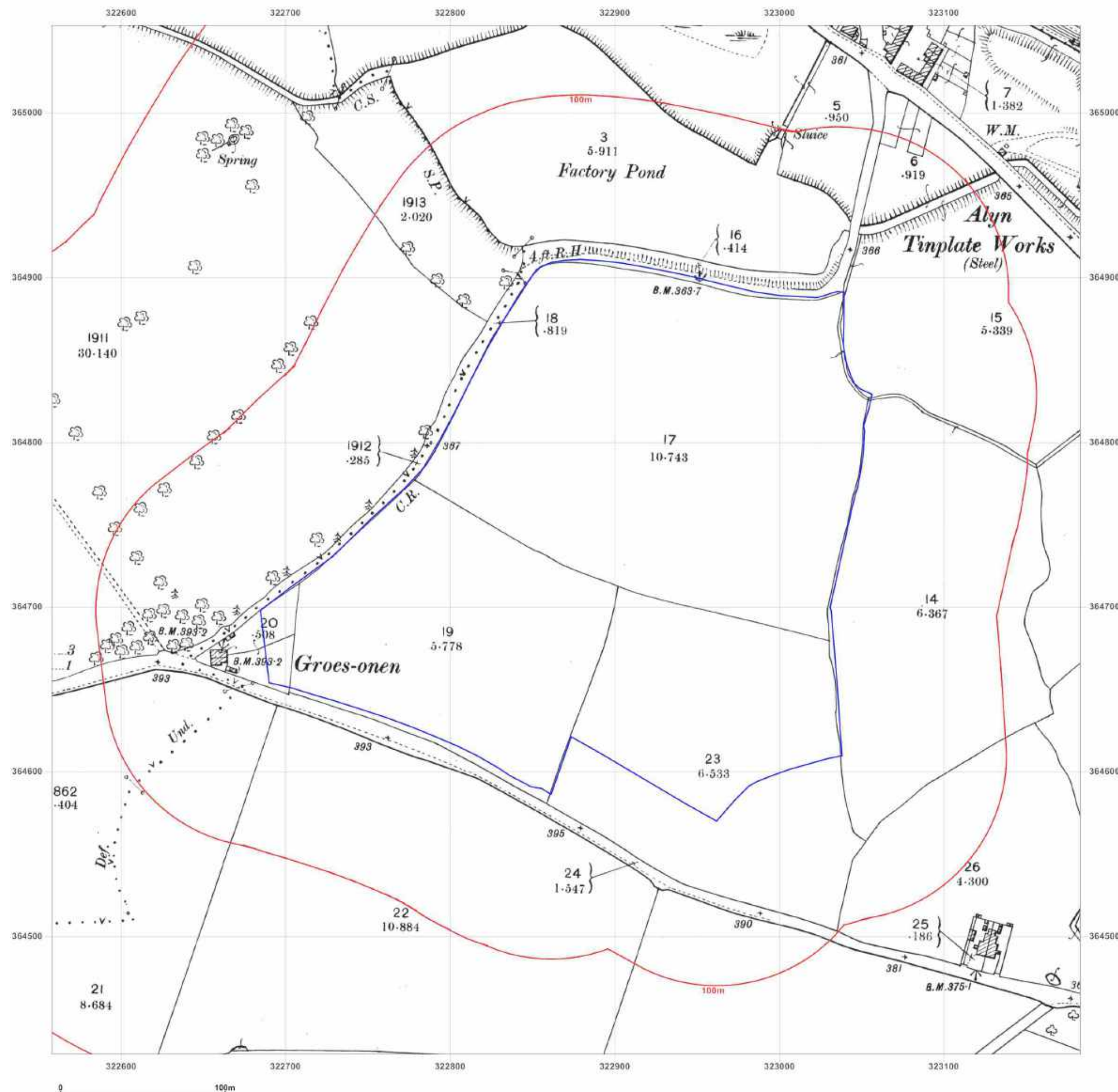


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: County Series

Map date: 1912

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1912
 Revised 1912
 Edition N/A
 Copyright N/A
 Levelled N/A



Produced by
 Groundsure Insights
www.groundsure.com

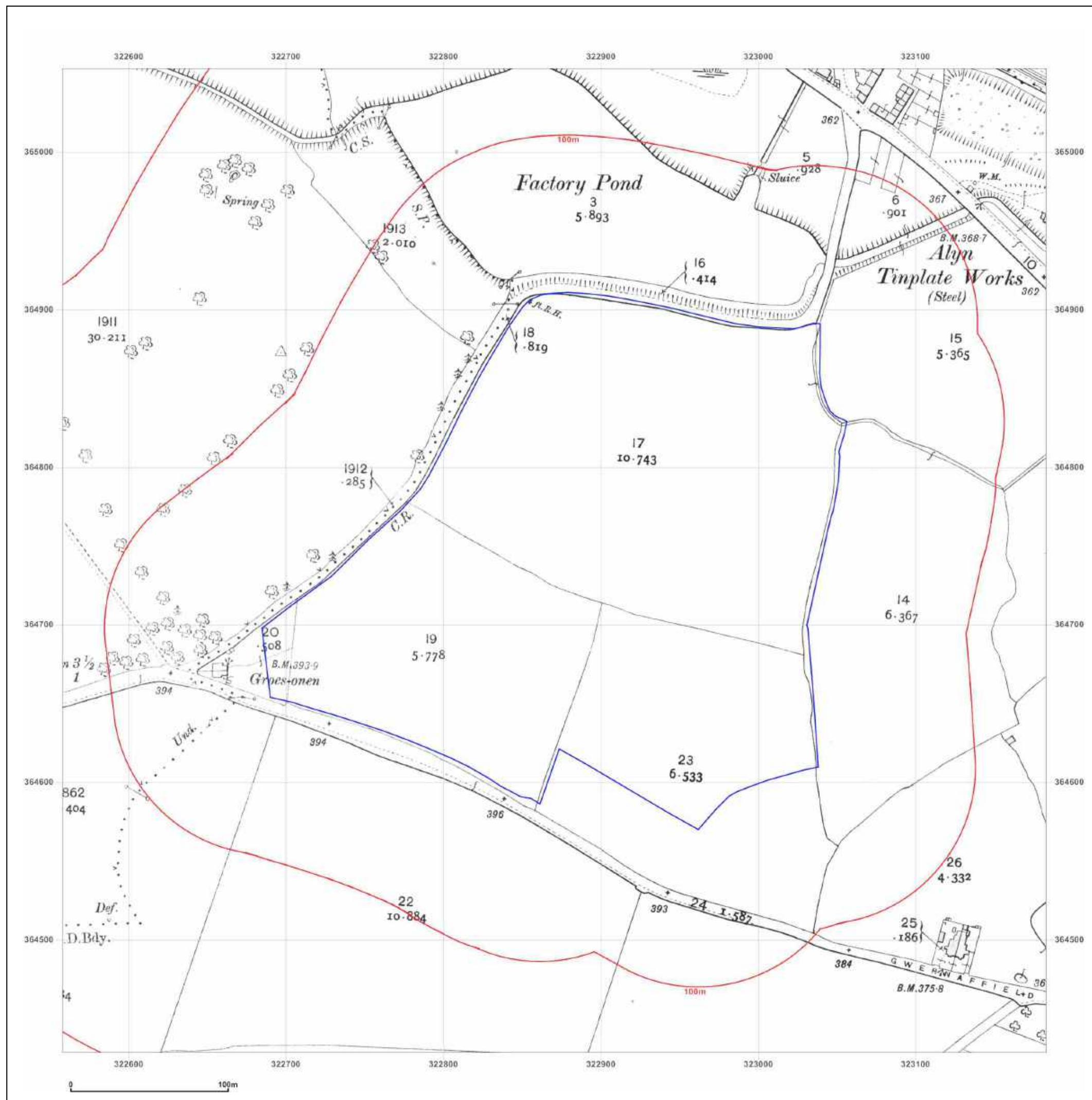


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 1960

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1960
Revised 1960
Edition N/A
Copyright 1961
Levelled 1951

Surveyed 1960
Revised 1960
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

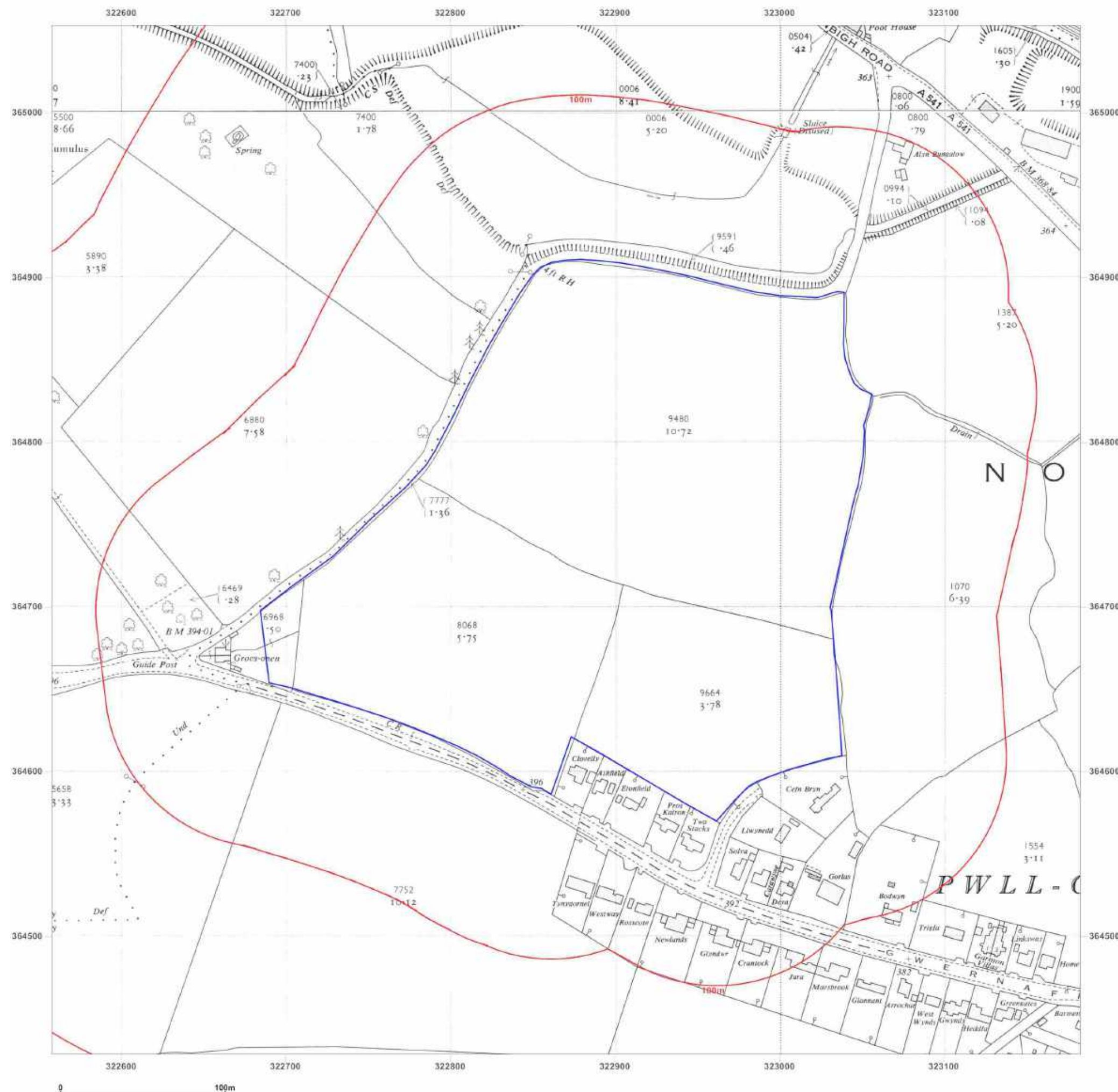


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)

