

Report type:	Phase I & II Site Appraisal Report
Site:	Maesgwyn Road, Wrexham
Client:	Morris Homes North
Ref:	GRM/P4519/F.2
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MAESGWYN ROAD, ROAD

PHASE I & II SITE APPRAISAL FOR MORRIS HOMES NORTH

Project Ref:
P4519

Date:
March 2012

Prepared for:
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This report has been prepared in accordance with GRM's Accredited Quality Procedures

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Site Appraisal for Maesgwyn Road, Wrexham

SUMMARY OF RECOMMENDATIONS

Where further assessment is required it is indicated with a "Y" in the right hand column		
Proposed Development	2-3 storey houses	
CONTAMINATION ASSESSMENT - REMEDIATION / WASTE DISPOSAL		
End Users	600mm (including 150mm anti dig layer) capping in domestic gardens and 400mm in areas of public open space (may not be required)	
Site Workers	None required other than use of PPE.	
Construction Materials	Standard concrete (GEN1/RC35), upgraded water pipes	
Groundwater	No remediation required.	
Surface Water	No remediation required.	
Waste Disposal (may include soils, asbestos, oil drums, chemical containers, etc)	Client has a duty of care to ensure that all waste is disposed appropriately to a licensed landfill. The landfill receiving the waste may request additional 'WAC' testing analysis. Waste characterisation can only be confirmed by the landfill site	
GEOTECHNICAL ASSESSMENT – FOUNDATIONS		
Ground Treatment Required	Cut/fill to form flood defence, piling mat required	
Main Bearing Strata	TBC by piling contractor	
Nett Allowable Bearing Pressure	Pile capacities to be confirmed by piling contractor, initial calculations indicate pile capacities of 375kN for 10m driven piles.	Y
Tree Influence	Heave protection may locally be required.	Y
Volume Change Potential	Moderate.	
Likely Foundation Types	Piled.	
Likely Foundation Depth Range	TBC by piling contractor, assume 10-12m pile lengths.	Y
Excavation Hazards	Shallow groundwater and unstable ground	
Floor Slab Types	Cast in situ suspended or beam and block	
Gas Protection Requirements Radon and/or Landfill	None	Y
GEOTECHNICAL ASSESSMENT - GENERAL		
Slope Stability Risk	Flood bank needs assessment	
Soakaways Potential	Not suitable	
New Access Roads	Observational CBRs 2% to 5% in made ground soils.	
Buried Concrete Class	DS-1; AC-1 (GEN1/RC35)	
Retaining Walls	None	
Other Comments	None	

This summary is based on the full report that provides the detailed assessment of the ground risks affecting the development and how to manage them. It should not be used in isolation.

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1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Morris Homes North (Client) to undertake a Site Appraisal. The desk study and site inspection form Phase I of the assessment and allow the geotechnical and geo-environmental setting of the site to be determined and the identification of areas of particular concern that require targeted investigation. The Phase II works comprise the intrusive ground investigation, geotechnical testing and chemical analysis. The information gained from the Phase II works will be used to refine the conceptual model for the site and determine the most cost effective development solutions for the site.

Although the desk study information was assessed prior to the intrusive investigation works, for ease of reading and efficiency, the Phase I and Phase II aspects of the appraisal are combined within this document.

This site appraisal is intended to provide information that will assist decision making by identifying and recommending solutions to ground engineering and contamination issues.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The Client proposes to develop the site with two storey residential houses and associated infrastructure. The proposed end use includes gardens and soft landscaped areas of public open space. The outline development proposals provided by the Client are presented in Appendix B.

The Client has not informed GRM of any potential development hazards.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The Client's specific requirements were to undertake a Phase I & II Site Appraisal.

The principal aims of the Site Appraisal are as follows:

- a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.
- b) Determine the possible ground related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.
- c) Provide preliminary development recommendations.
- d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY AND SITE OBSERVATIONS

2.1 INFORMATION SOURCES

In addition to the general sources of information listed in Appendix A (i) the client has supplied the following information that has been used in the assessment of the site:

- Site location plan.
- Proposed development layout.
- Desk Study Summary Facsimile, Ref 66327/MF, Structural Soils Ltd, dated 3rd April 2006.
- Ground Investigation Report, Ref 2004/294, Sub Soil Surveys Ltd, dated February 2005.
- Internal Memorandum from Contaminated Land Officer at Wrexham Borough Council regarding Sub Soil Surveys 2004 report, dated 15th Feb 2008.

Rather than reproduce the findings and recommendations in the above documents information GRM consider relevant has been used in this assessment.

2.2 SITE DESCRIPTION

2.2.1 Geographical Setting

The site is located approximately 0.5km west of Wrexham town centre. The National Grid Reference (NGR) for the approximate centre of the site is SJ327507. A Site Location and Boundary Plan is presented in Appendix C.

The site is presently an area of open space and covers an area of approximately 1.92 hectares. The northern boundary is formed by residential properties, the western boundary by open space and residential properties, the southern boundary by a hospital (beyond River Gwenfro) and the eastern boundary by a railway line.

The topography of the site is generally level with a slight fall to the south toward the River Gwenfro.

2.2.2 Site Inspection Observations

The site comprises two areas, separated by Maesgwyn Road. The two areas are fenced off, along Maesgwyn Road, by palisade fencing and access is via steel gates.

The area to the east of Maesgwyn Road contains a former bowling green and car park (tarmac). Long grass covers the area surrounding the bowling green/car park and the ground surface is slightly hummocky. Mature trees are present around the perimeter of the bowling area and along site boundaries. The area is generally level but slopes down gently towards the River Gwenfro, along the southern boundary. An operational railway line runs close to the eastern boundary. An overhead cable crosses the northern portion of the site. A small stand of Japanese Knotweed was observed in the northern corner of this area of the site.

The area to the west of Maesgwyn Road is an area of open ground, covered by long grass and the ground surface is hummocky. Mature trees are present around site boundaries and within the northern and western portion of the site. The area is generally level but slopes upwards slightly along the northern boundary. A grassed mound (possibly imported Made Ground), is situated along the eastern side of the northern boundary. Several manholes and vertical metal pipes were noted in the western portion of the site, probably related to the water pumping station close to the southern corner of the site. A small stand of Japanese Knotweed was observed on the boundary between the site and the pumping station.

The stands of Japanese Knotweed were reported to the client's representative, the Ecologist, and the tree fellers during the site investigation works.

Significant Features identified during site inspection:
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Overhead cable in the eastern site area. Underground service pipes. Adjacent railway line. Trees. Japanese Knotweed.
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2.3 HISTORICAL DEVELOPMENT OF THE SITE

A review of the available historical Ordnance Survey (OS) maps gives an insight into the development of the site and can highlight potential hazards. Extracts of the maps reviewed are provided in Appendix D.

The site has never been subject to major development and the only features of note are a suspected culverted stream in the western part (1874), Maesgwyn Road crossing through the site (1899), two tanks assumed to be for water storage (1912), electricity sub station and area of possible cut fill adjacent to northern boundary (1958), small unidentified building to south of site adjacent to Maesgwyn Road (1970), small effluent treatment plant in eastern section of site (1970) and a bowling green in southern area (1978).

The area surrounding the site been progressively developed since the late 1890s; the main features worth noting are railway lines 150m east (1874), hospital buildings 200m south (1874), railway lines/sidings adjacent to eastern boundary in an area of possible cut (1899) brewery 200m south east (1899), bus dept (later named garage) 200m north (1939), laundry (part of hospital) 200m south (1939). There are no major features recorded on the later maps.

The hazards identified are summarised in the table below.

Significant Features identified on OS Maps:
--

Culverted stream on site - no development zone and deepened foundations, potential receptor Area of possible fill – potential made ground/source of contamination and gas Bowling green – ash base to greens, potential source of contamination and gas Effluent treatment plant – potential point source of contamination Electricity substation – potential source of PCB contamination

2.4 ANTICIPATED GEOLOGY

The BGS Geological Sheet for this area shows superficial Alluvium to be present below the site and this is likely to comprise variable deposits of clay, silt, sand and gravel; locally Glaciofluvial Sheet Deposits (sand and gravel) and River Terrace Deposits (sand and gravel) are present and as such may also be encountered. The majority of the site is shown to be underlain by a solid geology comprising the Etruria Formation which generally comprises mudstone; the very western section is shown to be underlain by Lower and Middle Coal Measures Formation.

The BGS holds borehole records for the site; however, the records do not contain any details of the strata present but the information does show that the boreholes are at the location of the two tanks shown on the 1912 historical map and were water extraction wells for the nearby brewery, which confirms that the tanks noted on the historical maps were constructed for the storage of water.

The environmental data report indicates that areas of made ground are present to the south and east of the site and as part of the site have been developed in the past made ground including buried foundations should be anticipated.

Significant Features identified from geological data:
--

Variable strata (Alluvium) – deepened foundations

Made ground adjacent and potential on site – potential source of contamination and ground gas

2.5 HYDROGEOLOGICAL INFORMATION

No detailed information regarding the depths to groundwater is available; however, the groundwater level is likely to be subject to seasonal variations. The Environment Agency has classified the underlying strata (Alluvium, Coal Measures and Etruria Formations) as Secondary A Aquifers.

The brewery boreholes identified on the historical maps present in the western part of the site are recorded to be an active water abstraction point for process water. There are a further two groundwater abstractions within 50m of the site. The site is not recorded to be within a Groundwater Source Protection Zone. It is considered that further consultation is required with the EA to confirm whether or not these abstraction points are still in use as the brewery to which they fed water appears to be no longer present.

Significant Features identified from hydrogeological data:

Secondary A Aquifers – potential receptors
--

Groundwater abstraction wells – potential receptors

2.6 HYDROLOGICAL INFORMATION

The main surface water features are considered to be the River Gwenfro adjacent to the southern boundary and the culverted stream that runs through the site; both are considered to represent potential receptors.

The site is within a Zone 2 and 3 floodplain and a flood risk assessment will be required. The only surface water abstractions near the site relates to spray irrigation

and are approximately 500m from the site and as such are not considered potential receptors.

Significant Features identified from hydrological data:
--

River Gwenfro and culverted stream – potential receptors
--

2.7 MINING AND QUARRYING

The Coal Authority report presented in Appendix E states that the site is underlain by workings in two seams of coal at 290-340m depth and that all ground movement from these workings should have ceased. There are no mine entries recorded near the site. The risk to site from coal workings is negligible and no further work is required; however, as the site is within a Coal Mining Development Referral Area a separate coal mining risk assessment may be required to support any planning application.

Potential Mining Hazards:

None

2.8 ENVIRONMENTAL INFORMATION

An Environmental Report has been acquired for the site; the full report is presented in Appendix F. The report does not highlight any features, no highlighted elsewhere in this report, that are considered to pose a risk to the site.

Significant Features identified from Environmental data:

None

2.9 ARCHAEOLOGY

Archaeological information has not been sought as part of this desk study and has not been identified as an issue by the Client. Some Local Authorities require at least an initial archaeological appraisal for development sites. GRM can undertake such appraisals if required. Archaeological investigations occasionally reveal ground-related problems from ancient times (prior to the 1st Edition OS maps) and can occasionally cause foundation and contamination development hazards.

Archaeological Hazards:

None

2.10 INVASIVE PLANT SPECIES/ECOLOGY

GRM is not a specialist in this topic and has not conducted such a survey; however, we will endeavour to report easily recognisable issues such as Japanese Knotweed, Giant Hogweed, badger sets etc, when seen on site. Japanese Knotweed was tentatively identified during the works and the previous report suggests that Giant Hogweed is present on site (not observed by GRM); a survey by an ecological specialist will be required to confirm this.

Invasive Plant Species/Ecological Hazards:

Japanese Knotweed – survey and treatment required

Giant Hogweed (reported previously) – survey and possible treatment required
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2.11 RADON ASSESSMENT

The site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings' (BR211 2007). The site is within an area recorded to require full radon protection measures.

Radon Hazard:
Full radon protection measures required

2.12 CONTAMINANTS OF CONCERN

No site specific contaminants of concern, in addition to the general contaminants listed in Appendix A (ii), have been identified.

2.13 SUMMARY OF POTENTIAL GEOTECHNICAL/GENERAL HAZARDS

Potential geotechnical/general hazards have been identified in earlier sections and are summarised below.

Potential Hazard	Potential Consequence	Action
Culverted stream	Deepened foundations/buried structures	Ground investigation
Deep made ground associated with possible area of cut/fill	Deepened foundations	Ground investigation
In-filled ground	Deepened foundations	Ground investigation
Rutting/softened surface strata	Poor trafficability	Possible need to improve near surface strata
Variable strata	Deepened foundations	Ground investigation
Shrinkable clay/trees	Deepened foundations	Ground investigation plasticity testing/tree survey
Pump wells/shafts	Potentially require filling and/or capping	Site strip in the locality of the well/shaft to allow inspection

Potential sources, pathways and receptors are summarised in the Phase I conceptual model in Section 3.

3 PHASE I CONCEPTUAL MODEL

The conceptual model has been drafted following the current relevant guidance the principles of which are set out in Appendix A (iii).

3.1 POTENTIAL SOURCE – PATHWAY – RECEPTOR

The site comprises an area of open ground that does not have a significant industrial heritage but has in the past contained a bowling green (potential use of ash) and a small effluent treatment plant. Given the current and former uses the risk of significant contamination being present is low to moderate. The back fill to the culverted stream is a potential source of contamination as is the area of potential fill shown on the historical maps. Made ground reported to the south and east of the site, along with any on site made ground represent potential sources of ground gas.

Potential contaminants of concern for the whole site include those listed in Section 2.12 and Appendix A (ii).

The development proposals include residential houses with areas of hard standing (e.g. car parking) and areas of soft landscaping including domestic gardens.

The primary human health receptors are end users of the completed development and construction workers. The primary pathways of concern include dermal contact with contaminated soil and soil dust, the ingestion of contaminated soil and soil dust, ingestion of vegetables that have taken up the contamination, indoor and outdoor inhalation of ground gas and soil vapours, and migration of contamination into water supply pipes.

For controlled waters, the primary receptors for the site are the underlying Secondary A aquifers and the identified surface water features (River Gwenfro and culverted stream). The primary pathways of concern are leaching of contaminants and to the receptors.

For construction materials, the primary receptors are water pipes and buried concrete. The primary pathways of concern are the migration of contamination leading to degradation of pipe materials and sulphate and/or acid attack on buried concrete.

The pollutant linkage model is illustrated in detail on the following page.

3.2 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Solution
Potentially contaminated made ground associated with backfilled culvert and raised ground, ash below bowling green and any made ground associated with former treatment plant.	Indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil and soil dust, and dermal contact with contaminated soil and soil dust.	End users and construction workers.	Soil capping or removal of contaminated soils.
Potential ground gases (methane/carbon dioxide) from on site and off site made ground.	Inhalation.	End users.	Gas protection measures.
CONTROLLED WATERS			
Potentially contaminated made ground associated with backfilled culvert and raised ground, ash below bowling green and any made ground associated with former treatment plant.	Leaching of contaminants and vertical migration to the groundwater.	Secondary A Aquifer.	Assessment of groundwater quality and, if required, subsequent risk assessment and remediation.
	Leaching of contaminants and migration to the surface water features.	River Gwenfro and Culverted Stream.	Assessment of groundwater quality and, if required, subsequent risk assessment and remediation.
CONSTRUCTION MATERIALS			
Potentially contaminated made ground associated with previous development.	Migration of contamination through leaks and joints, degradation of pipe materials.	Water pipes.	Upgraded water pipes/clean backfill material.
Elevated levels of sulphate and/or acidic ground conditions.	Direct contact.	Buried concrete.	Appropriate concrete specification.

4 PHASE II GROUND INVESTIGATION

4.1 FIELDWORK

The ground investigation has been designed in accordance with the general comments outlined in Appendix A (iv).

As part of the GRM investigation 7no trial pits and 4no window sample holes were undertaken, to a maximum depth of 3.2m begl. As part of the previous investigation by Sub Soil Surveys 14no cable percussion holes were drilled to a maximum depth of 10m begl. The exploratory hole location plan and exploratory hole logs from both phases of investigation are presented in Appendix G and Appendix H respectively.

The Sub Soil Surveys ground investigation fieldwork was conducted in February 2004 and the GRM works in March 2012 with groundwater/gas monitoring visits continuing after that period. The exploratory holes were positioned on a general grid.