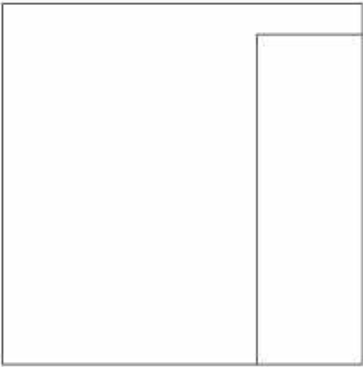




Site Details:
Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid
Map date: 1984
Scale: 1:2,500
Printed at: 1:2,500



Surveyed 1968
Revised 1984
Edition N/A
Copyright 1984
Levelled 1968

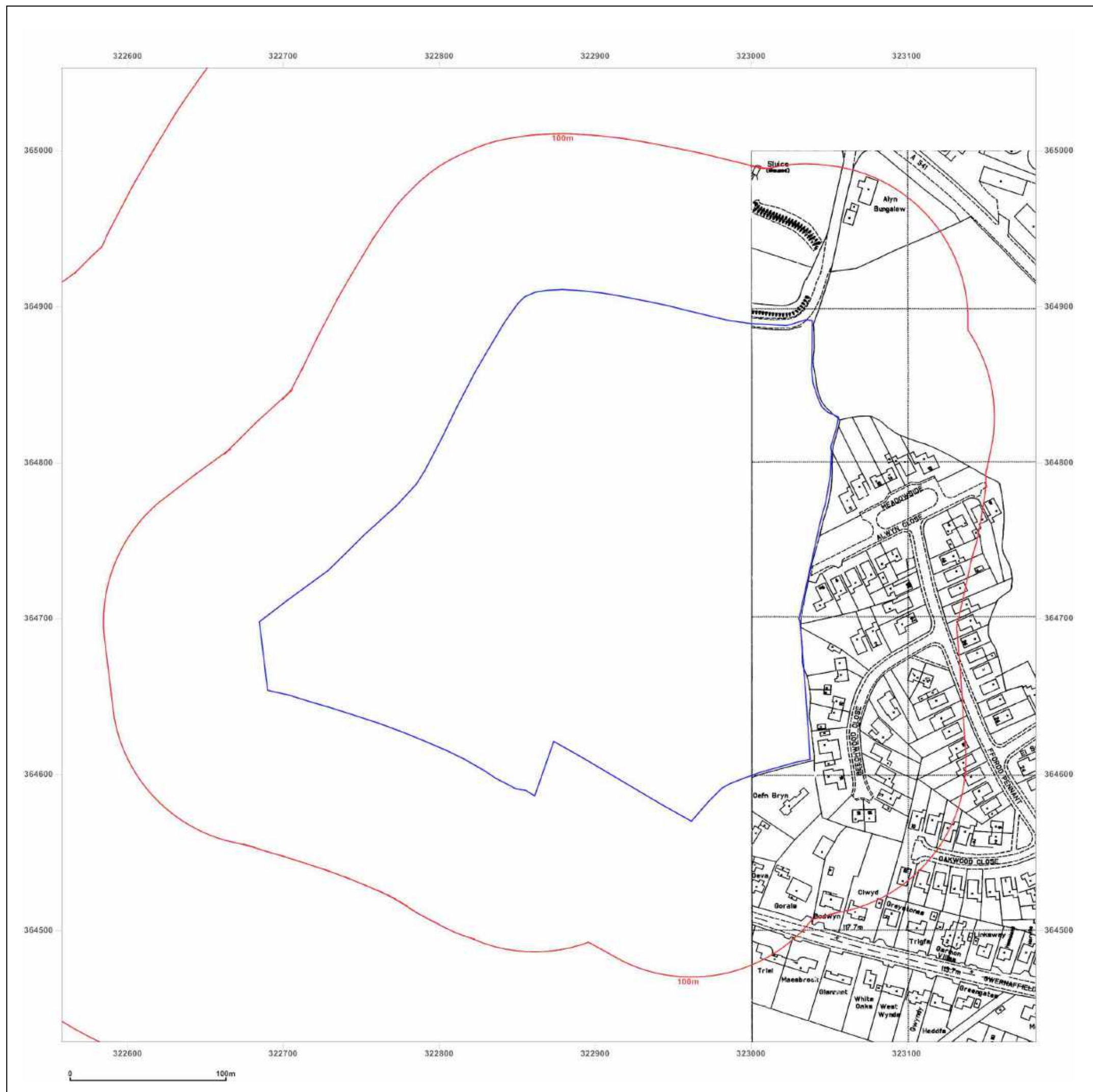
Produced by
Groundsure Insights
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

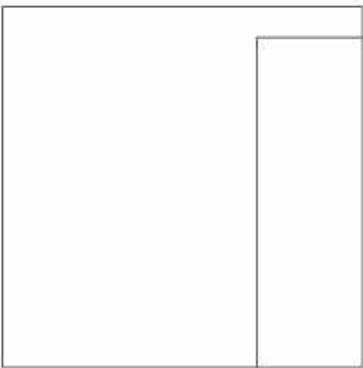
Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 1994

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1994
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

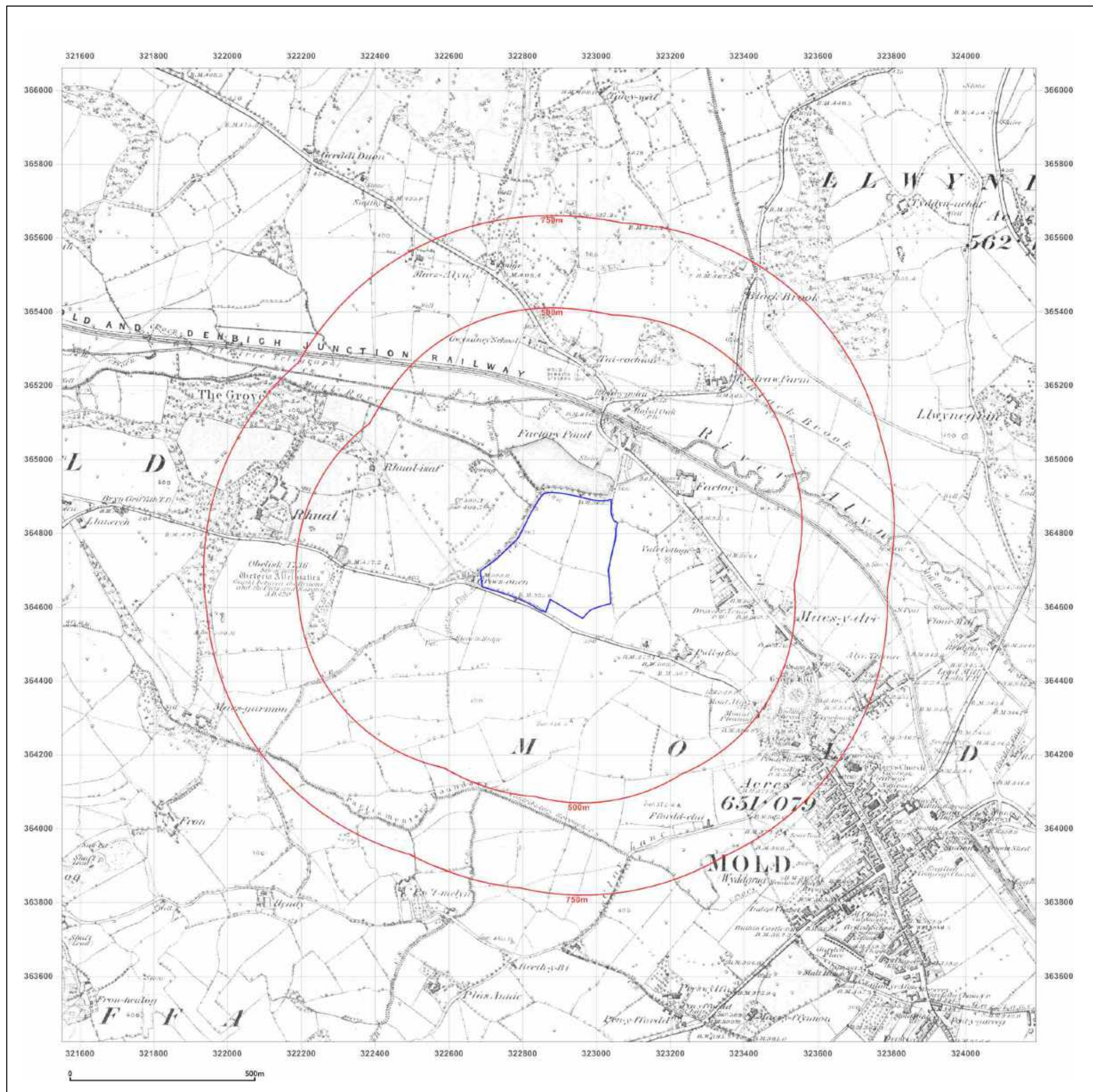


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:	
Gwernaffield Rd, Mold, CH7 1RR	
Client Ref:	30974
Report Ref:	CMAPS-CM-648937-30974-210817HIS
Grid Ref:	322870, 364741
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



Produced by
Groundsure Insights
www.groundsure.com



Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: County Series

Map date: 1898-1900

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1871 Revised 1898 Edition N/A Copyright N/A Levelled N/A
Surveyed 1871 Revised 1900 Edition N/A Copyright N/A Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

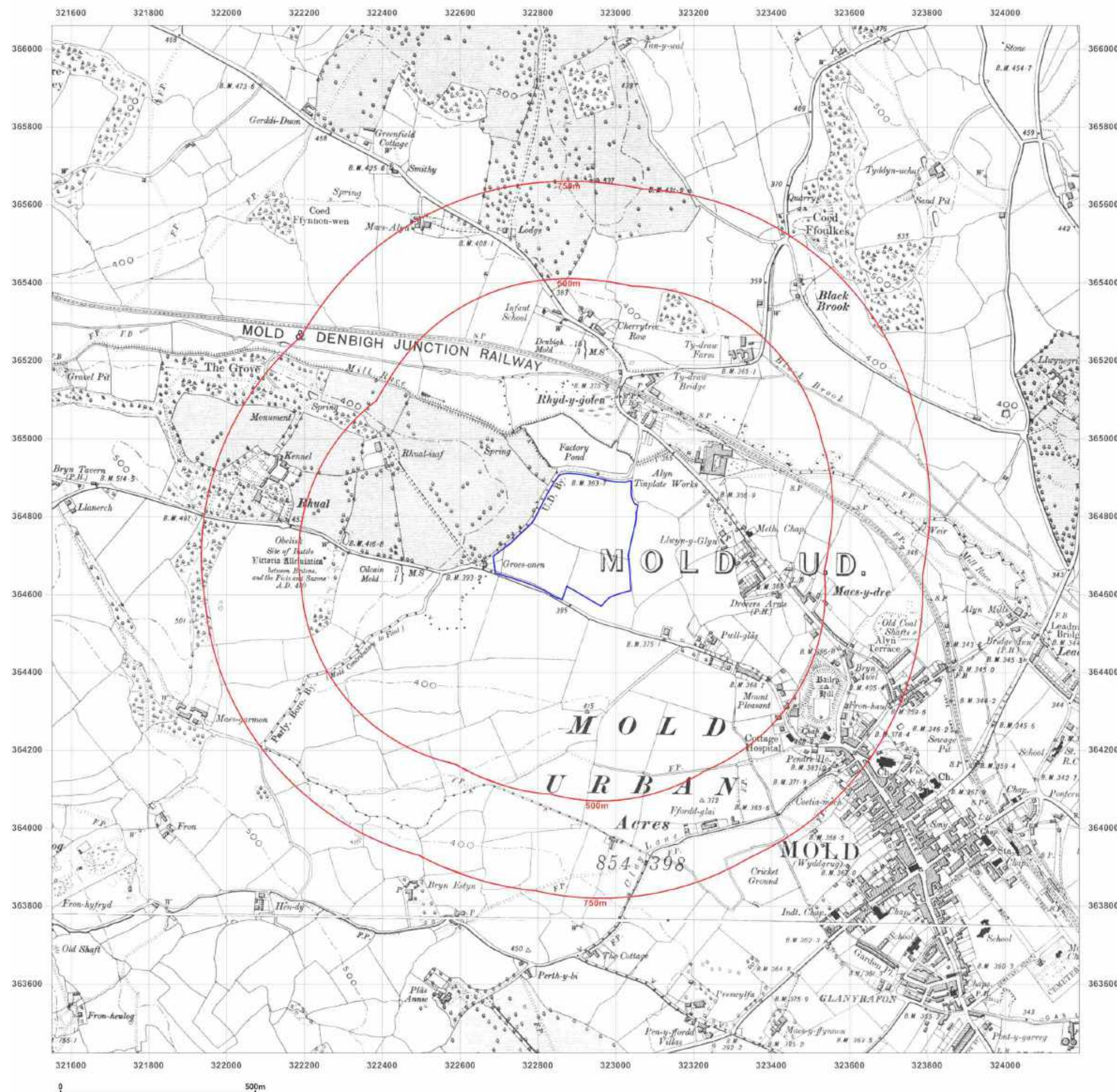


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: County Series

Map date: 1910

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1871 Revised 1910 Edition N/A Copyright N/A Levelled N/A
Surveyed 1871 Revised 1910 Edition N/A Copyright N/A Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

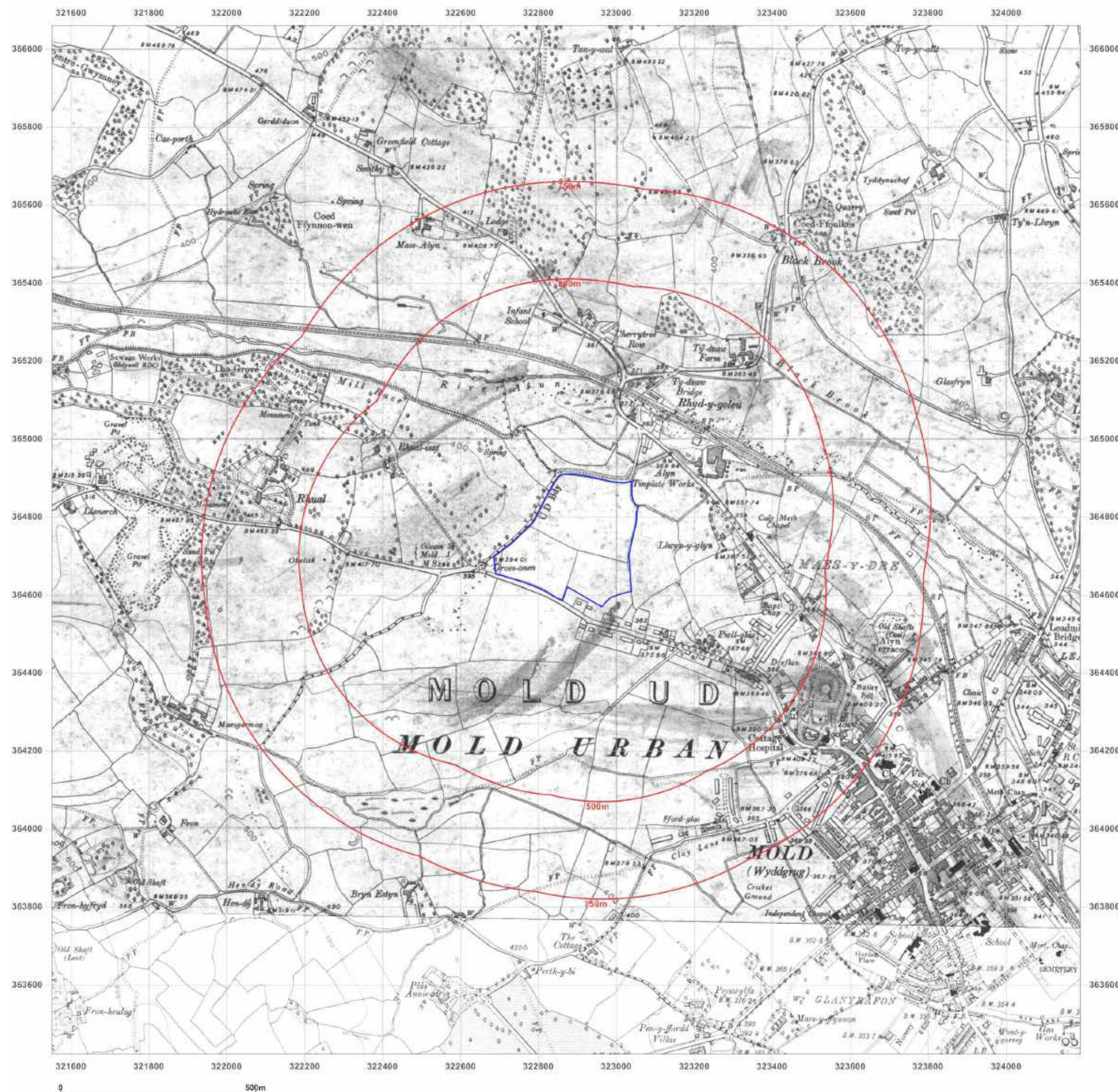


Supplied by:
www.centremapslive.com
groundsure@centremapslive.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1871
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1871
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

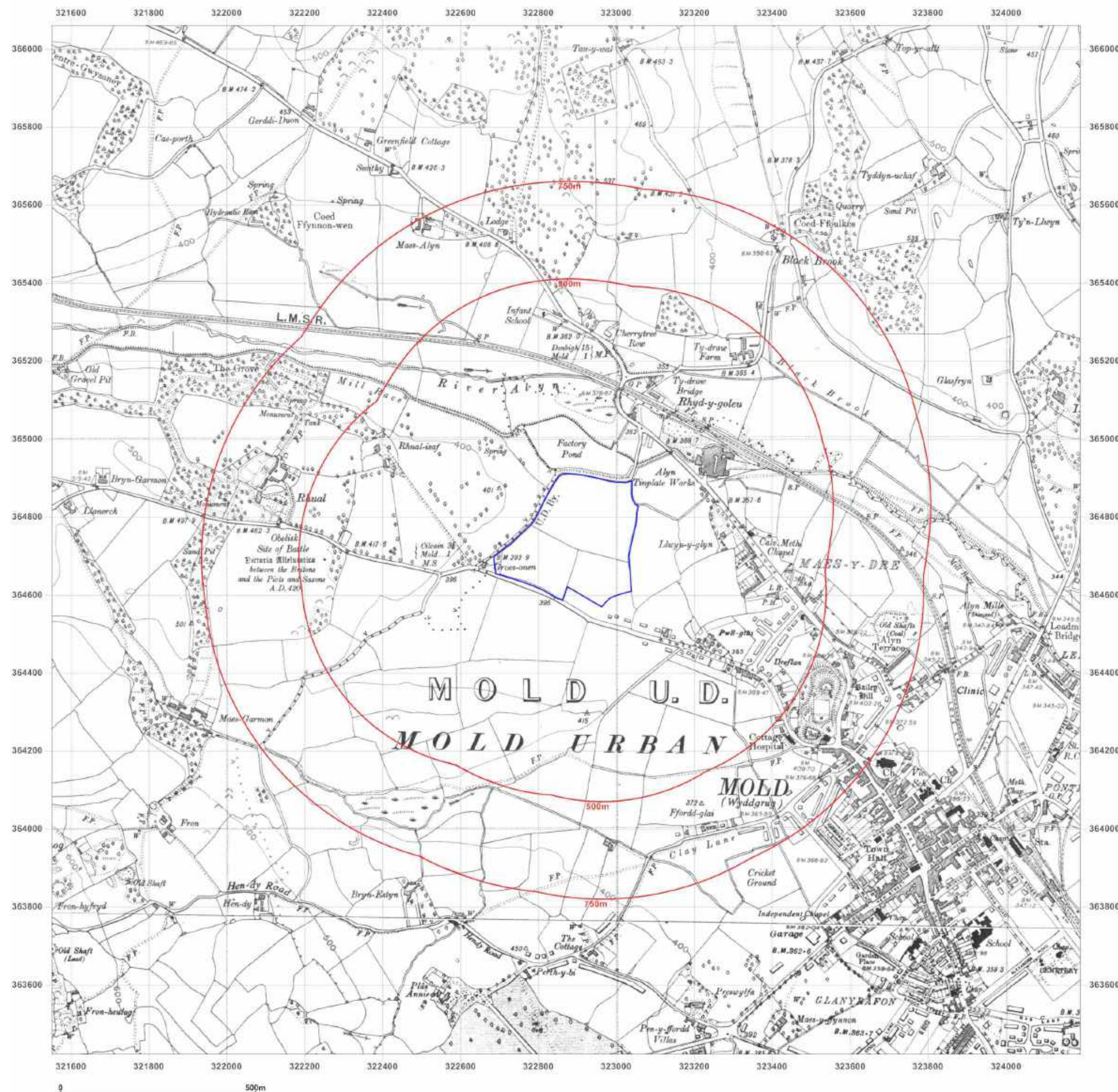


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: Provisional

Map date: 1959-1964

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1869
Revised 1959
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1964
Revised 1964
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