Samples not used for testing will be stored for a month after issue of this report and then disposed of, unless the client requests in writing that they be kept.

As part of the Sub Soil Surveys investigation 4no (BH3, BH5, BH10, BH12 and BH13) gas and water monitoring standpipes were installed and an additional 4no wells were installed by GRM (WS1-4), the rationale for these works are discussed fully in Section 5.

4.2 PROVEN GROUND

The following ground conditions were encountered during the investigation fieldwork:

- Made Ground / Topsoil
- Alluvium/Glacial Sand and Gravel/Glacial Clay (Superficial Deposits)

4.2.1 Made Ground / Topsoil

Made ground or topsoil was encountered in all of the exploratory holes to depths ranging from 0.3m to 3.0m begl. The made ground comprises variable deposits of reworked topsoil, limestone gravel, clayey sandy gravel gravelly clay. The made ground was noted to contain fragments of ash, brick and concrete.

4.2.2 Superficial Deposits

Variable superficial deposits were encountered below the made ground across the entire site. The superficial deposits generally comprised slightly sandy clayey gravel with bands or pockets of slightly sandy silty clay. The granular deposits are generally medium dense to dense and the cohesive soils are firm to stiff and occasionally soft.

The base of the superficial deposits was not encountered during the investigations and as such rock is present at depths >10m begl.

4.3 GROUNDWATER

Groundwater strikes were not recorded during the GRM investigation; however, the soils were noted as wet below depths of 1.1-2.7m begl. However, the exploratory techniques used were rapid and may have masked actual water strikes.

Groundwater strikes were recorded in all of the Sub Soil Surveys boreholes at depths ranging from 1.8-2.6m begl with the water levels rising to depths of 1.4-2.2m begl after 20 minutes.

The results of monitoring undertaken by Sub Soil Surveys and GRM are reported in Appendix I. In summary standing water was recorded at depths of 1.08-2.24m begl.

The groundwater encountered during the investigation is considered to represent the regional groundwater in the superficial deposits (Secondary A Aquifer). The observed groundwater in the underlying superficial deposits is likely to be in hydraulic continuity with River Gwenfro but not the groundwater in the bedrock aquifer.

Long term monitoring of groundwater levels has not been conducted as part of this investigation and interpreted levels are approximate and will be dependent on seasonal variations.

Due to the lack of groundwater and topographical data for the site it has not been possible to accurately determine the groundwater flow direction beneath the site. However, the groundwater flow is considered to be to the south following the local topography towards the adjacent River Gwenfro.

4.4 CONTAMINATION OBSERVATIONS

The following visual and olfactory evidence of potential contamination was encountered during the fieldwork and monitoring.

	Depth (mbegl)	Description of contamination and strata affected
TP1	0.4-1.1	Ash and fuel odour in made ground
TP3	0.8-1.1	Ash in made ground
BH10	0.0-0.7	Ash in made ground
BH11	0.2-1.4	Ash in made ground
BH13	0.3-1.5	Ash in made ground

4.5 GROUND GAS

Ground gases are discussed in full in Section 5, in summary no elevated levels methane levels, carbon dioxide of up to 4%v/v and oxygen as low as 12.7%v/v have been recorded. No flow was noted during the monitoring completed to date.

4.6 SUMMARY OF FIELDWORK OBSERVATIONS

The fieldwork has revealed/confirmed the following potential hazards, receptors and sources that were not identified during the desk study, but which should be included when assessing the site.

Significant Features identified during fieldwork

Made ground – presence confirmed Variable deposits – presence confirmed Shallow groundwater – presence confirmed

4.7 LABORATORY ANALYSES RATIONALE

4.7.1 Chemical Laboratory Analysis

Chemical laboratory analyses were selected to provide the parameters necessary to make an initial assessment of potentially contaminated soils and/or waters, for the budgetary design of the development. The choice of contamination testing was based on the Phase I assessment, identified past uses of the site and site observations.

The chemical analysis undertaken by Sub Soil Surveys comprised:

- 15no samples for a general suite of contaminants (metals, inorganics, total PAH and total TPH).

The chemical analysis undertaken by GRM comprised:

- 6no samples for a general suite of contaminants (metals, inorganics and speciated PAH).
- 6no samples for banded aliphatic and aromatic hydrocarbons (TPHCWG).
- 6no samples have been screened for the presence of asbestos.
- 6no water samples for a general suite of contaminants (metals, inorganics, speciated PAH).
- 4no water samples for banded aliphatic and aromatic hydrocarbons (TPHCWG).
- 2no water samples for total petroleum hydrocarbons (TPH).

pH and water soluble sulphate testing was conducted as part of the chemical analysis suite to determine how aggressive the ground and/or waters are to buried concrete.

The soil sampling density roughly equates to testing on a 30m grid or 1 sample per 900m² which is considered sufficient to fully characterise the site given the nature of the previous land use.

The chemical analysis results are presented in Appendix J.

4.7.2 Geotechnical Laboratory Testing

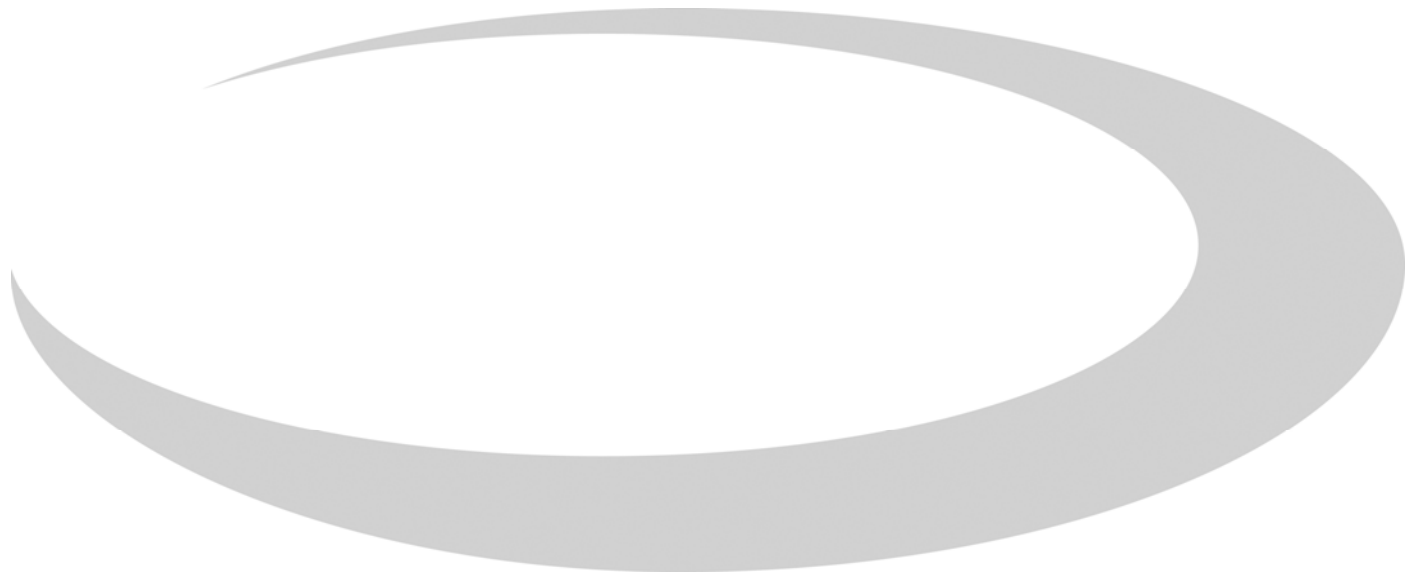
A Geotechnical soil testing has been undertaken as part of the Sub Soil Surveys ground investigation included the following:

- 4no samples for natural moisture content.
- 4no samples for quick undrained triaxials.
- 14no water samples pH and water soluble sulphate testing.

As part of the GRM investigation the following geotechnical testing was undertaken to supplement the above:

- 9no soil samples pH and water soluble sulphate testing.

Geotechnical tests were selected to provide the parameters necessary for the budgetary design of the development including foundations and infrastructure. The geotechnical test results are presented in Appendix K.



5 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (GROUND GAS)

The gas risk assessment methodology used by GRM is outlined in Appendix A (v).

As the proposed land use is classed as high (residential with gardens) sensitivity, 4no number gas/water monitoring standpipes were installed by GRM (WS1-WS4). The 35mm standpipes have been installed in window sampling boreholes with response zones targeted at the made ground and natural strata. The results of the GRM monitoring has been assessed with the results presented by Sub Soil Surveys which were related to 5no installations (BH3, BH5, BH10, BH12 and BH13), the 50mm standpipes were installed with response zones targeted at made ground and natural strata. The Sub Soil Surveys were not monitored by GRM as they could not be located.

As the gas hazard is considered low (made ground/limited organic clay) the GRM monitoring programme will comprise six visits over three months, these results will be assessed with the four results over six weeks collected by Sub Soil Surveys. Therefore, only an initial assessment of the local gas regime has been undertaken at this stage and further visits will be required to complete the monitoring program. A separate gas addendum letter report will be issued following the completion of the full monitoring program.

The gas monitoring has been undertaken using an LMSxi Multifunction Gas Analyser. Gas monitoring is currently on-going and a complete assessment of the ground gas regime will be reported at a later date. The gas monitoring results to date, are presented in Appendix I. In summary no elevated methane, carbon dioxide of up to 4%v/v and oxygen as low as 12.7%v/v have been recorded. No flow was noted during the monitoring completed to date

For this site, as the development is residential and is likely to include a number of different floor types, the risk from ground gases has been assessed using both 'Situation A' and 'Situation B'.

Using the default borehole flow rate of 0.1l/hr and the maximum methane concentration of 0%v/v, a GSV of 0l/hr has been calculated for methane. Using the same borehole flow rate the maximum carbon dioxide concentration of 4%v/v equates to a GSV of 0.004l/hr. Therefore, the site has been assessed as 'Characteristic Situation 1' or 'Traffic Light Green' as outlined CIRIA C665.

Therefore, at this stage it is considered that gas protection measures are not required for the proposed development.

The desk study risk assessment determined that no radon protection measures are required. Observations during fieldwork confirm that this assessment does not need be altered.

6 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (SOIL)

6.1 INTRODUCTION

The proposed development comprises residential properties with domestic gardens.

Various sources of contamination have been put forward in earlier text and summarised in the Phase I conceptual model. The material on site identified as being the most likely to be contaminated is the made ground.

Representative samples of all strata and those considered to be potentially contaminated by virtue of the desk study and/or based on site observations were collected for further examination and/or potential testing.

The rationale for the end use specific SGV/TAC used by GRM is outlined in Appendix A (vi) for this site the chemical analysis results are being compared against the TAC for residential end use with plant uptake with a Soil Organic Matter content of 1#%

6.2 RISK TO END USERS

The chemical analysis results are presented in Appendix J.

Statistical analysis in accordance with the principles outlined in the CIEH document *Guidance on Soil Contamination Data with a Critical Concentration* (May 2008) has been used to assess the chemical analysis test results; the accompanying reports are available on request.

As the made ground/topsoil across all parts of the site is relatively similar, the statistical analysis has been carried out on the full data set. The two samples of natural strata (BH6 and BH10) have not been included in the statistical assessment.

6.2.1 Analysis of Soil Contamination Data

The statistical analysis indicates that the made ground contains widespread levels of elevated benzo(a)pyrene and two hotspots of lead (TP2 0.3 and TP7 0.1).

Although not visually noted during the logging process, two samples TP1 0.4-0.6 and TP3 0.4-0.6 have been found to contain Chrysotile and Amosite respectively.

The banded hydrocarbon analysis has identified slightly elevated levels of aliphatic C12-C16, aromatic C12-C16 and aromatic C16-C21 in the sample collected from TP1 (0.4-0.6m).

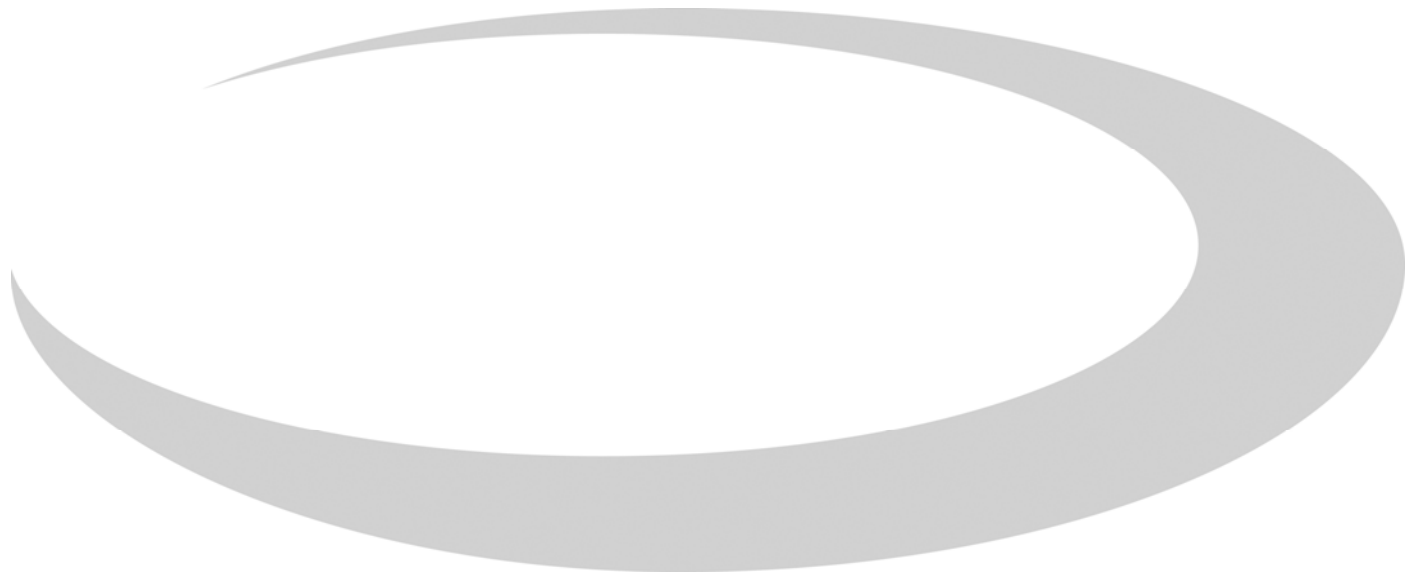
6.2.2 Summary of Risk to End Users

In summary the risk to end users from soil contamination is considered to be moderate and remediation will be required.

As outlined in Section 5 there is considered to be no risk to end users from methane, carbon dioxide or radon; however, the monitoring is ongoing.

6.3 RISK TO SITE WORKERS

The investigation has not revealed any specific risk to site workers; however, the general comments outlined in Appendix A (vii) should be considered when site specific risk assessments are completed.



7 QUANTITATIVE RISK ASSESSMENT - CONTROLLED WATERS

The methodology, rationale and guidance GRM have used to assess the risk to controlled waters are set out in Appendix A (viii).

7.1 ASSESSMENT OF THE CHEMICAL ANALYSIS RESULTS

Water samples have been collected from four on site boreholes (WS2, WS3, BH3 and BH8) along with upstream and down stream samples from the adjacent River Gwenfro.

The results from the onsite boreholes show the following:

- The levels of arsenic in all four holes (29.8-62.3ug/l) are above the UKDWS of 10ug/l.
- The levels of iron in all four holes (224-1980ug/l) are above the UKDWS of 200ug/l.
- The level of cadmium in BH3 (6.2ug/l) is above the UKDWS of 5ug/l.
- The level of lead in BH3 (47.3ug/l) is above the UKDWS of 25ug/l.

No elevated levels of organic contaminants have been recorded in the water below the site.

The levels of arsenic, iron, cadmium and lead in the groundwater below the site are above the thresholds and as such could technically be considered to be a risk to the underlying aquifer. However, it is considered that local ground water flow regime will be heavily influenced by the sites proximity to a major water course (River Gwenfro), i.e. all near surface ground water will flow through the near surface superficial or via the culverted stream below the site and enter the river. The upstream and downstream samples collected from the River Gwenfro have both returned levels for all contaminants below the relevant assessment criteria and as such the slightly contaminated ground water below the site is not impacting the quality of the River Gwenfro.

As the site is being developed for residential housing the superficals below the site are not likely to be considered an important water resource and are extremely unlikely to ever be exploited.