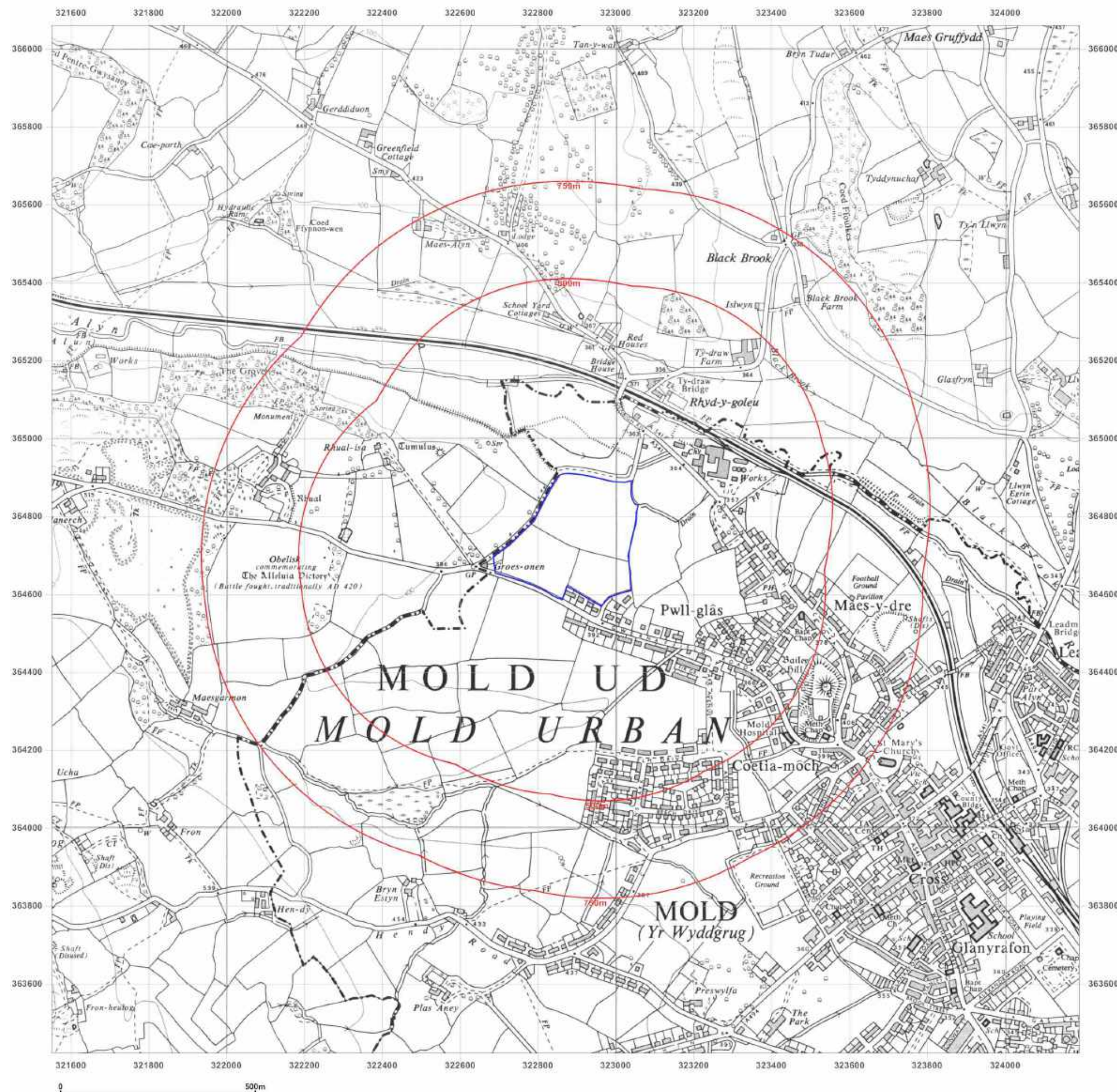


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 1971

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1968
Revised 1971
Edition N/A
Copyright 1971
Levelled 1968



Produced by
Groundsure Insights
www.groundsure.com

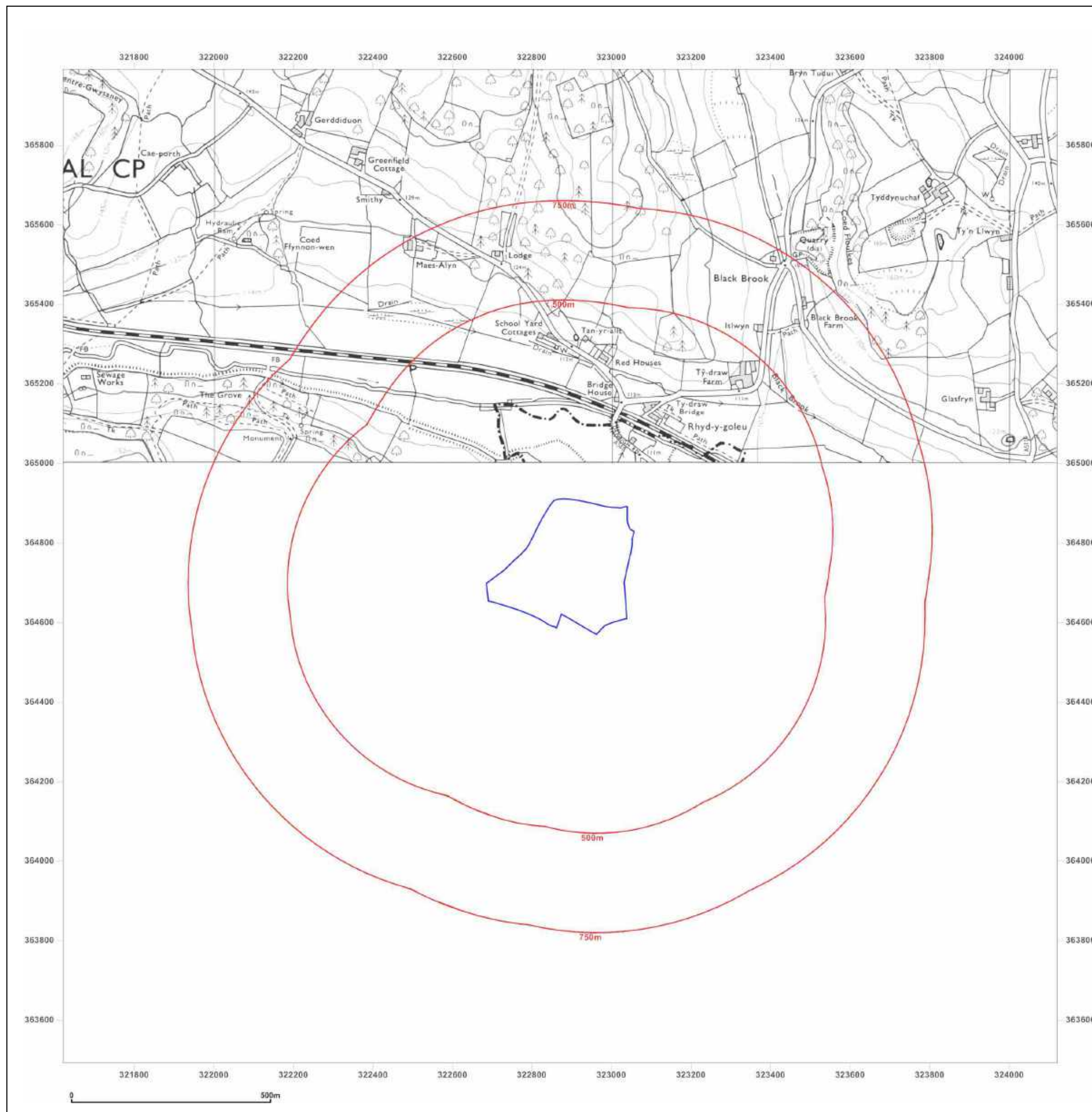


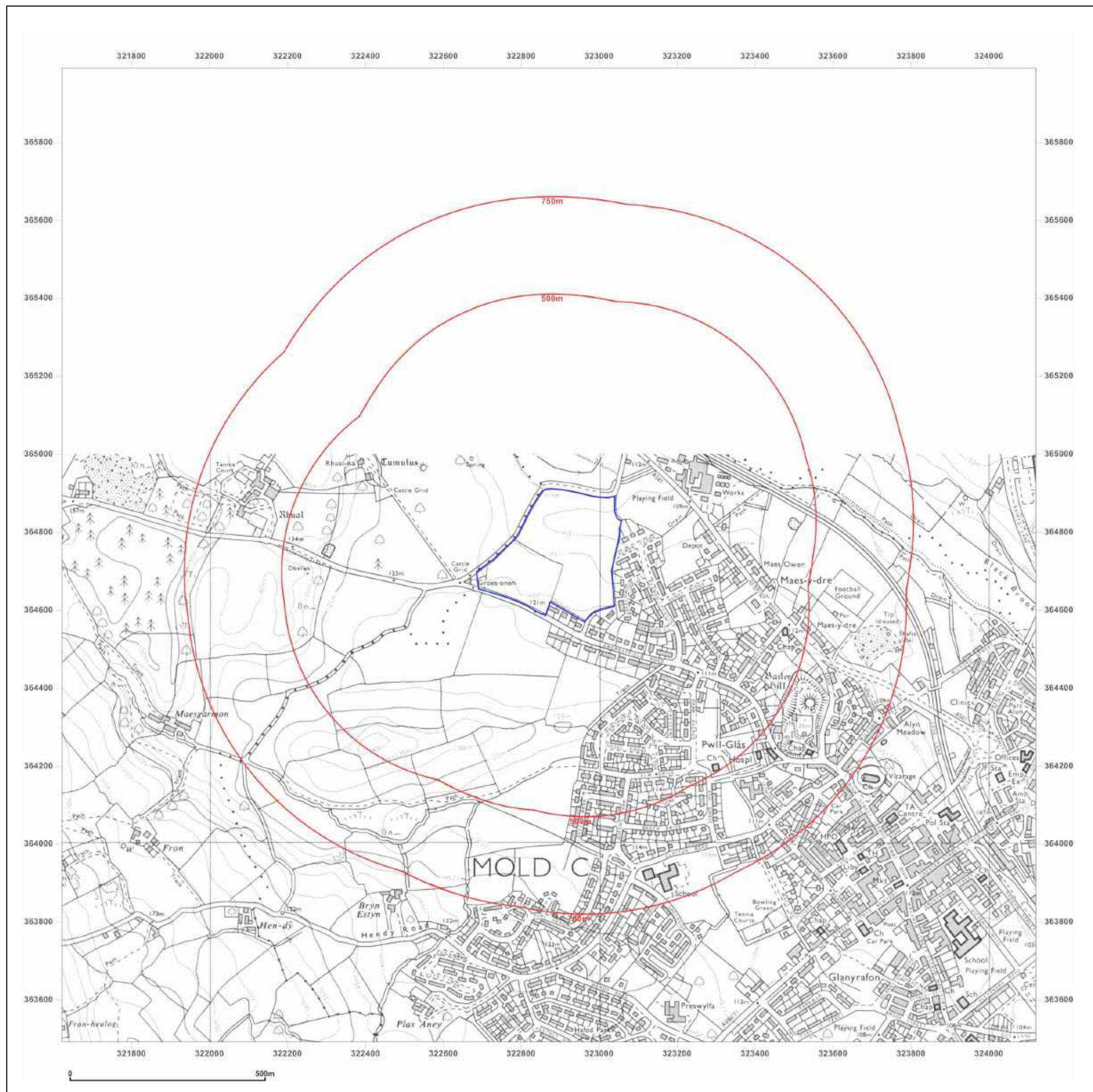
Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:
Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid
Map date: 1981
Scale: 1:10,000
Printed at: 1:10,000

Surveyed 1974
Revised 1981
Edition N/A
Copyright 1981
Levelled 1965

Produced by
Groundsure Insights
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 1989-1992

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1973
Revised 1989
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1991
Revised 1992
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

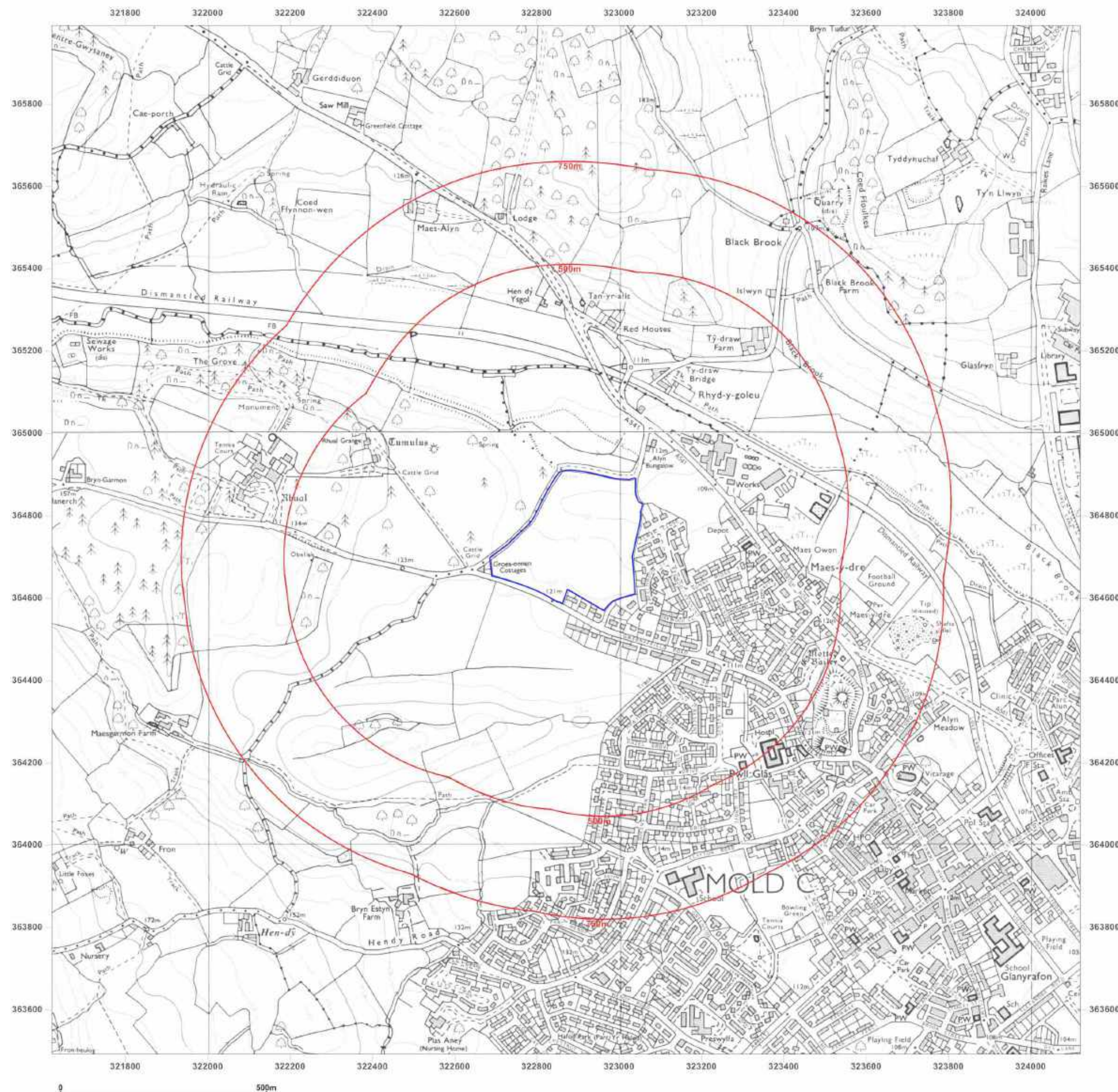


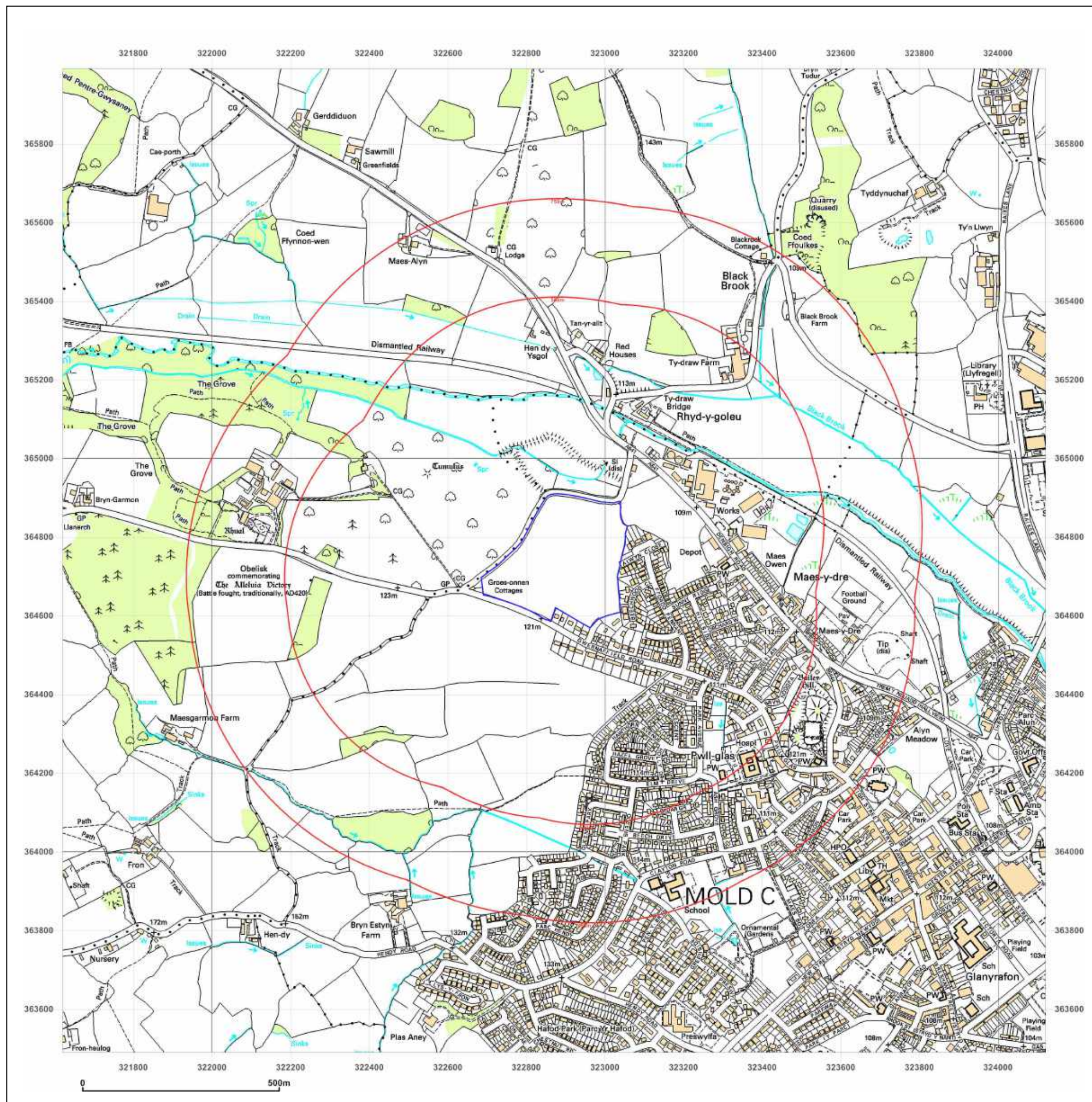
Supplied by:
www.centremapslive.com
groundsure@centremapslive.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

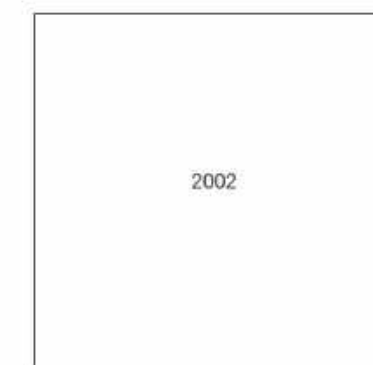
Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000



Produced by
Groundsure Insights
www.groundsure.com



Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



Site Details:

Gwernaffield Rd, Mold, CH7 1RR

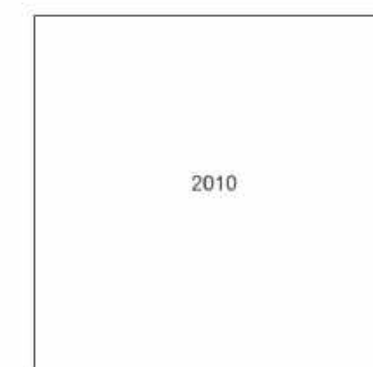
Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