7.2 SUMMARY OF RISK TO CONTROLLED WATERS

The water sampling and analysis has proven that although the groundwater below the site is slightly contaminated it is not impacting on the quality of the adjacent River Gwenfro; as such it is considered that the site does not pose a risk to controlled waters.

8 QUANTITATIVE RISK ASSESSMENT - CONSTRUCTION MATERIALS

The methodology, rationale and guidance GRM have used to assess the risk to construction materials is set out in Appendix A (ix).

8.1 WATER SUPPLY PIPES

The recorded concentrations of organic contaminants present in TP1 (isolated occurrence) exceed the acceptable levels listed in the UKWIR Documentation (extract included in Appendix L). The contaminant concentrations recorded are such that upgraded water pipes such as metal (copper) pipes or copper sheathed placed in clean backfill are likely to be required.

The local utility should be contacted to determine its exact requirements in respect of the levels of contamination encountered.

8.2 BURIED CONCRETE

Based on the recorded water soluble sulphate and pH levels in the soils groundwater below the site and assuming mobile groundwater conditions, in accordance with requirements of BRE Special Digest 1 (2005), 'Concrete in Aggressive Ground', the Design Sulphate Class for buried concrete at the site should be assumed as DS-1 and the ACEC Class as AC-1. Therefore, GEN1 and RC35 concrete will be suitable for unreinforced and reinforced concrete respectively.

The results of the water soluble sulphate and pH testing of are presented in Appendices J and K.

9 PHASE II CONCEPTUAL MODEL

9.1 SOURCE – PATHWAY – RECEPTOR

The intrusive investigation has revealed that the made ground across the site is contaminated with benzo(a)pyrene with localised hotspots of hydrocarbons (TP1), lead (TP2 and TP7) and asbestos (TP1 and TP2). Gas monitoring is ongoing but to date elevated concentrations of methane and carbon dioxide have not been recorded. Water testing is ongoing and the risk to groundwater will be discussed in the final report.

Development proposals have been confirmed as including residential houses with areas of hardstanding (e.g. car parking) and domestic gardens and landscaping.

The primary human health receptors are end users of the completed development and construction workers. The pathways of concern include dermal contact with contaminated soil and soil dust, the ingestion of contaminated soil and soil dust, ingestion of vegetables that have taken up the contamination, indoor and outdoor inhalation of ground gas and soil vapours.

For controlled waters, the primary receptors for the site have been confirmed as the underlying Secondary A Aquifer, culverted stream below the site and the adjacent River Gwenfro. As outlined in Section 8 the site is not considered to pose a risk to controlled waters.

The concentrations of petroleum hydrocarbons in the area of TP1 exceed thresholds for water pipes. Specifications for buried concrete have been made in light of the reported pH and water soluble sulphate concentrations.

Considering the above, it is considered that the site poses a moderate risk to end users, and construction materials. Water testing is ongoing and the risk to controlled water will be included in the final report.

The pollutant linkage model is illustrated on the following page.

9.2 PHASE II CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Solution
Elevated levels of benzo(a)pyrene and hotspots of hydrocarbons, lead and asbestos.	Indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil and soil dust, and dermal contact with contaminated soil and soil dust.	End users and construction workers.	Soil capping and use of PPE by ground workers.
No elevated ground gasses recorded in monitoring completed to date (ongoing).	Inhalation.	End users.	Gas protection measures not considered necessary at this stage (assume basic protection until monitoring complete).
CONTROLLED WATERS			
Slightly elevated levels of metals in groundwater below the site.	Leaching of contaminants and vertical migration to the groundwater.	Secondary A Aquifer.	No impact, no remediation required.
	Leaching of contaminants and migration to the surface water features.	River Gwenfro and Culverted Stream.	No impact, no remediation required.
CONSTRUCTION MATERIALS			
Slightly elevated levels of hydrocarbons in area of TP1	Migration of contamination through leaks and joints, degradation of pipe materials.	Water pipes.	Upgraded water pipes/clean backfill material.
No elevated levels of sulphate or acidic ground conditions present.	Direct contact.	Buried concrete.	Standard concrete will be applicable (GEN1/RC35)

10 REMEDIATION

10.1 RECOMMENDED RISK REDUCTION AND REMEDIAL MEASURES

10.1.1 Protection of End Users

Based on the recorded levels of contamination across the site remediation will be required to protect end users of the proposed residential development. Potential remedial measures would comprise either soils capping or source removal. Source removal would be applicable in respect of the identified hydrocarbon, asbestos and lead contamination; however, as widespread elevated levels of benzo(a)pyrene have been recorded and given the depth of fill in some parts of the site it is considered that the use of a soil capping system in soft landscaped areas to break the source-pathway-receptor linkage would represent the most suitable and cost effective form of remediation. No capping would be required below areas of hard standing, such as roads, drives and houses as the hard cover will remove the possibility of a plausible linkage being present by removing the pathway.

For this site a clean capping layer approximately 600mm in thickness is recommended for the proposed garden. The capping layer should comprise a 150mm granular anti-dig layer or geotextile marker and subsoil/topsoil above to provide a total capping thickness of 600mm. In the areas of soft landscaping the capping thickness can be reduced to 400mm and anti dig layer omitted; capping will not be required if all the made ground is removed as part of the flood alleviation works.

If current ground levels are to be maintained then sufficient material should be removed to facilitate the capping layer. Any material removed to facilitate the capping layer can be placed under areas of hardstanding.

Should any material suspected of being significantly contaminated be encountered during the redevelopment of the site, GRM can be contacted to undertake additional investigation if necessary. The local Environmental Health Officer should be contacted and informed of any additional remedial work required.

10.1.2 Protection of Site Workers

The risk to site workers from the soil contamination is generally negligible and no remedial measures are required. However, the use of suitable PPE should be enforced during the ground works stage of construction and suitable precautions should be taken during the ground works phase due to presence of asbestos containing materials in the made ground.

10.1.3 Protection of Controlled Waters

No remediation to protect controlled waters is considered necessary.

10.1.4 Protection of Construction Materials

Following consultation with the relevant water supply company, remedial measures to protect underground plastic water pipes may be required. This may take the form of an alternative pipe material, this may be restricted to the area of TP1 but may

required on a site wide basis, at this stage it should be assumed that all water pipes will need to be upgraded,.

There is no risk to buried concrete, and accordingly no specific protection is required.

10.2 POST REMEDIATION VALIDATION

The recommended remedial methods should avoid the need for monitoring after validation; however, validation of any remedial measures will be required. Validation will comprise laboratory analysis of the capping material to confirm it is suitable for its intended end-use; at this stage it is anticipated that chemical validation should be undertaken at a rate of 1 sample per 50m³ of imported material with a minimum of three samples tested per source.

Additionally the validation will include confirmation that the capping layer is of sufficient thickness. This confirmation usually takes the form of hand dug trial pits to determine the exact thickness of the soil capping layer; at this stage it is considered that the test pits will be excavated at a rate of 1 per 3 plots in domestic gardens and approximately 1 per 100m² in soft landscaped areas of public open space.

Validation analysis of the capping soil is best conducted prior to importing the material. If subsoil/topsoil is to be imported with an existing test certificate, then it is recommended that this be forwarded to GRM to ensure that the material is suitable for use. The test certificate should be for the same suite of contaminants as the GRM soils testing suite, details of which are presented in Appendix J, plus total hydrocarbon concentration, which is now required by the NHBC.

Details of the validation testing of the imported material and verification of the capping layer thickness will be required by the local Environmental Health Officer and the NHBC.

10.3 REMEDIATION METHOD STATEMENT

As the remedial works are limited to soil capping for gardens and soft landscaped areas, this report should be suitable for submission as a Remediation Method Statement.

Following your review of this document, we would recommend that a copy of it be forwarded to the Local Authority for comment and approval, prior to commencing development of the site. The Local Authority may choose to include other consultees as part of the planning process (such as the Environment Agency).

Consultation should be undertaken at the earliest possible opportunity to avoid abortive or delayed works.

10.4 DISPOSAL AND CLASSIFICATION

Based on the chemical analysis results currently available it is considered that any material removed from site will be classed as Non Hazardous; however, this assessment will need to be confirmed by the receiving landfill and reference should be made to the relevant notes presented in Appendix A (x).

11 GEOTECHNICAL ASSESSMENT

11.1 INTRODUCTION

The client has indicated that the proposed development comprises two and three storey houses. A full set of finished floor levels and the levels of any underground engineering works have not been provided and it is assumed that final ground levels in the areas of the plots will be similar to those recorded at present and that site levels will be lowered in the southern section of the site as part of flood protection measures..

In addition to the site specific comments below reference should be made to the general comments relating to the Geotechnical Assessment listed in Appendix A (xi to xvi).

11.2 ENGINEERING GROUND TREATMENT

As site levels are to be lowered in the southern section of the site a cut and fill exercise will be required, it is likely that off site disposal will be necessary.

11.3 EXCAVATION CONDITIONS

Excavation of the materials encountered during the ground investigation should be easily achieved using conventional hydraulic excavation techniques. A breaker or similar plant may be required where hard standing or existing foundations are encountered.

From the ground investigation undertaken, it is likely that excavations will be generally unstable in the short term. Some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress.

The observed groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) will be sufficient for shallow excavations; however, for deeper excavations (>1-1.5m) the use of a full dewatering system (e.g. well pointing) may be necessary. Care should be taken to ensure that dewatering does not lead to settlement of soils below existing structures or services on or off-site.

11.4 EXISTING STRUCTURES / SUBSTRUCTURES

There are no existing structures on the site but there may be old foundations or other buried structures from the previous site use (e.g. associated with demolished buildings), that have not been identified from this investigation.

11.5 FOUNDATIONS

Due to the variability of the natural strata, locally deep made ground and the relatively high water table it is considered that the shallow strata noted during the investigation are not suitable for the proposed structures to found on. Vibro replacement ground improvement is not considered suitable due to the presence of trees and soft clay; therefore, piled foundations will be required and the bearing strata is likely to be the

dense and stiff deposits at depths of 7-10m (to be confirmed by a piling specialist). Initial calculations suggest pile capacities of 375kN for 10m precast driven piles.

At this stage it is suggested that allowance is made for 10m deep pre-cast driven; however, a specialist piling contractor should confirm the suitability of the site and advise on the most appropriate and cost effective pile type and required length. The existing cable percussion boreholes should be sufficient to enable pile design, although the deeper holes may be required by the NHBC to provide additional geotechnical information for pile design.

Due to clay and trees piles should be designed to resist potential heave and negative skin friction.

A testing regime and objectives of the works will need agreeing with regulatory and warranting bodies prior to works.

It should be noted that a working platform will be required by the piling contractor.

The soils include a mixture of non shrinkable granular soils and potentially shrinkable clay although not tested it is considered that the clay will be of moderate volume change potential. As a result foundations will need to be design accordance with NHBC Standards Chapter 4.2 'Building near trees'.

Heave precautions will be required where the foundations lie within the heave zone of trees as defined in NHBC Standards Chapter 4.2. Foundations should be remote from the direct action of tree roots, and should not be constructed so close to trees as to significantly damage their root systems.

Pile layouts and ground beams will need to be engineer designed.

Once the development plan and levels have been finalised, consideration should be given to the most appropriate foundation solution, taking into account removal of old substructures, stability of the strata and proximity to boundaries/services/roads/ existing structures.

11.6 FLOOR SLABS

In excess of 600mm of unsuitable material/made ground/fill is likely to remain present below floor slabs following site preparation/regrading. Therefore, suspended floor slabs will be required across the site.

Old substructures should be removed to at least 0.5m below any new floor slabs to prevent the formation of 'hard spots'.

A suspended floor system incorporating a sub-floor void, such as beam and block, will be required for all properties where the foundations lie within the heave zone of trees as defined by NHBC Standards in Chapter 4.2 or where seasonally desiccated soils are present at the time of construction.

At this stage no gas or radon protection measures are required.

11.7 SLOPE STABILITY AND RETAINING STRUCTURES

The site is generally level and at a similar level to the surrounding area. Therefore, there is minimal risk of slope instability occurring on the site at current grades. As part of the flood alleviation works a 1.5-2m high bank will be formed and it is suggested that a slope stability assessment is undertaken to determine whether this slope needs to be reinforced.

11.8 SOAKAWAY DRAINAGE

Due to the high water table the site is not considered suitable for soakaway drainage.

11.9 NEW ACCESS ROADS

Site observations suggest that near surface materials will have CBR values of between 2% and 5%, when suitably drained. Proof rolling and the improvement of soft spots may result in increased CBR values and the incorporation of a geotextile grid into sub-base layers may allow for reduced capping thickness.

Site observations should be confirmed by in situ or laboratory testing in accordance with the adopting Local Authority's preference.

12 FURTHER INVESTIGATION

Further investigation, to determine more accurately the effect of some of the identified hazards on the development, is recommended. This includes the following:

- Consultation with the EA regarding the onsite extraction licenses.
- Stability check of the proposed embankment.
- The gas monitoring should be completed and the gas risk assessment updated (ongoing).
- A copy of this report should be submitted to the Planning Department of the Local Authority/Local Authority EHO for review, if planning conditions exist for this site. A copy should also be sent to the NHBC for their records.

13 CONCLUSIONS

This Site Appraisal has shown the site is suitable for the proposed development, assuming compliance with all the recommendations contained within this report (for abridged version see 'Summary of Recommendations' table at the beginning of the report).



A P P E N D I X A

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GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: <http://www.environment-agency.gov.uk/>
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2007), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- NRPB Publication W26 (2002), 'Radon Atlas of England and Wales'
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- | | | |
|------------|-------------------|--|
| • Arsenic | • Copper | • Water soluble sulphate |
| • Cadmium | • Nickel | • PAH (polycyclic aromatic hydrocarbons) |
| • Chromium | • Zinc | |
| • Lead | • Phenols | |
| • Mercury | • cyanide (total) | |
| • Selenium | • pH | |

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2007)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' (2007). This uses Gas Screening Values (GSVs), which are gas concentrations multiplied by borehole flow rate, along with additional limiting factors (such as maximum methane concentrations) to classify the gas regime of a site.

The guidance document includes two methods of characterising a site. The main method 'Situation A' is based on work by Wilson and Card and is used for all types of development except low rise housing that meets the assumptions of 'Situation B'. The 'Situation B' method proposed by Boyle and Witherington for the NHBC assumes all properties have pre-cast suspended floors (beam and block) with ventilated underfloor voids.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Report has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of

one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables.

For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Soil Guideline Values (SGV) published by the EA, values calculated by GRM using the CLEA v1.06 risk assessment and values and chemical data developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.06 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be an aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier 1 Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

WASTE DISPOSAL AND SITE WASTE MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. Likewise making the site as volume neutral as possible will reduce the costs of development.

Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

SWMPs are a legal requirement for all projects with an overall development cost of over £300k. GRM can assist in the production of SWMPs which comply with the Code of Practice and identify best environmental disposal options when dealing with waste.

xi**GEOTECHNICAL ASSESSMENT GENERAL COMMENTS**

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii**GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT**

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

GEOTECHNICAL ASSESSMENT – SOAKAWAYS

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE 365 (1991). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.
- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.

- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefers 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).