Produced by
Groundsure Insights
www.groundsure.com

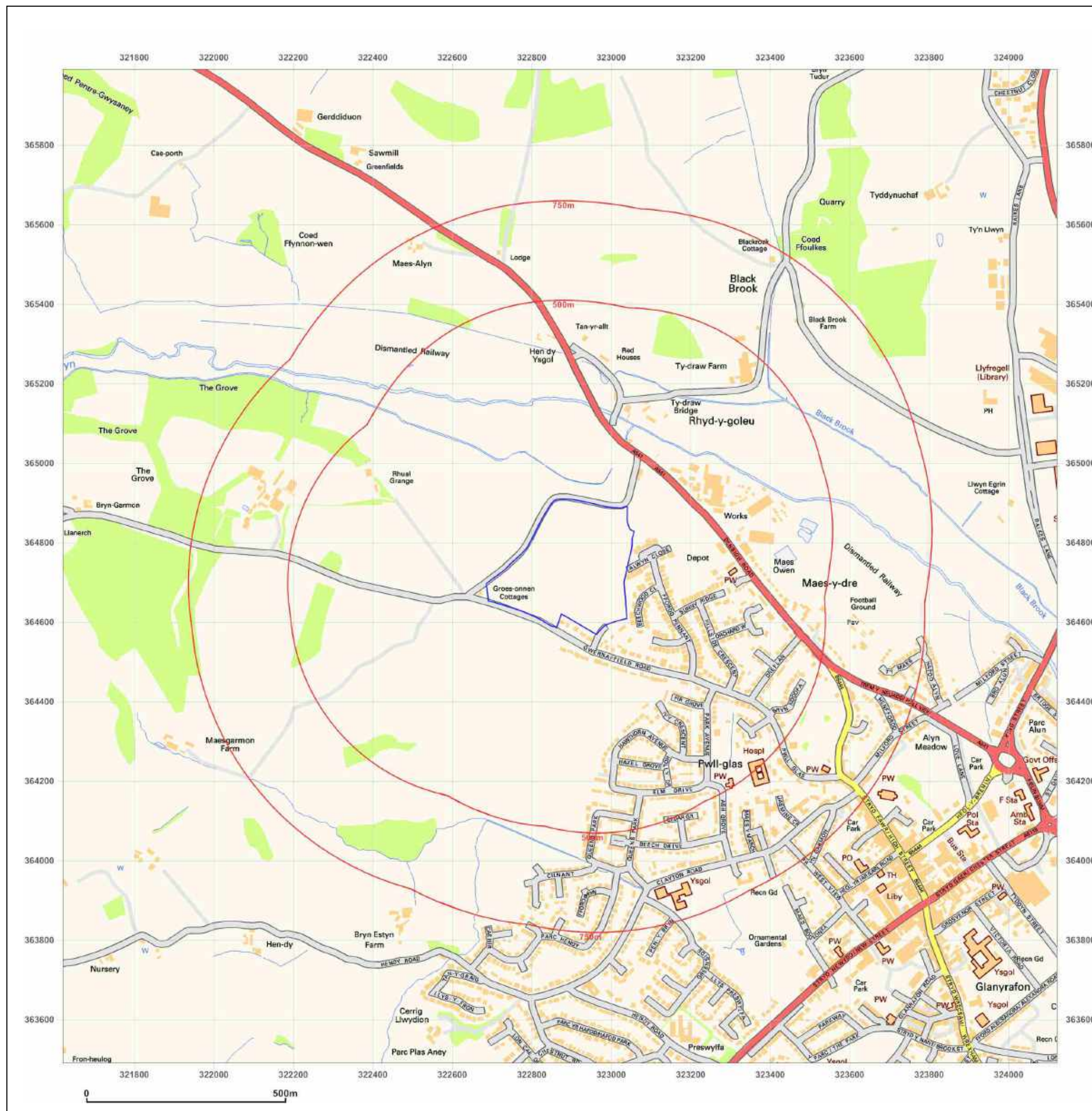


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)





Site Details:

Gwernaffield Rd, Mold, CH7 1RR

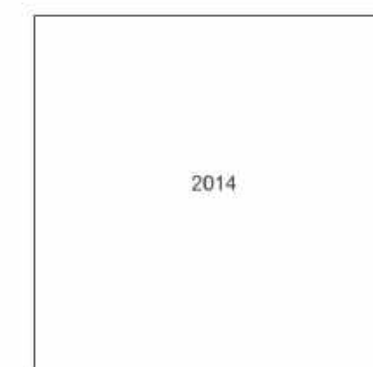
Client Ref: 30974
Report Ref: CMAPS-CM-648937-30974-210817HIS
Grid Ref: 322870, 364741

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000



Produced by
Groundsure Insights
www.groundsure.com

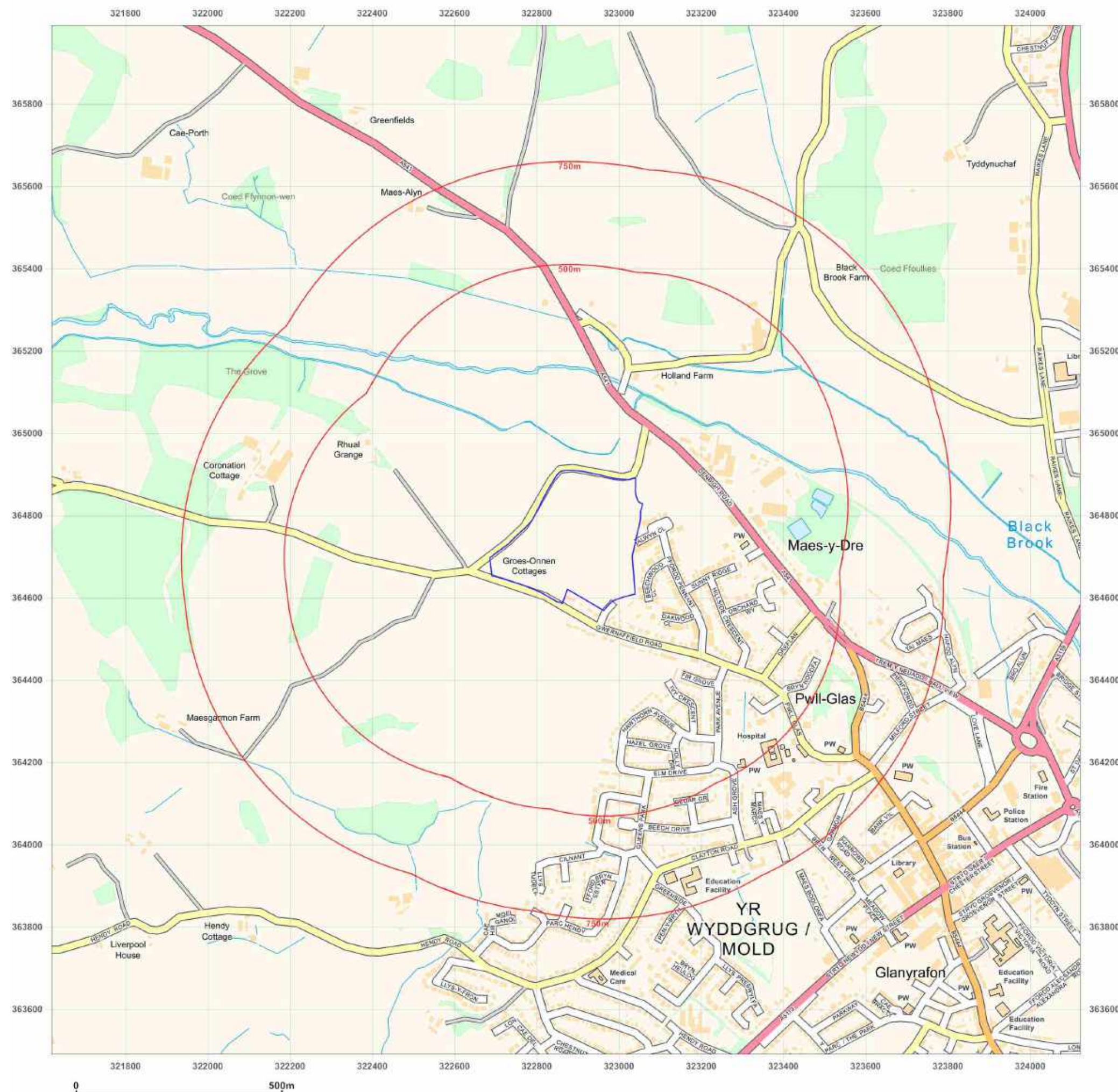


Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 21 August 2017

To view map legend click here [Legend](#)



APPENDIX K



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Robert E Fry & Associates Ltd
45 Bridgeman Terrace
Wigan
WN1 1TT

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention :	Mark Davies
Date :	12th September, 2017
Your reference :	17136
Our reference :	Test Report 17/14819 Batch 1
Location :	Gwernaffield Rd, Mold
Date samples received :	6th September, 2017
Status :	Final report
Issue :	1

Thirty samples were received for analysis on 6th September, 2017 of which thirty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: Robert E Fry & Associates Ltd
Reference: 17136
Location: Gwernaffield Rd, Mold
Contact: Mark Davies
JE Job No.: 17/14819

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2	3	4	5	6	7	8	9	10	Please see attached notes for all abbreviations and acronyms		
Sample ID	TP01	TP02	TP03	TP04	TP05	TP07	TP08	TP09	TP09	TP10			
Depth	0.10	0.50	0.10	0.10	0.50	0.10	0.10	0.10	0.50	0.10			
COC No / misc													
Containers	J	J	J	J	J	J	J	J	J	J			
Sample Date	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	LOD/LOR	Units	Method No.
Arsenic #	15.3	-	16.2	14.0	-	12.2	9.3	12.9	-	12.9	<0.5	mg/kg	TM30/PM15
Cadmium #	0.7	-	0.6	0.7	-	0.3	0.4	0.6	-	0.7	<0.1	mg/kg	TM30/PM15
Chromium #	60.9	-	52.0	53.8	-	65.3	55.2	56.3	-	43.3	<0.5	mg/kg	TM30/PM15
Copper #	34	-	31	38	-	27	25	27	-	24	<1	mg/kg	TM30/PM15
Lead #	272	65	234	203	49	177	128	193	29	163	<5	mg/kg	TM30/PM15
Mercury #	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	mg/kg	TM30/PM15
Nickel #	27.2	-	27.0	22.8	-	27.5	32.6	29.9	-	33.2	<0.7	mg/kg	TM30/PM15
Selenium #	<1	-	1	<1	-	<1	<1	<1	-	<1	<1	mg/kg	TM30/PM15
Zinc #	144	-	125	137	-	128	120	151	-	157	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	-	<0.03	<0.03	-	<0.03	<0.03	<0.03	-	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.07	-	0.05	0.06	-	0.06	0.03	<0.03	-	0.05	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.14	-	0.07	0.10	-	0.13	0.07	0.06	-	0.11	<0.03	mg/kg	TM4/PM8
Pyrene #	0.13	-	0.07	0.10	-	0.12	0.06	0.06	-	0.11	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.15	-	0.08	0.10	-	0.12	0.08	0.07	-	0.09	<0.06	mg/kg	TM4/PM8
Chrysene #	0.11	-	0.06	0.06	-	0.08	0.05	0.05	-	0.09	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.20	-	0.12	0.11	-	0.15	<0.07	0.08	-	0.14	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.13	-	0.06	0.06	-	0.09	0.05	0.06	-	0.08	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.07	-	<0.04	<0.04	-	0.06	<0.04	<0.04	-	0.08	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.07	-	<0.04	<0.04	-	0.06	<0.04	<0.04	-	0.07	<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.1	-	<0.6	<0.6	-	0.9	<0.6	<0.6	-	0.8	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.14	-	0.09	0.08	-	0.11	<0.05	0.06	-	0.10	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.06	-	0.03	0.03	-	0.04	<0.02	0.02	-	0.04	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	102	-	99	103	-	99	102	103	-	101	<0	%	TM4/PM8
Total Phenols HPLC	<0.15	-	<0.15	<0.15	-	0.19	<0.15	<0.15	-	0.20	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	18.9	-	19.8	22.4	-	16.5	14.5	17.3	-	13.4	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	15.9	-	16.5	18.3	-	14.2	12.6	14.8	-	11.8	<0.1	%	PM4/PM0
Sulphate as SO ₄ (2:1 Ext) #	0.0032	-	<0.0015	0.0045	-	<0.0015	0.0042	0.0047	-	<0.0015	<0.0015	g/l	TM38/PM20
Total Cyanide #	0.8	-	1.0	1.0	-	0.9	0.9	1.1	-	1.0	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	4.40	-	6.47	7.30	-	3.32	2.37	3.50	-	2.24	<0.02	%	TM21/PM24
Sulphide	<10	-	<10	<10	-	<10	<10	<10	-	<10	<10	mg/kg	TM106/PM119

Please see attached notes for all abbreviations and acronyms

Client Name: Robert E Fry & Associates Ltd
Reference: 17136
Location: Gwernaffield Rd, Mold
Contact: Mark Davies
JE Job No.: 17/14819

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11	12	13	14	15	16	17	18	19	20	Please see attached notes for all abbreviations and acronyms		
Sample ID	TP11	TP12	TP12	TP13	TP14	TP15	TP15	TP16	TP16	TP17			
Depth	0.10	0.10	0.50	0.15	0.15	0.15	0.50	0.15	0.50	0.10			
COC No / misc													
Containers	J	J	J	J	J	J	J	J	J	J			
Sample Date	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	LOD/LOR	Units	Method No.
Arsenic [#]	13.3	9.6	-	13.0	17.3	14.6	-	13.6	-	19.2	<0.5	mg/kg	TM30/PM15
Cadmium [#]	0.8	0.4	-	0.4	0.7	0.5	-	0.6	-	1.0	<0.1	mg/kg	TM30/PM15
Chromium [#]	39.8	58.0	-	61.0	68.2	64.6	-	57.7	-	58.3	<0.5	mg/kg	TM30/PM15
Copper [#]	31	20	-	31	40	27	-	32	-	40	<1	mg/kg	TM30/PM15
Lead [#]	181	105	26	192	293	218	54	181	32	292	<5	mg/kg	TM30/PM15
Mercury [#]	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM30/PM15
Nickel [#]	31.1	36.0	-	24.2	32.6	29.2	-	37.9	-	36.5	<0.7	mg/kg	TM30/PM15
Selenium [#]	<1	<1	-	<1	<1	<1	-	<1	-	<1	<1	mg/kg	TM30/PM15
Zinc [#]	156	122	-	129	184	153	-	137	-	200	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [#]	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	-	<0.03	<0.03	<0.03	-	<0.03	-	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	0.05	<0.03	-	0.05	0.07	0.06	-	0.05	-	0.05	<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	0.09	0.07	-	0.08	0.21	0.12	-	0.08	-	0.10	<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.09	0.06	-	0.07	0.20	0.12	-	0.08	-	0.10	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.08	0.07	-	0.10	0.19	0.13	-	0.09	-	0.11	<0.06	mg/kg	TM4/PM8
Chrysene [#]	0.07	0.04	-	0.06	0.14	0.08	-	0.06	-	0.06	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene [#]	0.13	<0.07	-	0.10	0.28	0.17	-	0.10	-	0.11	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.08	0.04	-	0.06	0.18	0.12	-	0.07	-	0.07	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	0.06	<0.04	-	<0.04	0.13	0.07	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	-	<0.04	<0.04	<0.04	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	0.06	<0.04	-	<0.04	0.12	0.07	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	0.7	<0.6	-	<0.6	1.5	0.9	-	<0.6	-	0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.09	<0.05	-	0.07	0.20	0.12	-	0.07	-	0.08	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.04	<0.02	-	0.03	0.08	0.05	-	0.03	-	0.03	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	104	108	-	108	107	108	-	110	-	106	<0	%	TM4/PM8
Total Phenols HPLC	<0.15	<0.15	-	<0.15	<0.15	<0.15	-	<0.15	-	<0.15	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	14.7	11.3	-	19.5	17.6	15.9	-	13.5	-	19.4	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	12.8	10.2	-	16.3	15.0	13.8	-	11.9	-	16.3	<0.1	%	PM4/PM0
Sulphate as SO ₄ (2:1 Ext) [#]	<0.0015	0.0016	-	0.0046	0.0064	0.0055	-	<0.0015	-	0.0033	<0.0015	g/l	TM38/PM20
Total Cyanide [#]	0.9	1.0	-	0.8	0.8	0.8	-	0.6	-	0.7	<0.5	mg/kg	TM89/PM45
Total Organic Carbon [#]	6.31	2.27	-	4.29	4.30	3.78	-	3.35	-	5.05	<0.02	%	TM21/PM24
Sulphide	<10	<10	-	<10	<10	<10	-	<10	-	<10	<10	mg/kg	TM106/PM119

Please include all sections of this report if it is reproduced

Client Name: Robert E Fry & Associates Ltd
Reference: 17136
Location: Gwernaffield Rd, Mold
Contact: Mark Davies
JE Job No.: 17/14819

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	21	22	23	24	25	26	27	28	29	30	Please see attached notes for all abbreviations and acronyms		
Sample ID	TP17	TP18	TP19	TP19	TP20	TP21	TP22	TP25	TP28	TP29			
Depth	0.50	0.10	0.10	0.40	0.10	0.40	0.10	0.50	0.15	0.15			
COC No / misc													
Containers	J	J	J	J	J	J	J	J	J	J			
Sample Date	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	06/09/2017	LOD/LOR	Units	Method No.
Arsenic [#]	-	13.4	12.9	-	13.6	-	10.5	-	15.5	10.3	<0.5	mg/kg	TM30/PM15
Cadmium [#]	-	0.6	0.5	-	0.7	-	0.4	-	0.5	0.7	<0.1	mg/kg	TM30/PM15
Chromium [#]	-	61.2	56.1	-	62.5	-	54.3	-	58.7	68.4	<0.5	mg/kg	TM30/PM15
Copper [#]	-	23	27	-	37	-	31	-	30	29	<1	mg/kg	TM30/PM15
Lead [#]	181	239	140	22	229	17	175	27	220	156	<5	mg/kg	TM30/PM15
Mercury [#]	-	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel [#]	-	28.7	33.8	-	26.2	-	19.6	-	22.5	28.3	<0.7	mg/kg	TM30/PM15
Selenium [#]	-	<1	<1	-	<1	-	<1	-	<1	<1	<1	mg/kg	TM30/PM15
Zinc [#]	-	122	132	-	164	-	134	-	126	143	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [#]	-	<0.04	<0.04	-	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	<0.03	<0.03	-	<0.03	-	<0.03	-	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	-	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [#]	-	<0.04	<0.04	-	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	-	0.03	0.03	-	0.05	-	<0.03	-	<0.03	0.08	<0.03	mg/kg	TM4/PM8
Anthracene [#]	-	<0.04	<0.04	-	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	-	0.06	0.07	-	0.08	-	0.06	-	0.07	0.22	<0.03	mg/kg	TM4/PM8
Pyrene [#]	-	0.06	0.07	-	0.07	-	0.06	-	0.06	0.22	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	-	<0.06	0.08	-	0.11	-	<0.06	-	<0.06	0.12	<0.06	mg/kg	TM4/PM8
Chrysene [#]	-	0.04	0.05	-	0.06	-	0.06	-	0.02	0.14	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene [#]	-	<0.07	0.09	-	0.12	-	<0.07	-	0.10	0.36	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	-	0.04	0.05	-	0.08	-	0.06	-	0.05	0.21	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	-	<0.04	<0.04	-	0.05	-	<0.04	-	0.05	0.15	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	-	<0.04	<0.04	-	<0.04	-	<0.04	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	-	<0.04	<0.04	-	<0.04	-	<0.04	-	<0.04	0.17	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	<0.6	<0.6	-	0.6	-	<0.6	-	<0.6	1.7	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	<0.05	0.06	-	0.09	-	<0.05	-	0.07	0.26	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	<0.02	0.03	-	0.03	-	<0.02	-	0.03	0.10	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	108	106	-	105	-	106	-	99	101	<0	%	TM4/PM8
Total Phenols HPLC	-	0.15	0.29	-	0.71	-	0.68	-	0.64	0.26	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	-	11.9	14.0	-	21.1	-	23.1	-	21.1	15.3	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	-	10.6	12.2	-	17.4	-	18.8	-	17.4	13.3	<0.1	%	PM4/PM0
Sulphate as SO4 (2:1 Ext) [#]	-	0.0036	<0.0015	-	0.0090	-	0.0042	-	0.0034	0.0017	<0.0015	g/l	TM38/PM20
Total Cyanide [#]	-	0.8	1.0	-	1.1	-	1.1	-	1.0	0.8	<0.5	mg/kg	TM89/PM45
Total Organic Carbon [#]	-	2.76	2.59	-	4.75	-	4.50	-	5.11	3.29	<0.02	%	TM21/PM24
Sulphide	-	<10	<10	-	<10	-	<10	-	<10	<10	<10	mg/kg	TM106/PM119

Please see attached notes for all abbreviations and acronyms

Client Name: Robert E Fry & Associates Ltd
Reference: 17136
Location: Gwernaffield Rd, Mold
Contact: Mark Davies

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/14819

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/14819

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
TM106	Determination of Sulphide by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes

APPENDIX L



LABORATORY REPORT REPORT



4043

Contract Number: PSL17/4489

Report Date: 21 September 2017
Client's Reference: 17136
Client Name: REFA Consulting Engineers
45 Brdgeman Terrace
Wigan
WN1 1TT