NOTES ON LIMITATIONS**General**

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Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

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

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

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

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

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

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

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

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

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



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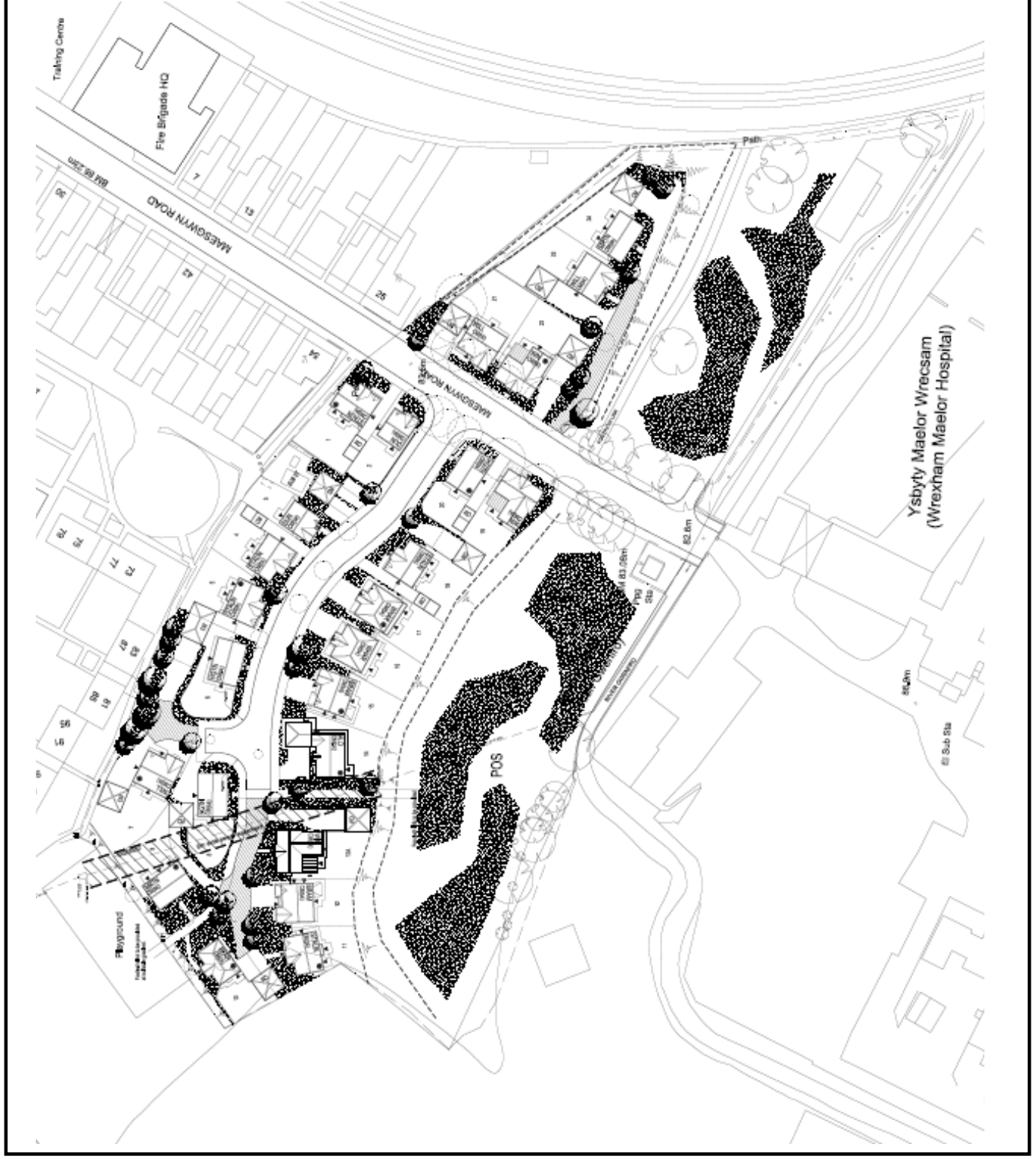
info@grm-uk.com

Fax: 01283 211968

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Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:

Morris Homes

PROJECT:

Maesgwyn Road, Wrexham

TITLE:

Proposed Development Plan

SCALE@SIZE:

NTS

ISSUE:

FINAL

DESIGNED/DRAWN:

CRS

DATE:

April 2010

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Figure 1

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Morris Homes

PROJECT:

Maesgwyn Road, Wrexham

TITLE:

Site Location Plan

SCALE@SIZE:

NTS.

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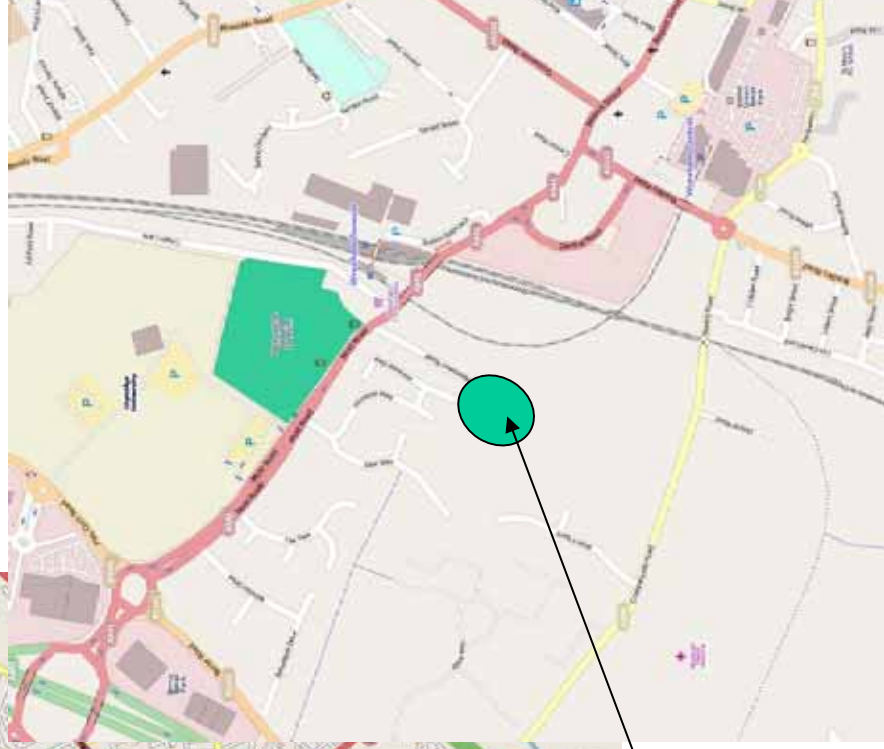
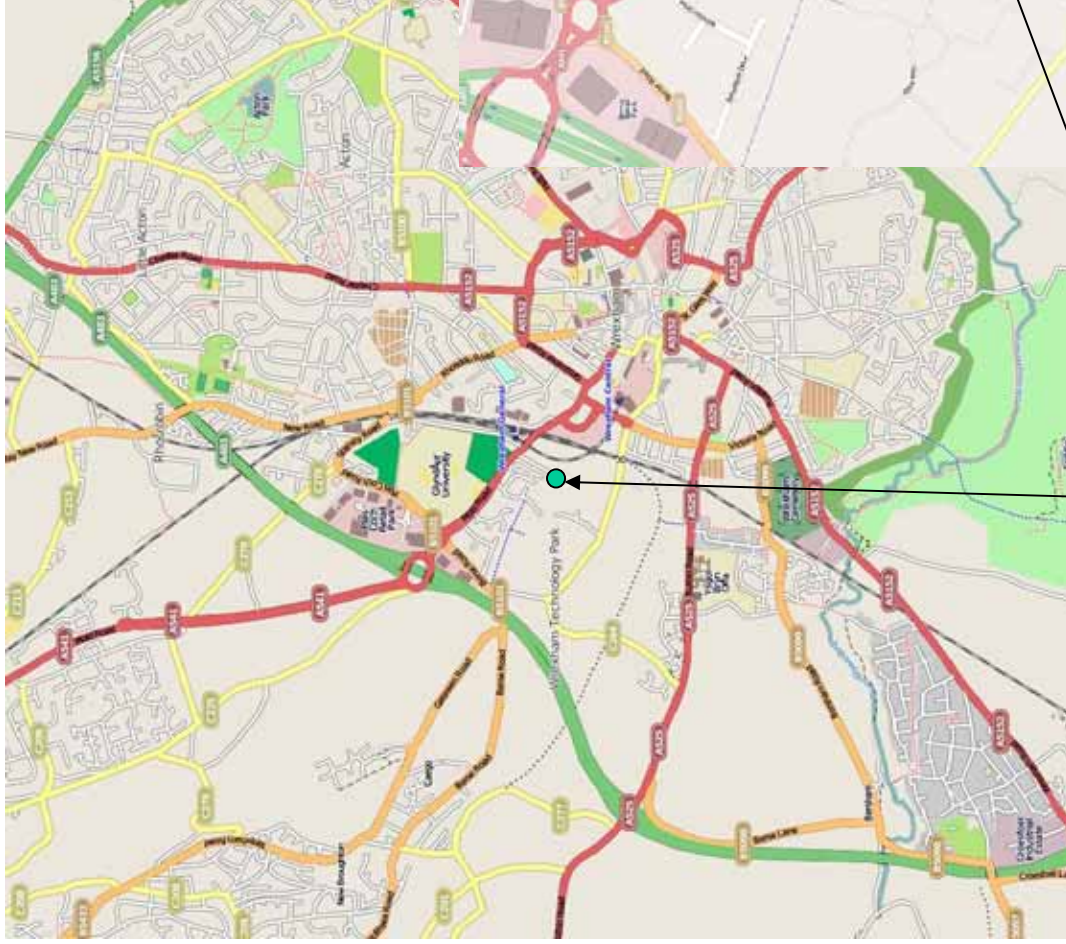
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Figure 2

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SITE



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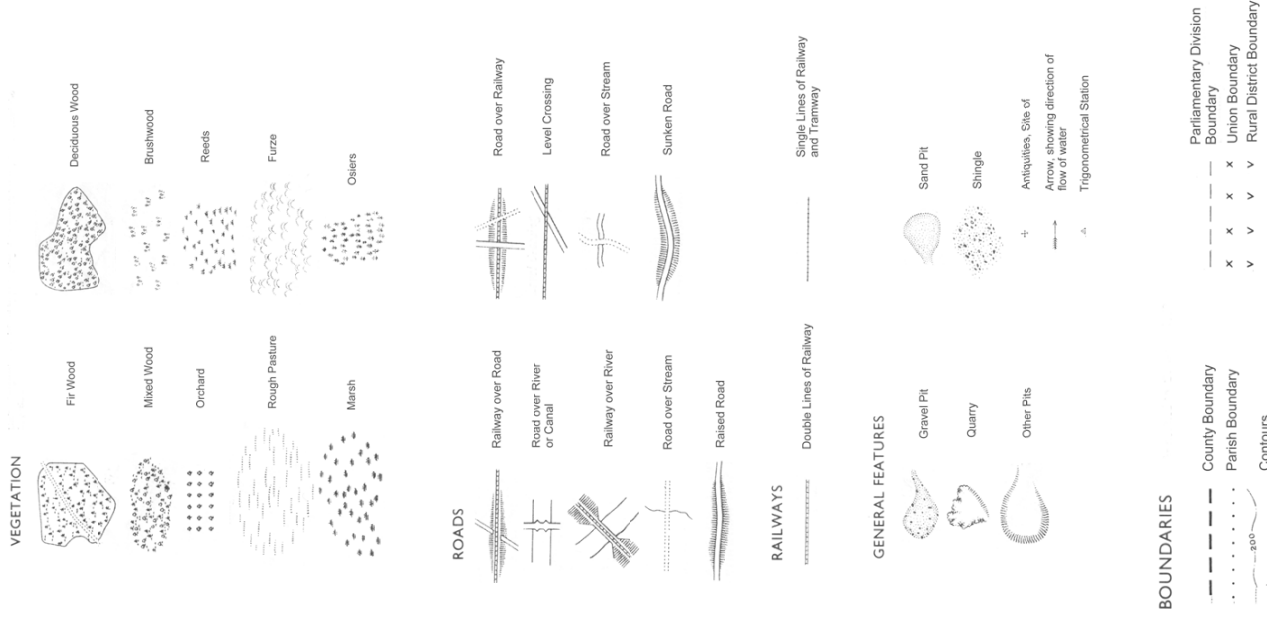
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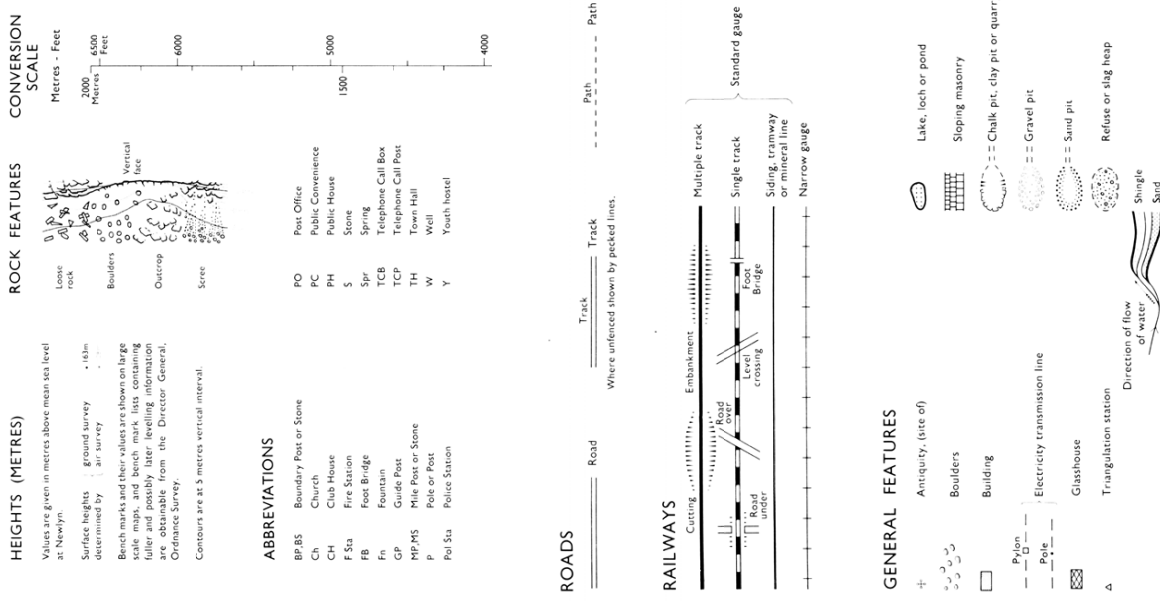
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County Series 1:10,560 scale



National Grid 1:10,000 scale



Historical Map Pack Legend

County Series & National Grid

1:10,560 scale
&
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Grid Ref: 332711, 350661

Map Name: MasterMap**Map date:** 2011**Scale:** 1:2,500**Printed at:** 1:2,500

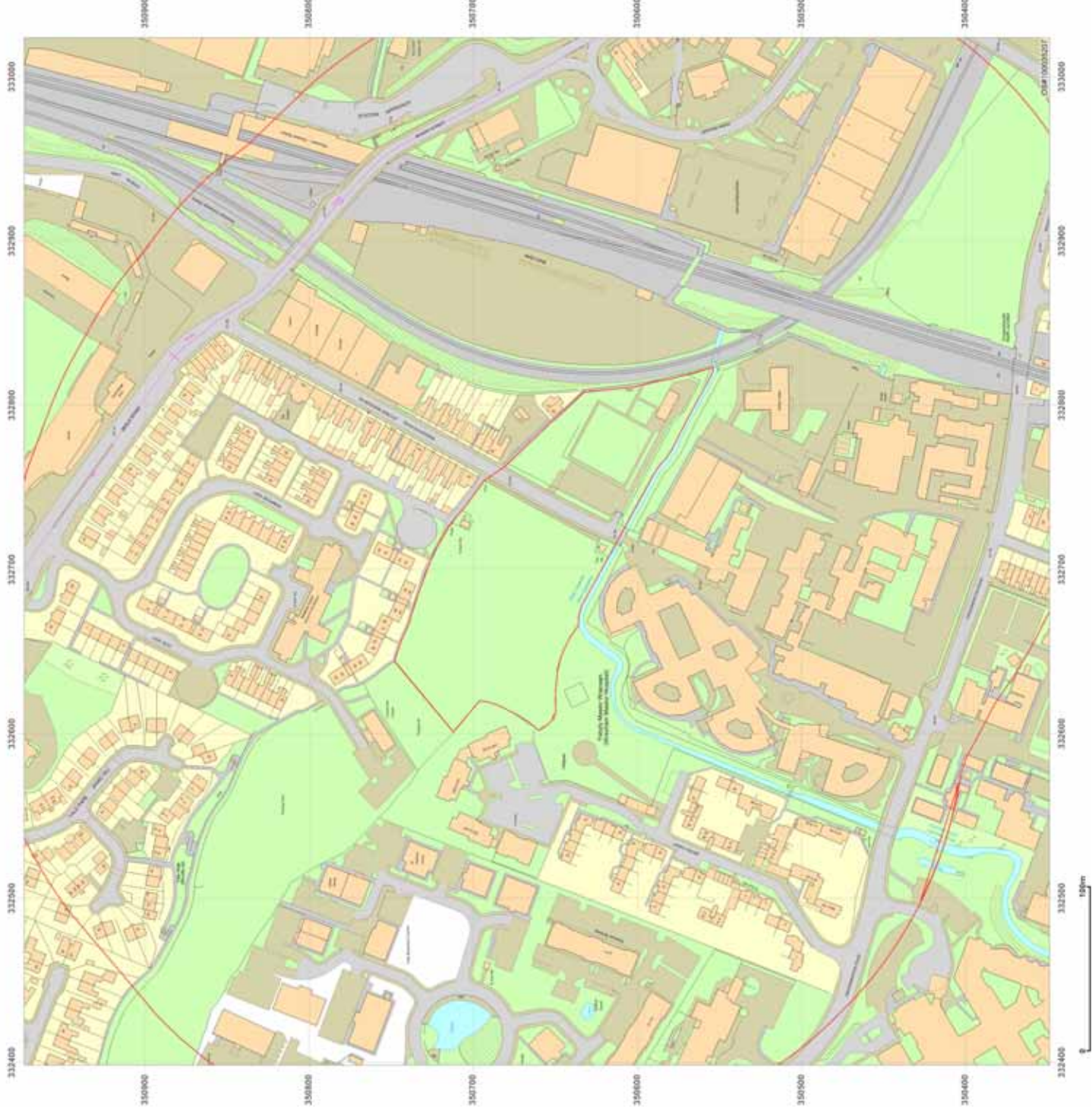
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Grid Ref: 332711, 350661

Map Name: National Grid

Map date: 1989-1993

Scale: 1:1,250

Printed at: 1:2,500



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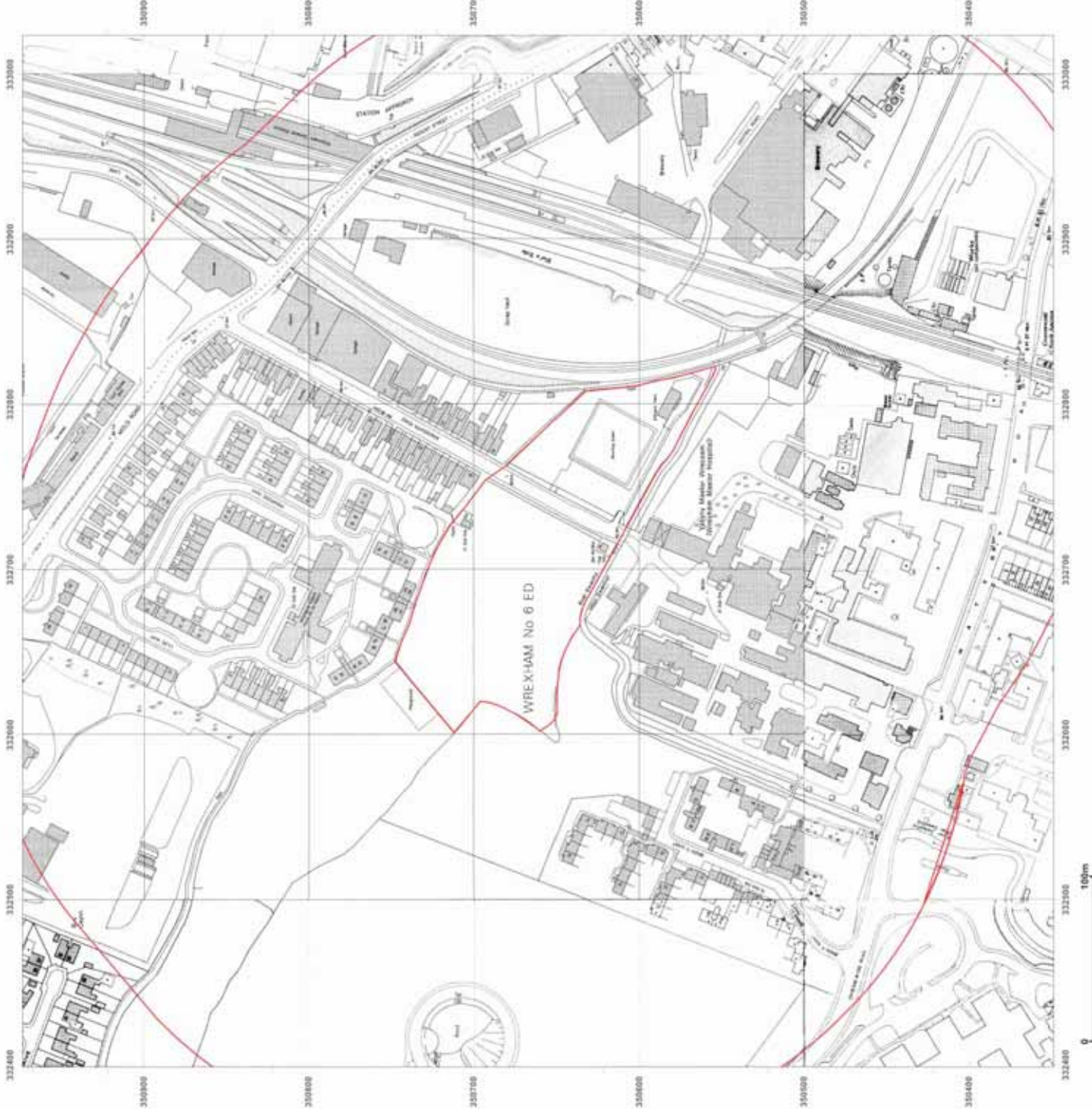


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Map Name: National Grid

Map date: 1990-1993

Scale: 1:1,250

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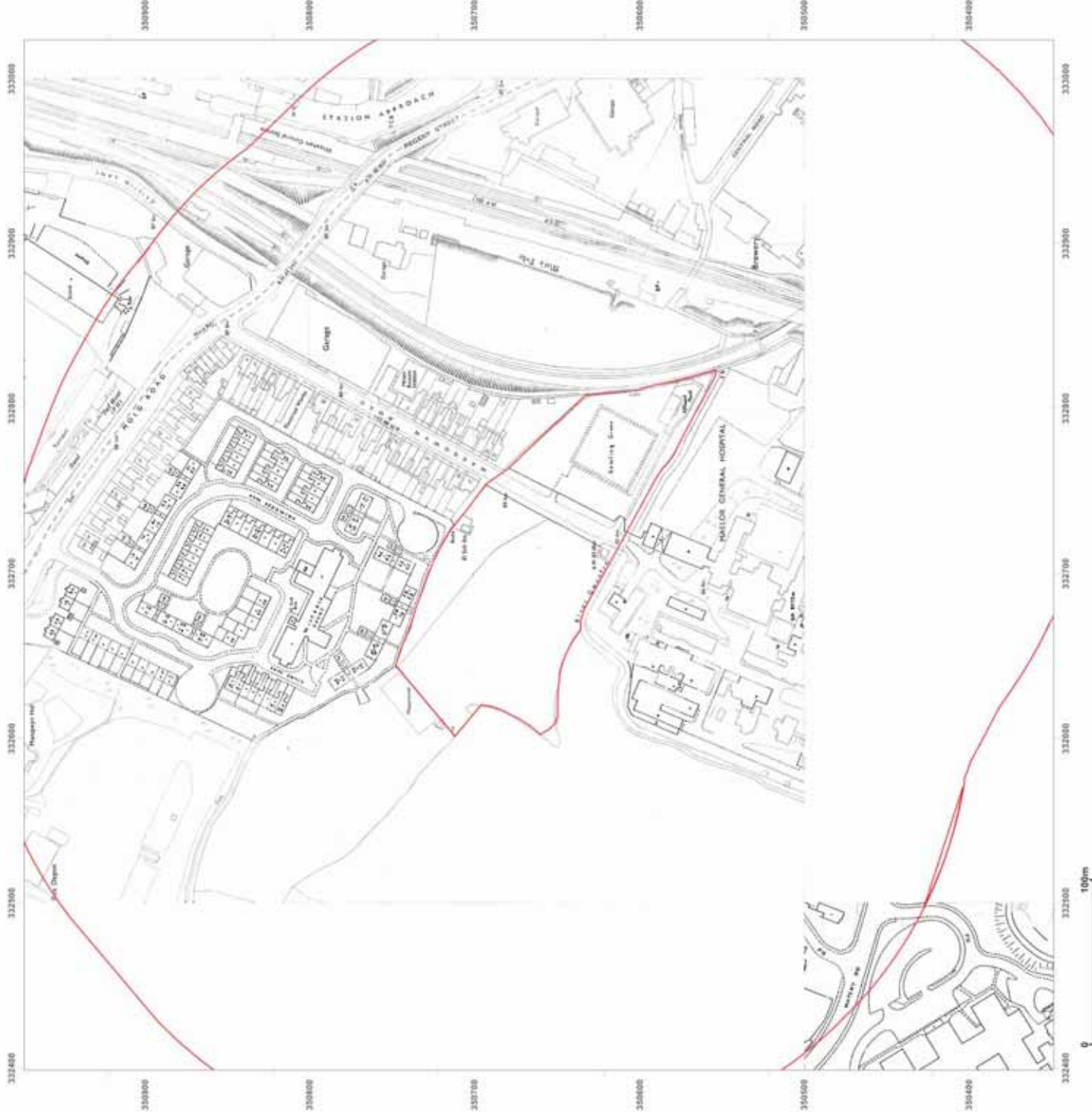


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Grid Ref: 332711, 350661

Map Name: National Grid

Map date: 1975-1978

Scale: 1:1,250

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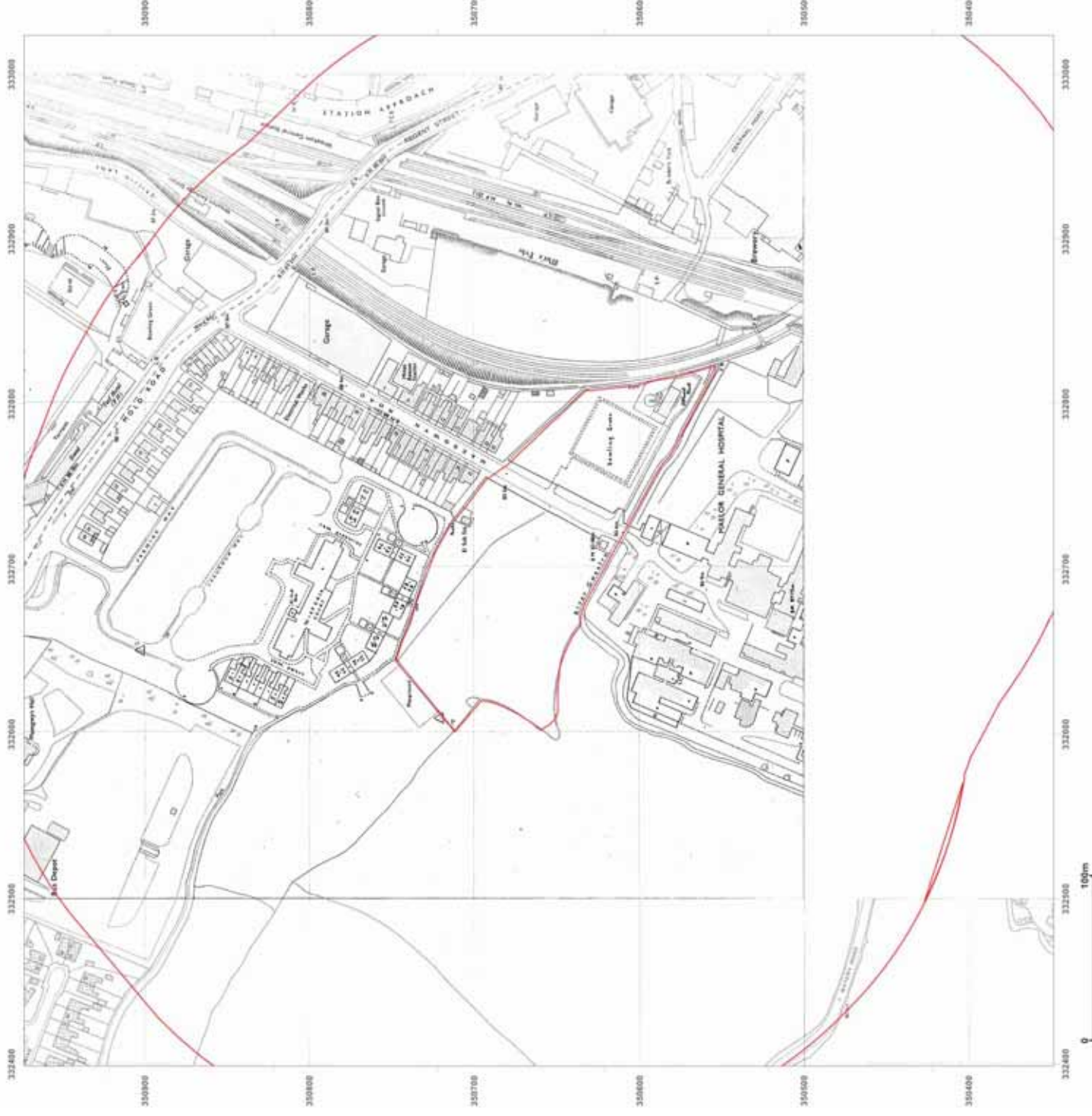


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Map Name: National Grid

Map date: 1968-1970

Scale: 1:1,250

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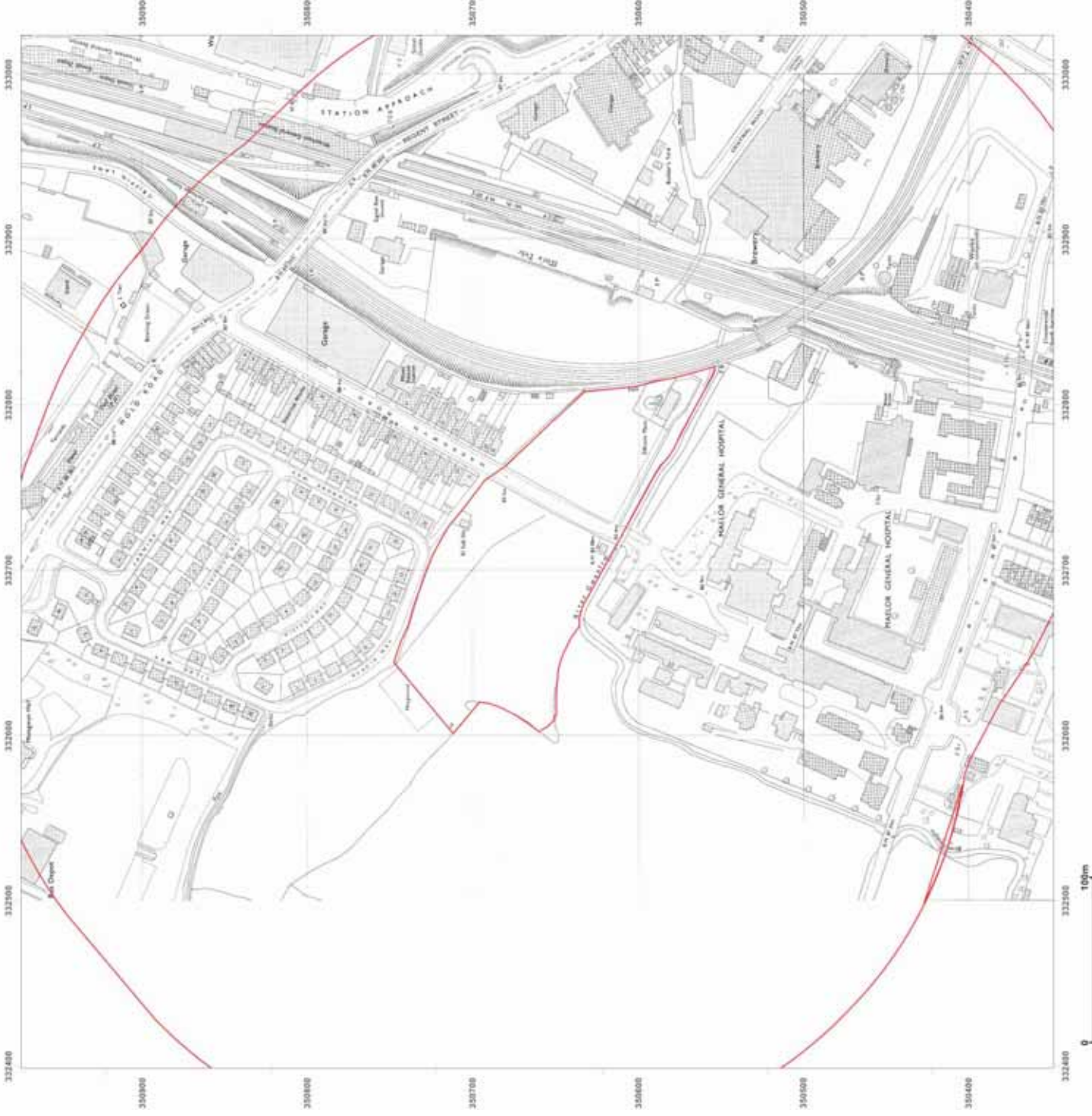