For the attention of: Mark Davies

Contract Title: Gwernaffield Road, Mold
Date Received: 15/9/2017
Date Commenced: 15/9/2017
Date Completed: 21/9/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

L Knight
(Senior Technician)

C Marshall
(Laboratory Manager)

A Fry
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

Gwernaffield Road, Mold

Contract No:

PSL17/4489

Client Ref:

MD/EJ/17136

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



PSL
Professional Soils Laboratory

Gwernaffield Road, Mold

Contract No:

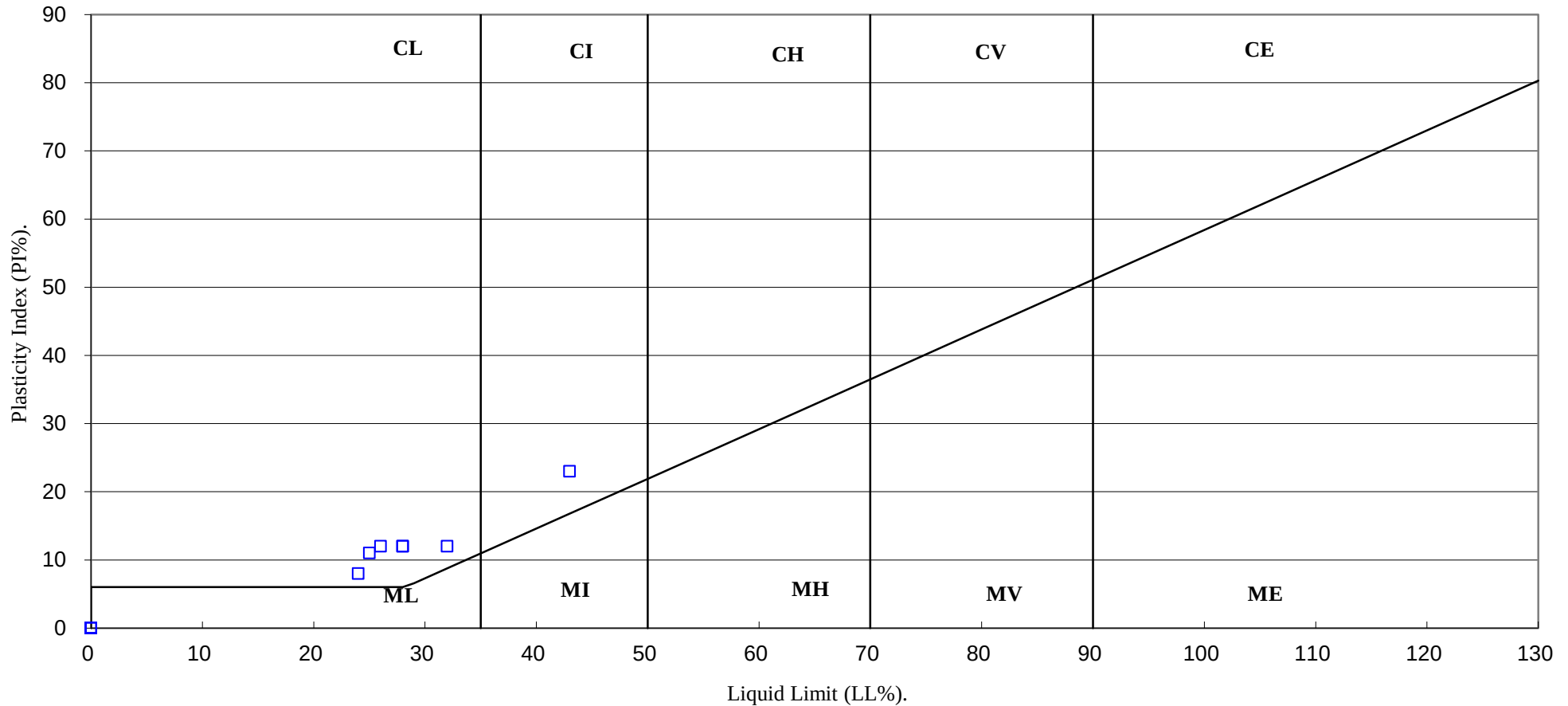
PSL17/4489

Client Ref:

MD/EJ/17136

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Gwernaffield Road, Mold

Contract No:

PSL17/4489

Client Ref:

MD/EJ/17136

APPENDIX M

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.0				1.2		19.2		79.5		DRY	994	
WS 4	0.0	0	0.0				2.5		18.4		79.0		2.36	994	
WS 5	0.0	0	0.0				0.0		20.8		79.1		2.59	994	
WS 8	0.0	0	0.0				2.4		17.9		79.6		1.51	994	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	S Edwards Rain LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	12.09.2017
		Job No.	
		Sheet No.	1

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.0				0.1		20.8		79.0		0.72	1023	
WS 4	0.0	0	0.0				0.0		21.2		78.7		0.68	1023	
WS 5	0.0	0	0.0				0.2		21.0		78.7		0.64	1023	
WS 8	0.0	0	0.0				0.0		21.0		78.9		0.83	1023	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	S Edwards LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	03.10.2017
		Job No.	
		Sheet No.	2

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.2				2.2		19.1		78.4		DRY	1009	
WS 4	0.0	0	0.1				3.0		18.9		77.9		2.19	1009	
WS 5	0.0	0	0.0				3.0		17.9		79.0		2.41	1009	
WS 8	0.0	0	0.1				3.2		18.0		78.6		1.33	1009	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	S Edwards Overcast LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	17.10.2017
		Job No.	
		Sheet No.	3

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.1				1.8		18.9		79.1		3.60	1029	
WS 4	0.0	0	0.1				3.1		18.1		78.7		2.10	1029	
WS 5	0.0	0	0.0				2.9		17.4		79.6		2.20	1029	
WS 8	0.0	0	0.1				2.6		18.9		78.3		1.31	1029	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	P. Platt Dry LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	27.10.2017
		Job No.	
		Sheet No.	4

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.1				1.6		19.4		78.8		3.10	1006	
WS 4	0.0	0	0.0				3.2		17.3		79.4		2.10	1006	
WS 5	0.0	0	0.0				2.8		17.1		80.0		1.95	1006	
WS 8	0.0	0	0.1				2.1		19.1		78.6		1.25	1006	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	S Edwards Dry LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	24.11.2017
		Job No.	
		Sheet No.	5

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS 3	0.0	0	0.0				1.2		19.8		78.9		2.80	1013	
WS 4	0.0	0	0.0				3.2		16.9		79.8		2.02	1013	
WS 5	0.0	0	0.0				2.8		16.8		80.3		1.80	1013	
WS 8	0.0	0	0.0				1.6		19.2		79.1		1.21	1013	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by: Weather : Equipment used: Visible signs of vegetation stress: Boreholes sampled for laboratory analysis: Other comments / observations:	S Edwards Cloudy, cold LMS Type G3 xi Gas Meter	Contract:	Gwernaffield Road, Mold
		Date:	06.12.2017
		Job No.	
		Sheet No.	6

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

APPENDIX N



The Coal
Authority

Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

ALYN BUNGALOW, DENBIGH ROAD
MOLD
FLINTSHIRE

Date of enquiry: 21 August 2017
Date enquiry received: 21 August 2017
Issue date: 21 August 2017

Our reference: 51001583074001
Your reference: 136668439_1 |



CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

LANDMARK INFORMATION GROUP LIMITED

Enquiry address

ALYN BUNGALOW, DENBIGH ROAD, MOLD,
FLINTSHIRE

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

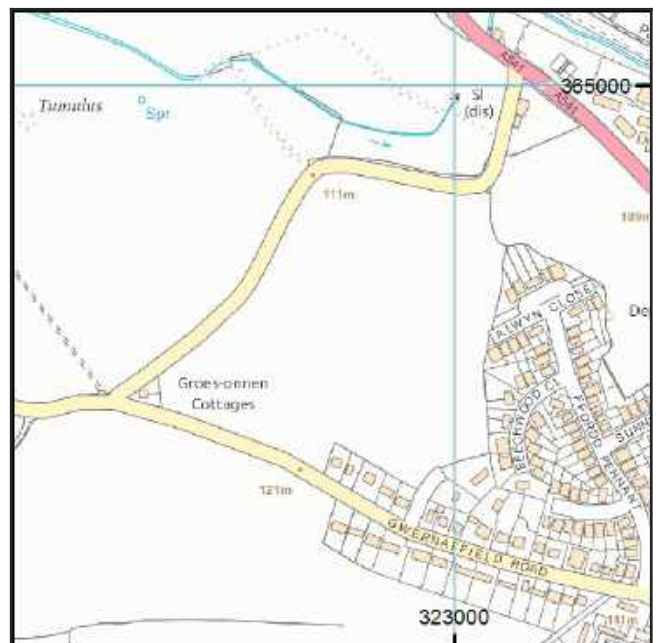
200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



Approximate position of property



Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2017. All rights reserved.

Ordnance Survey Licence number: 100020315

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	No
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	No
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is not within a surface area that could be affected by past underground mining.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

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

4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7. Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, 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.

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

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.

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. 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.

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

Disclaimer

The Coal Authority owns the copyright in this report and the information used to produce this report is protected by our database rights. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

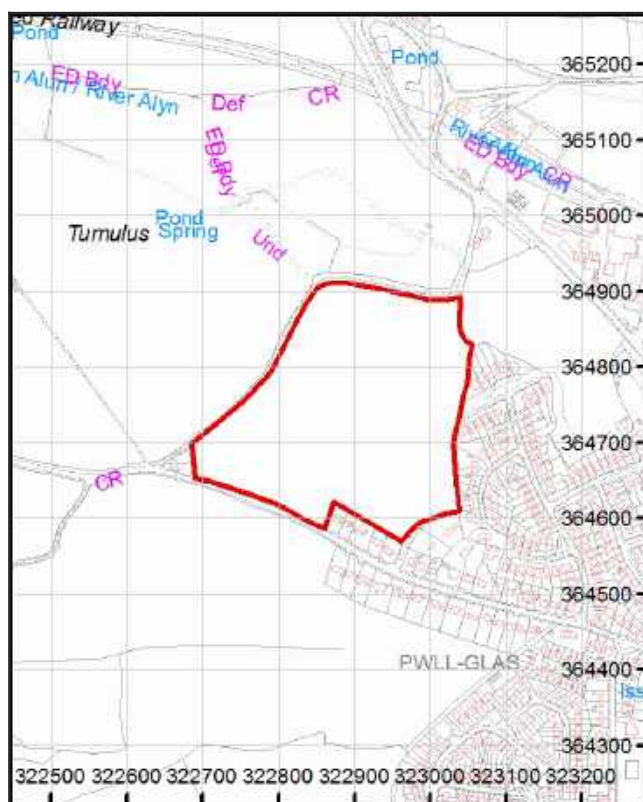
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2017. All rights reserved.

Ordnance Survey Licence number: 100020315