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Map Name: National Grid

Map date: 1958-1963

Scale: 1:1,250

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Map Name: National Grid

Map date: 1958

Scale: 1:2,500

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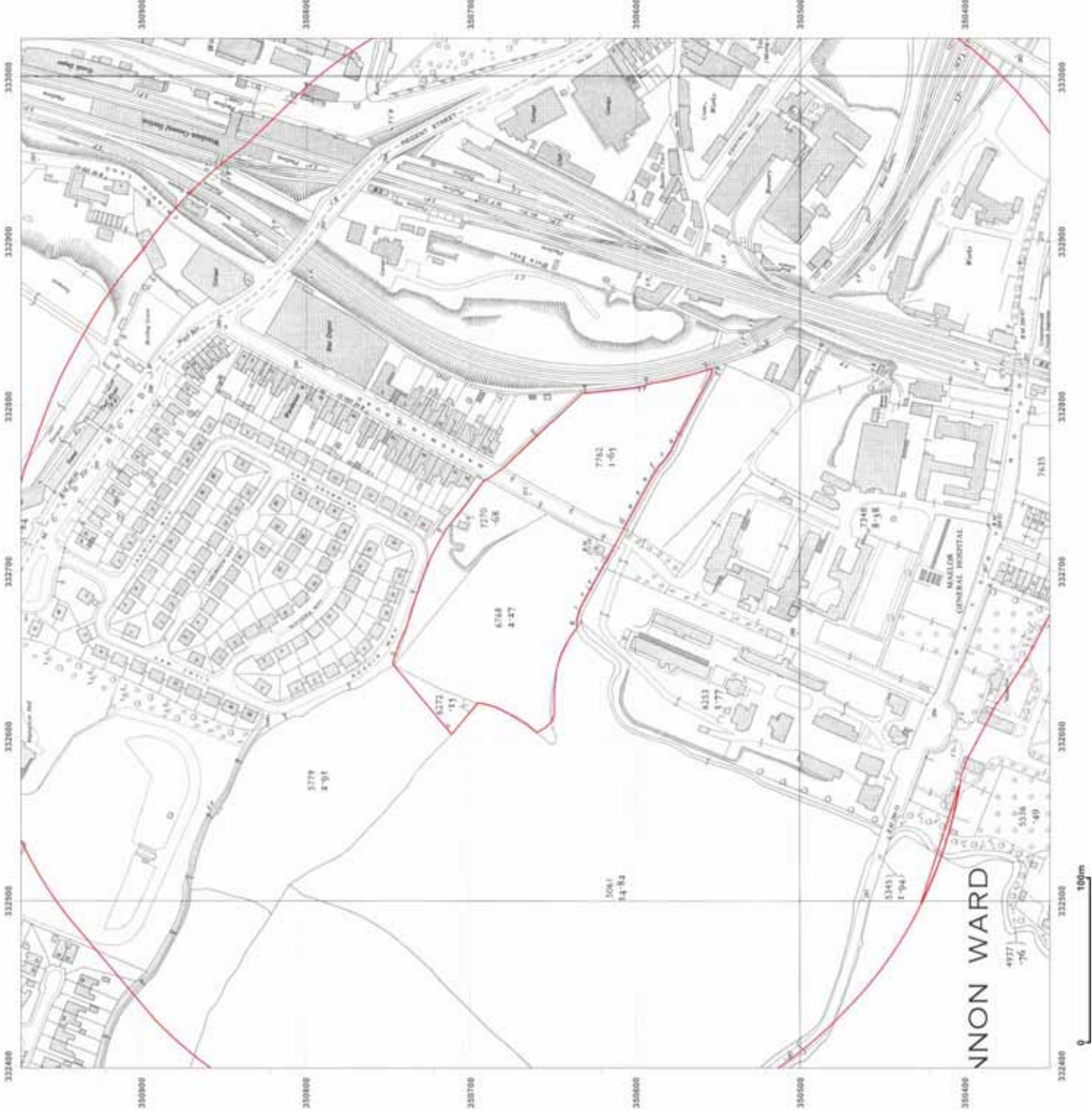


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Client Ref: EMS_158387_232283
Report Ref: EMS-158387_232283
Grid Ref: 332711, 350661

Map Name: County Series

Map date: 1937-1939

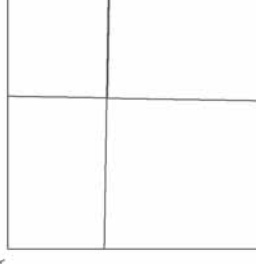
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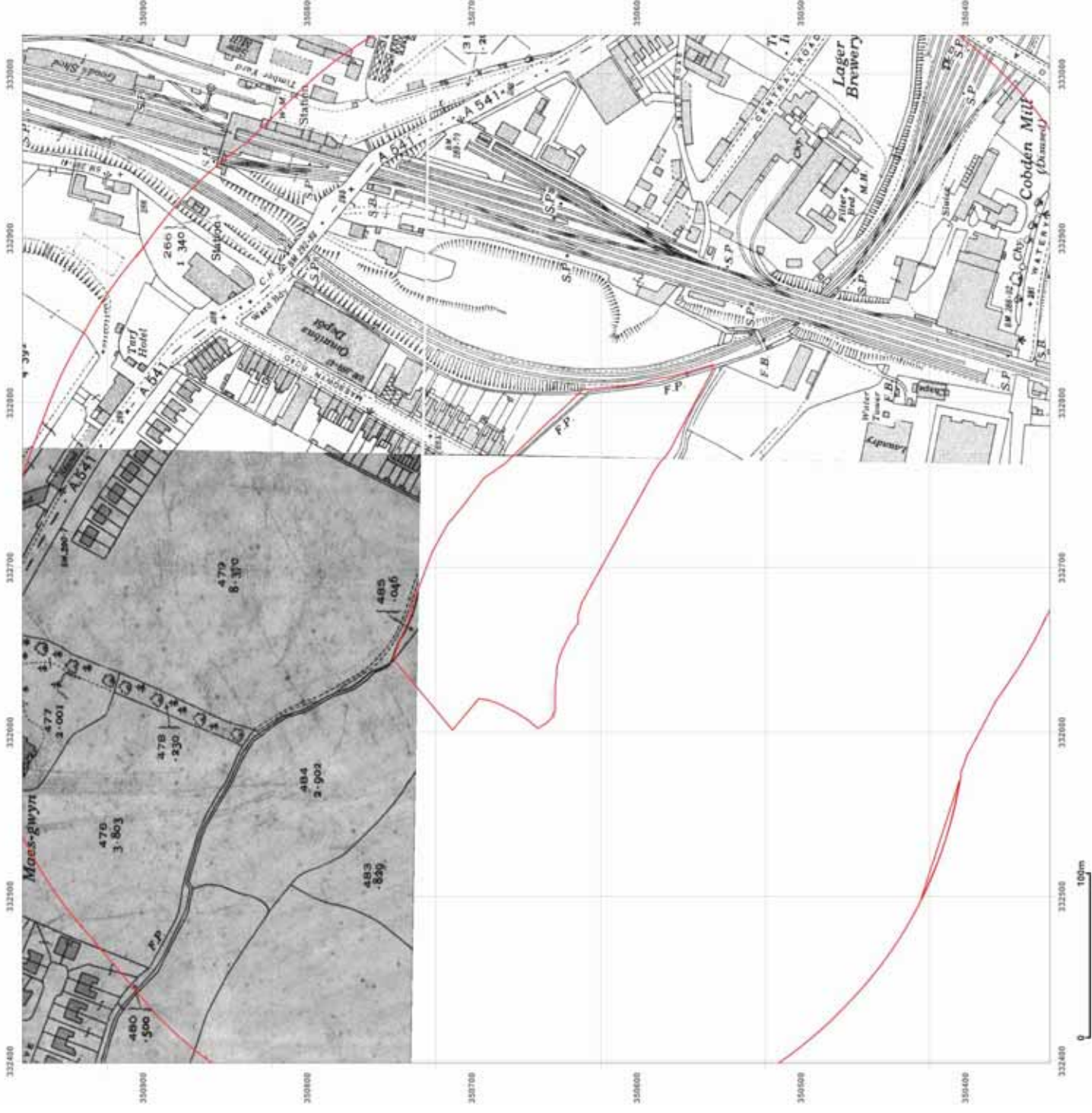
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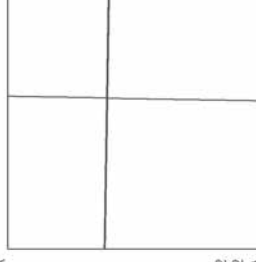
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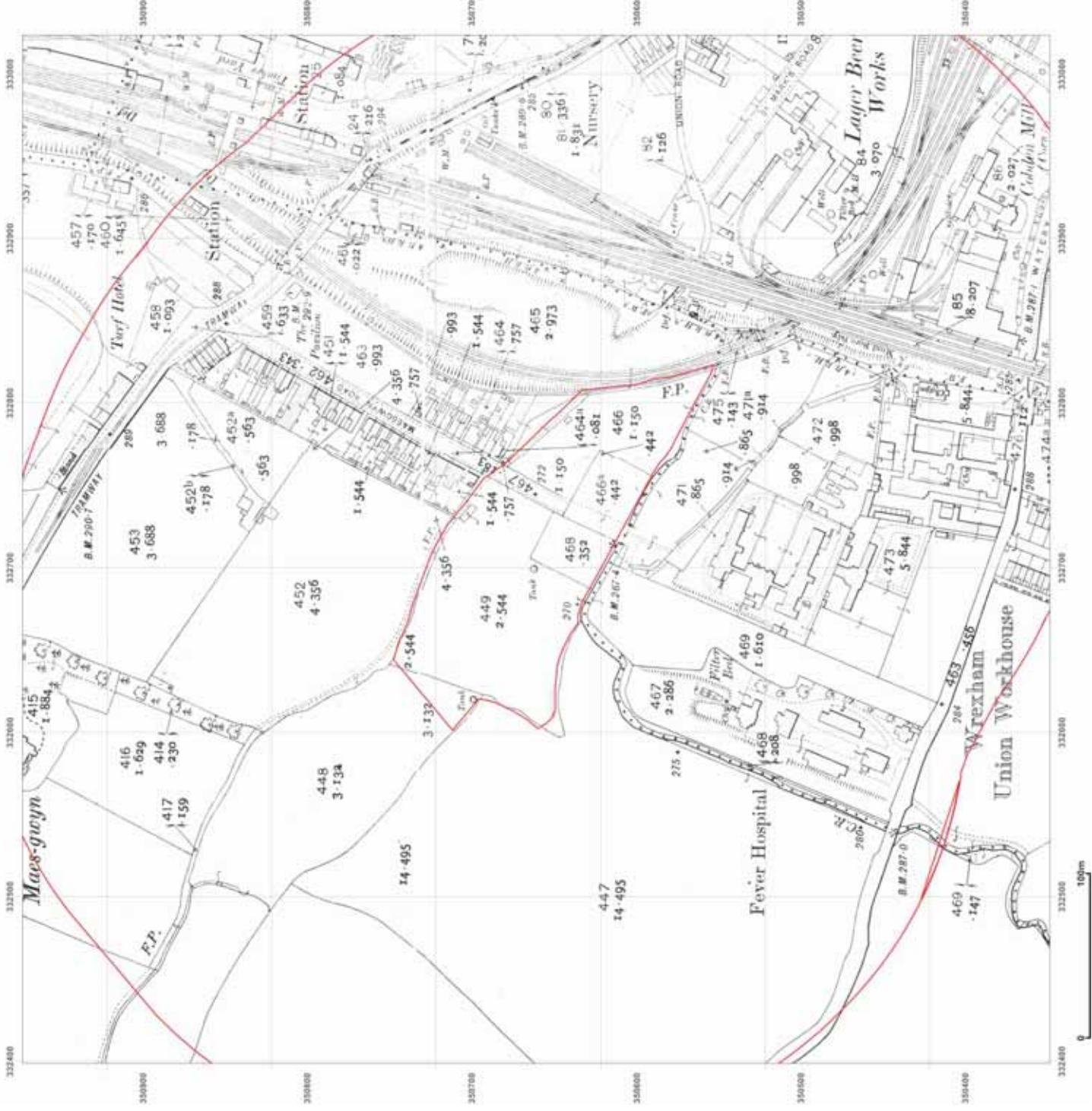
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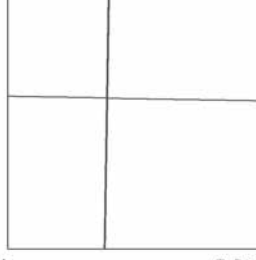
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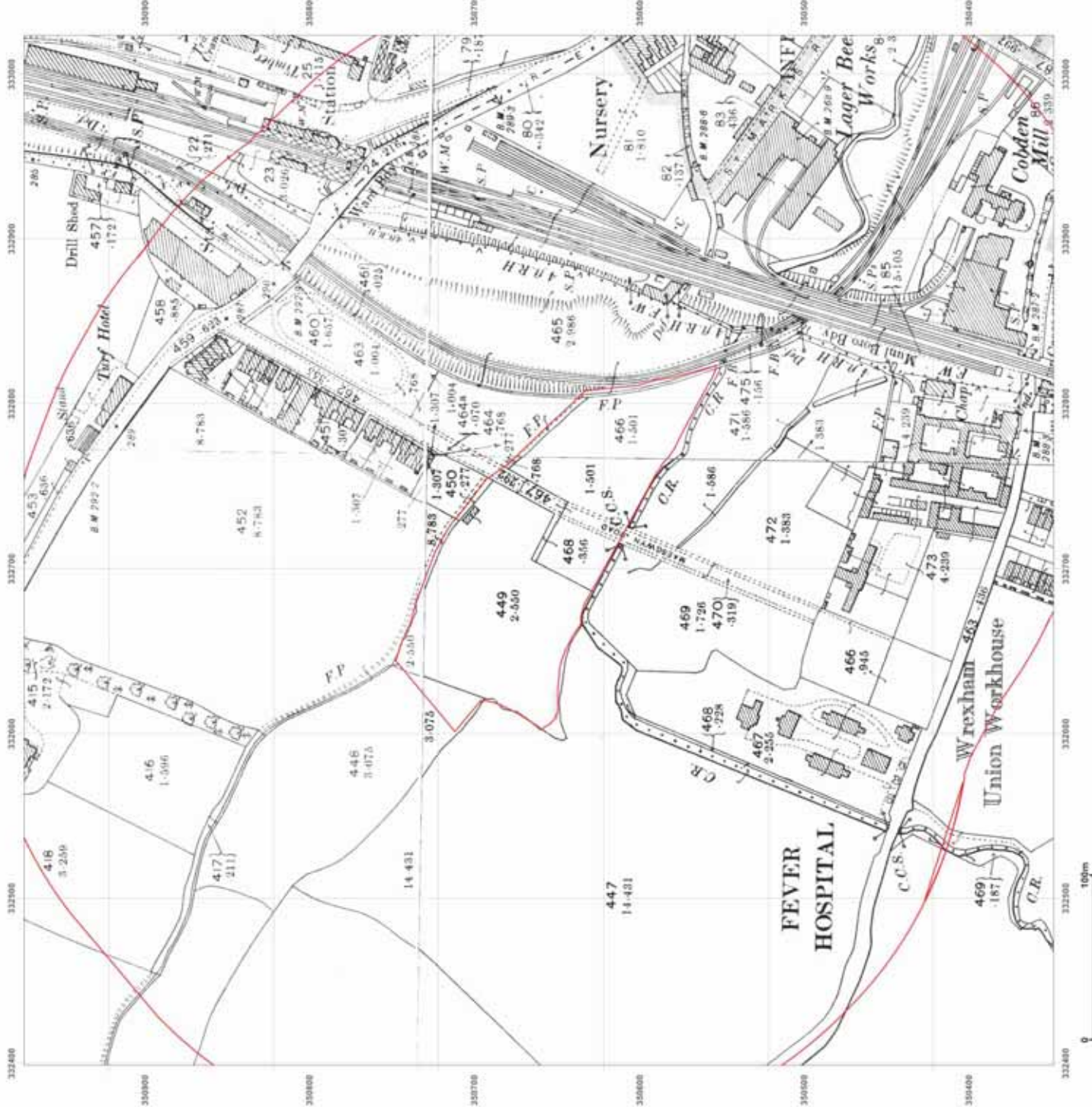
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Map Name: County Series

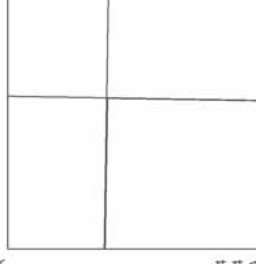
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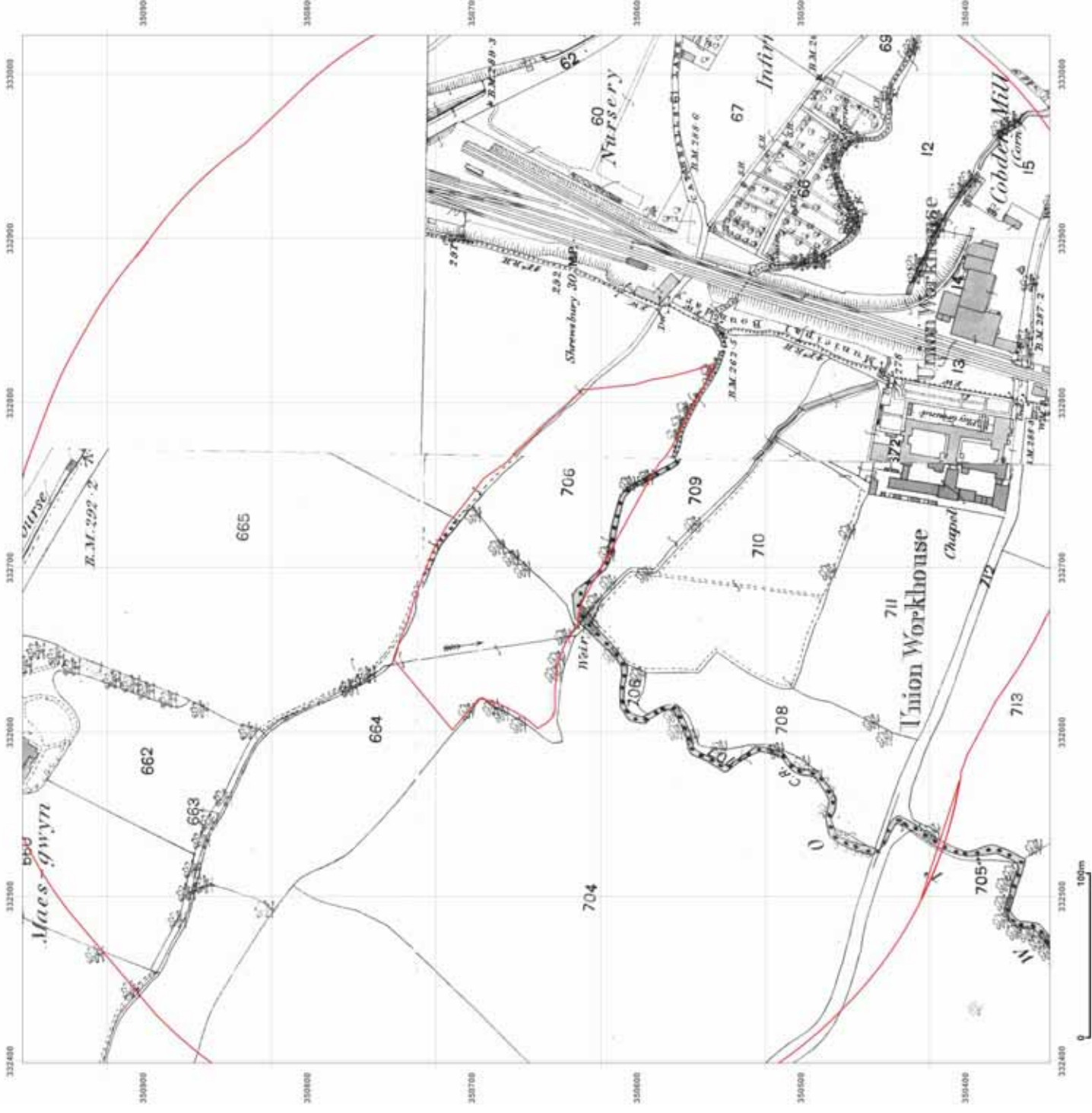
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Map Name: National Grid

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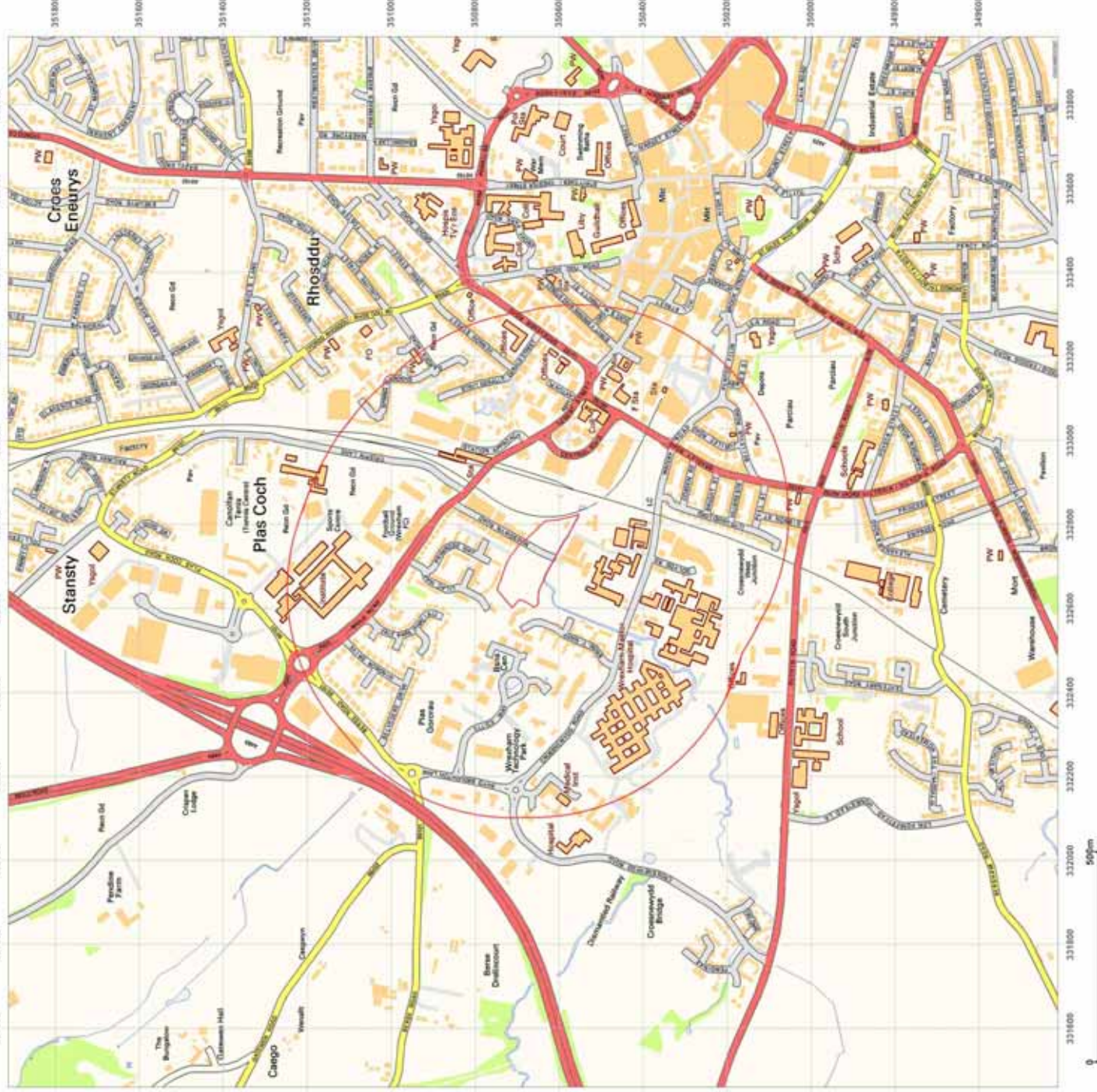


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Grid Ref: 332711, 350661

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000



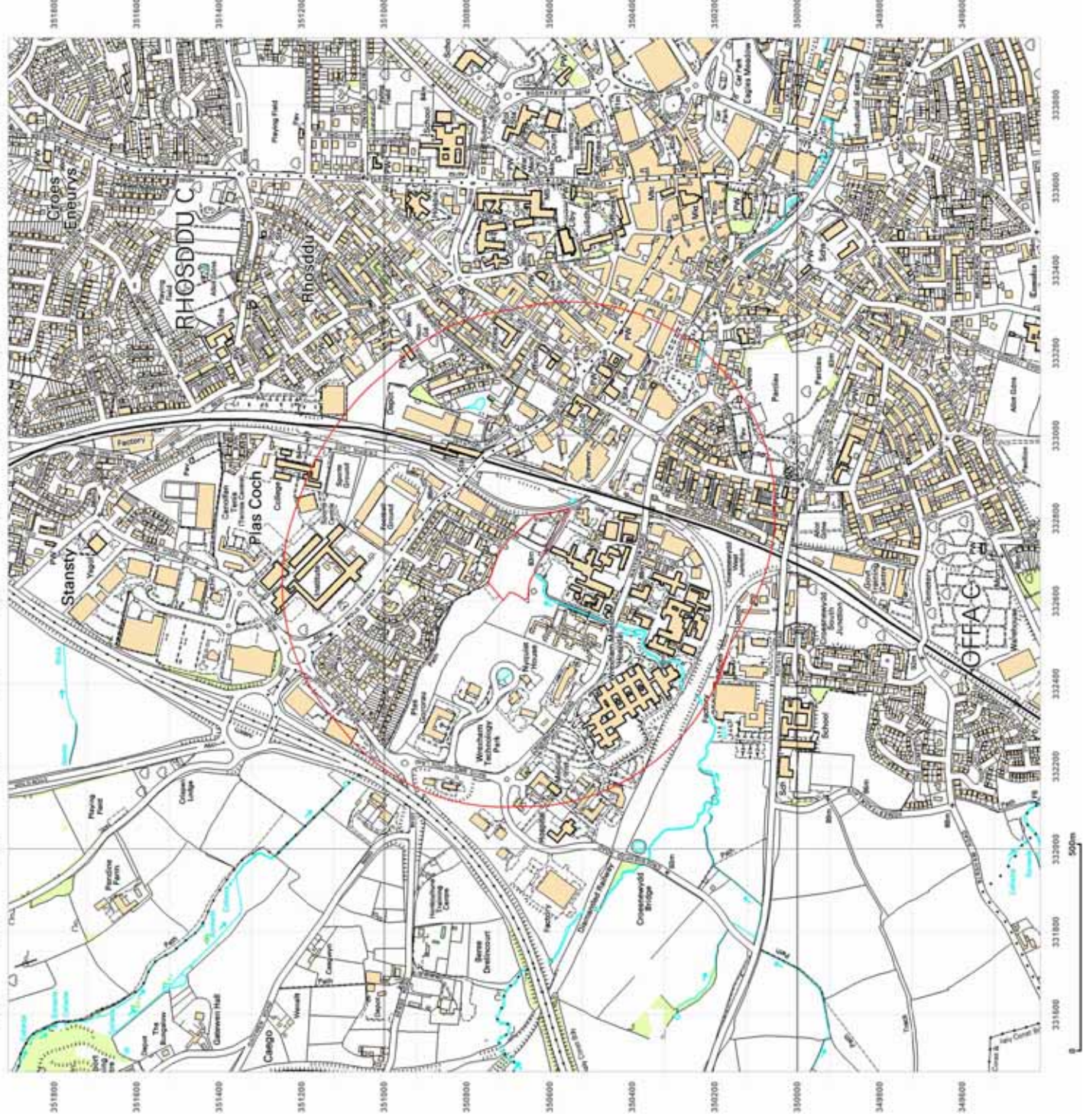
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Grid Ref: 332711, 350661

Map Name: National Grid

Map date: 1989-1992

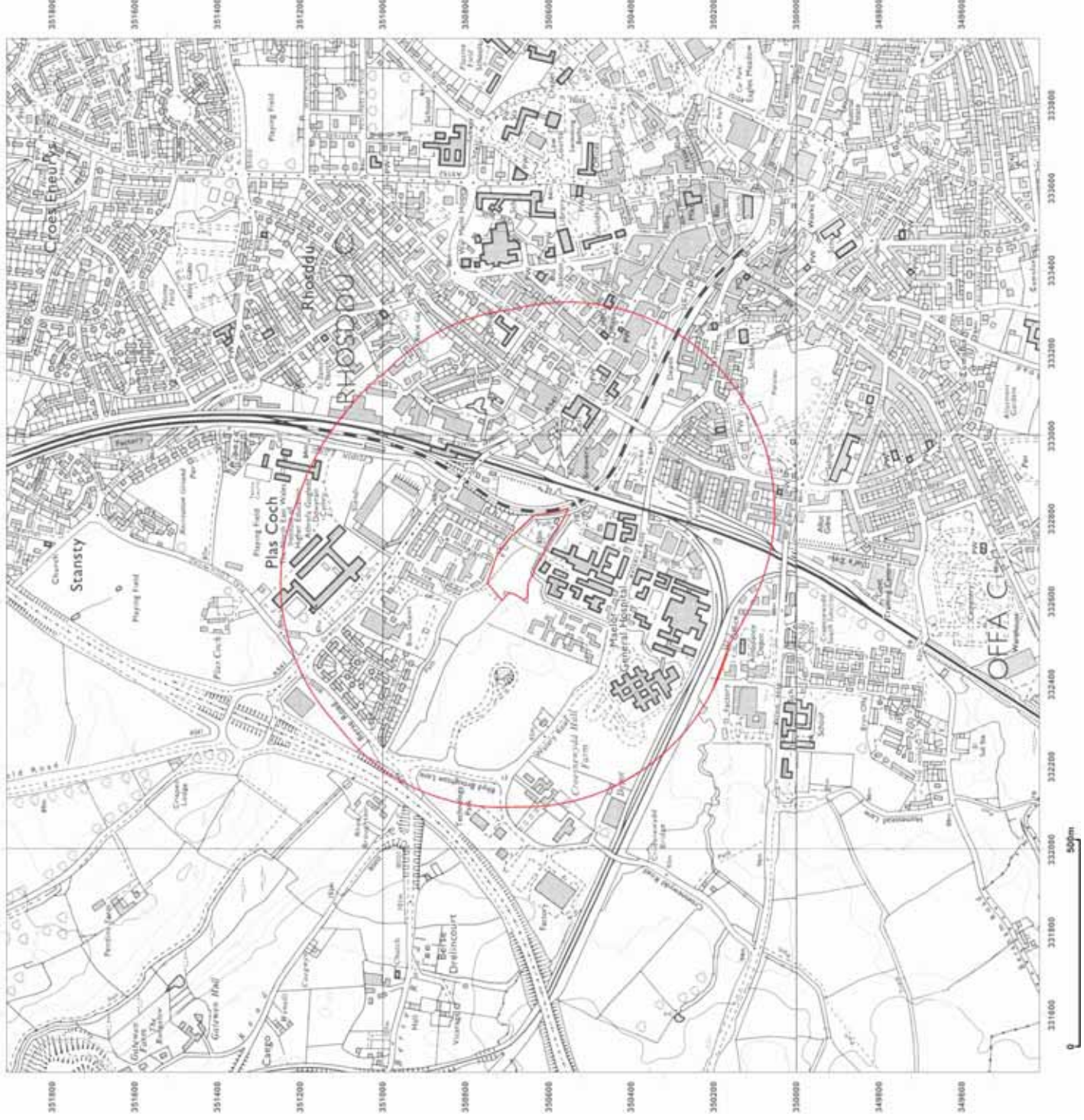
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Map Name: National Grid

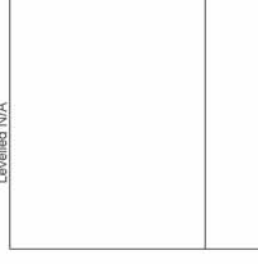
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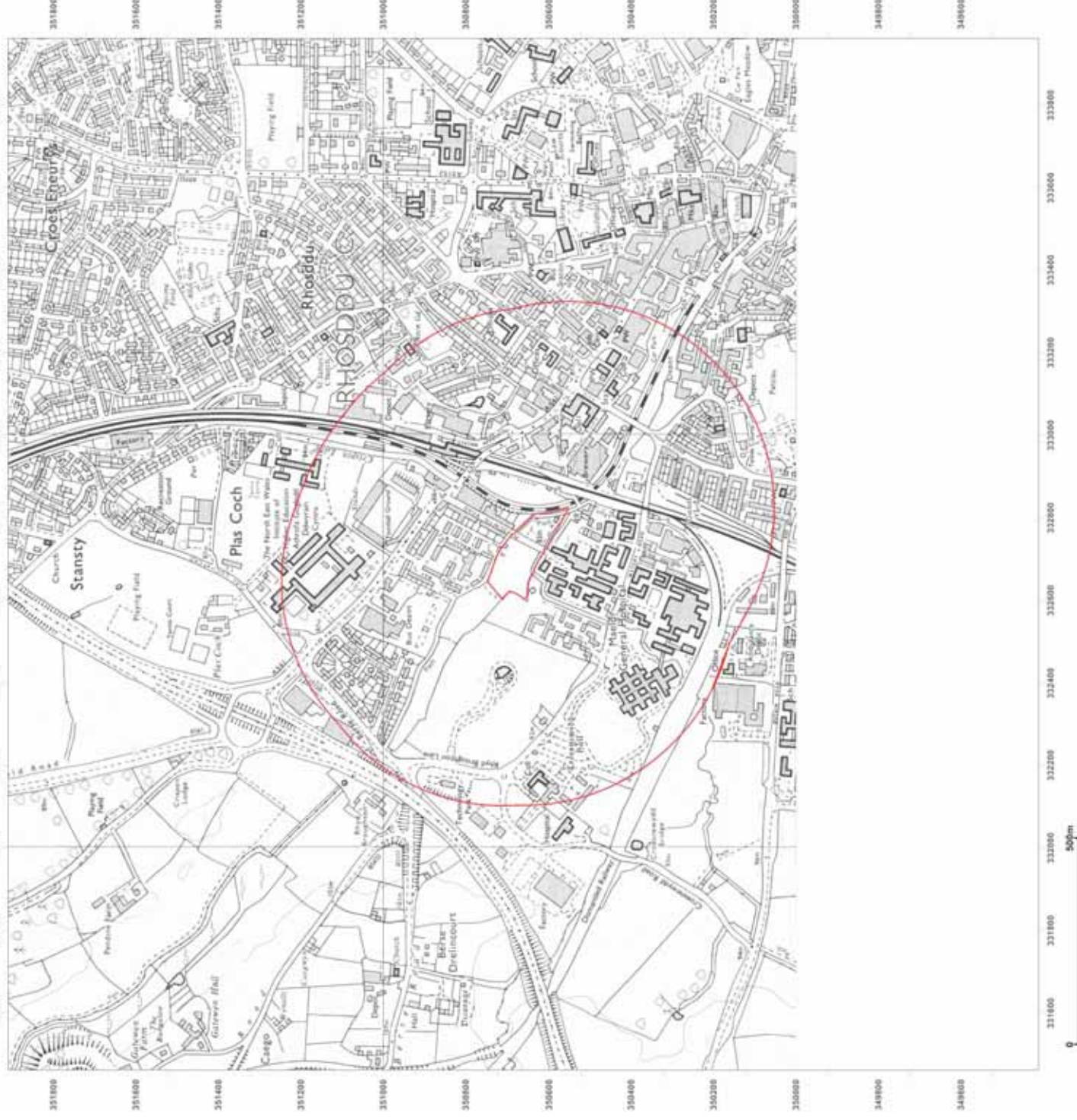


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Map Name: National Grid

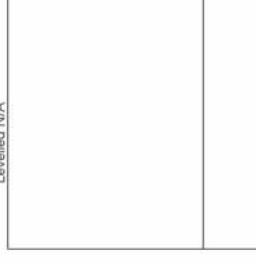
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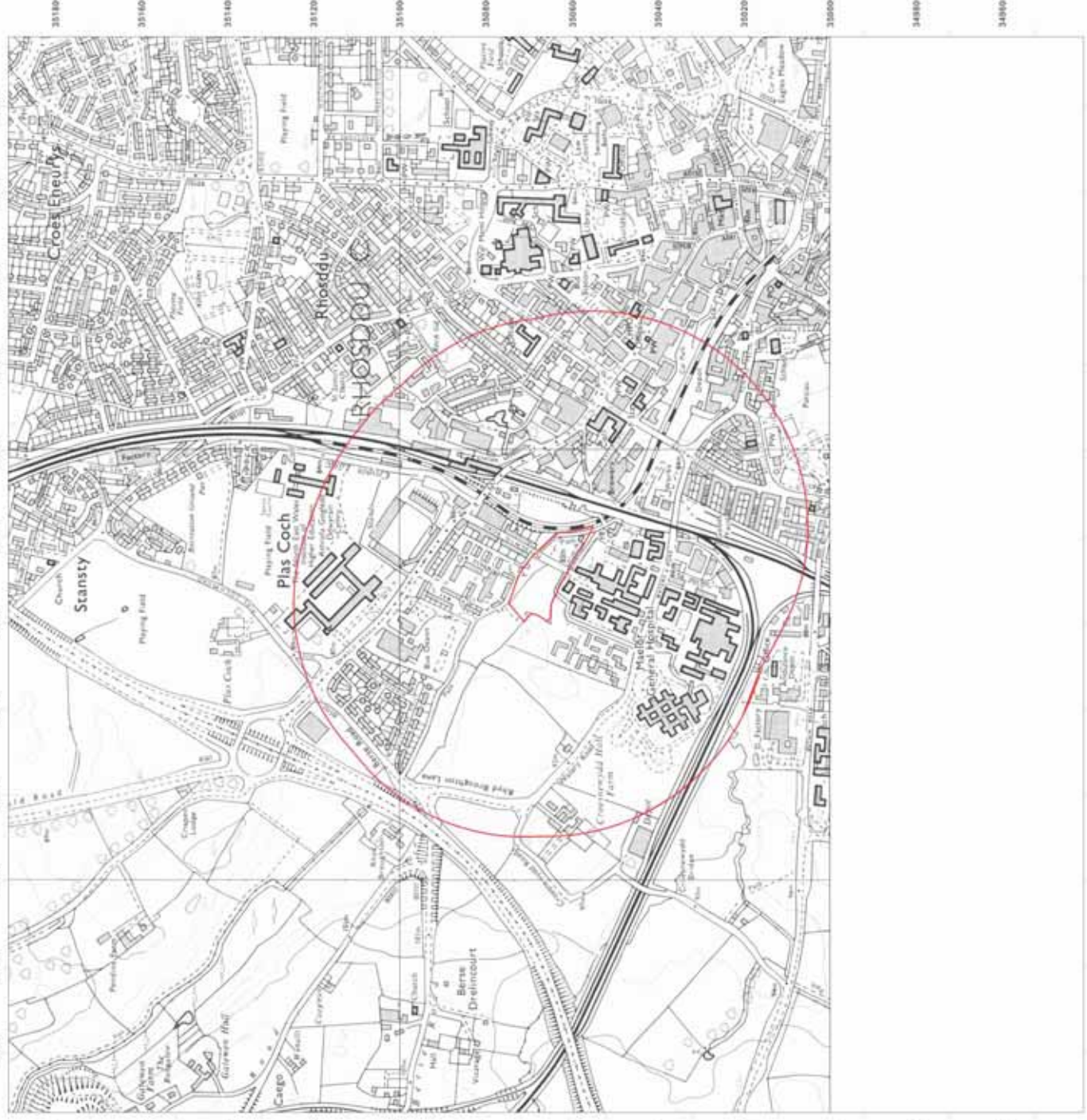


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Grid Ref: 332711, 350661

Map Name: National Grid

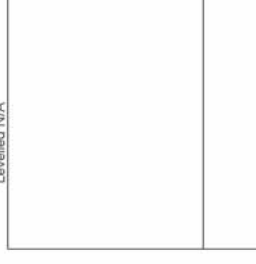
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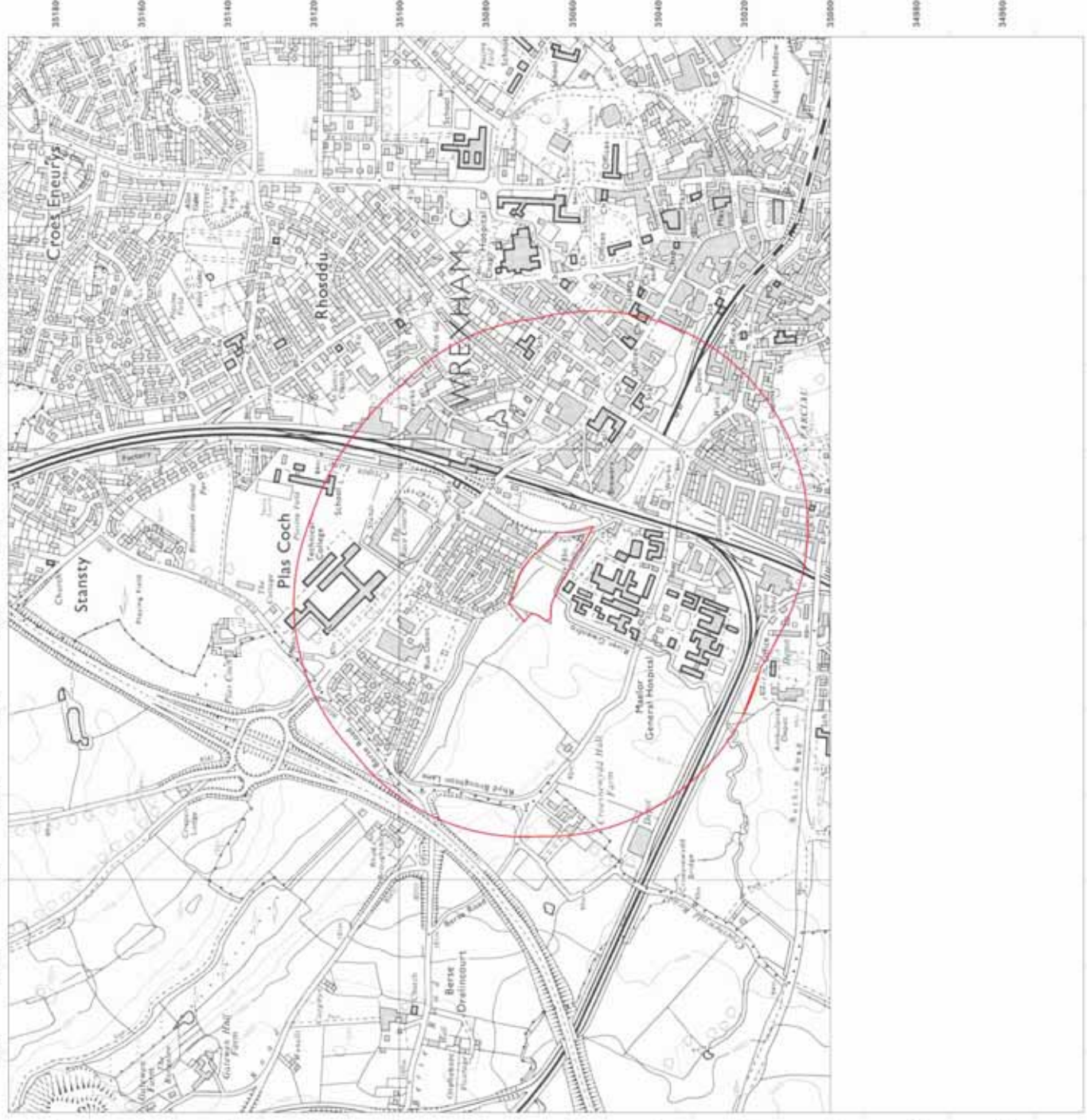


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Grid Ref: 332711, 350661

Map Name: National Grid

Map date: 1974-1977

Scale: 1:10,000

Printed at: 1:10,000



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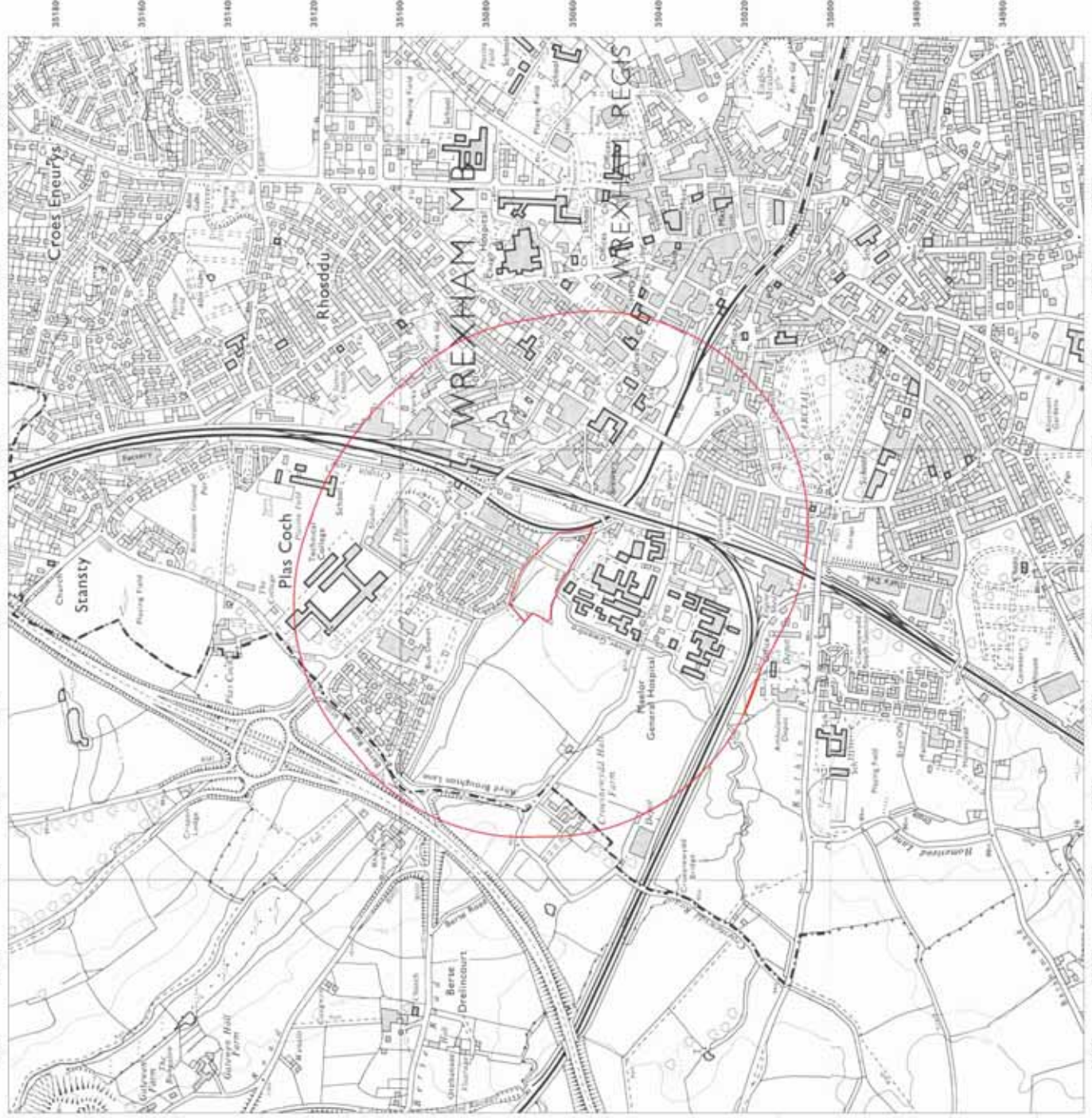
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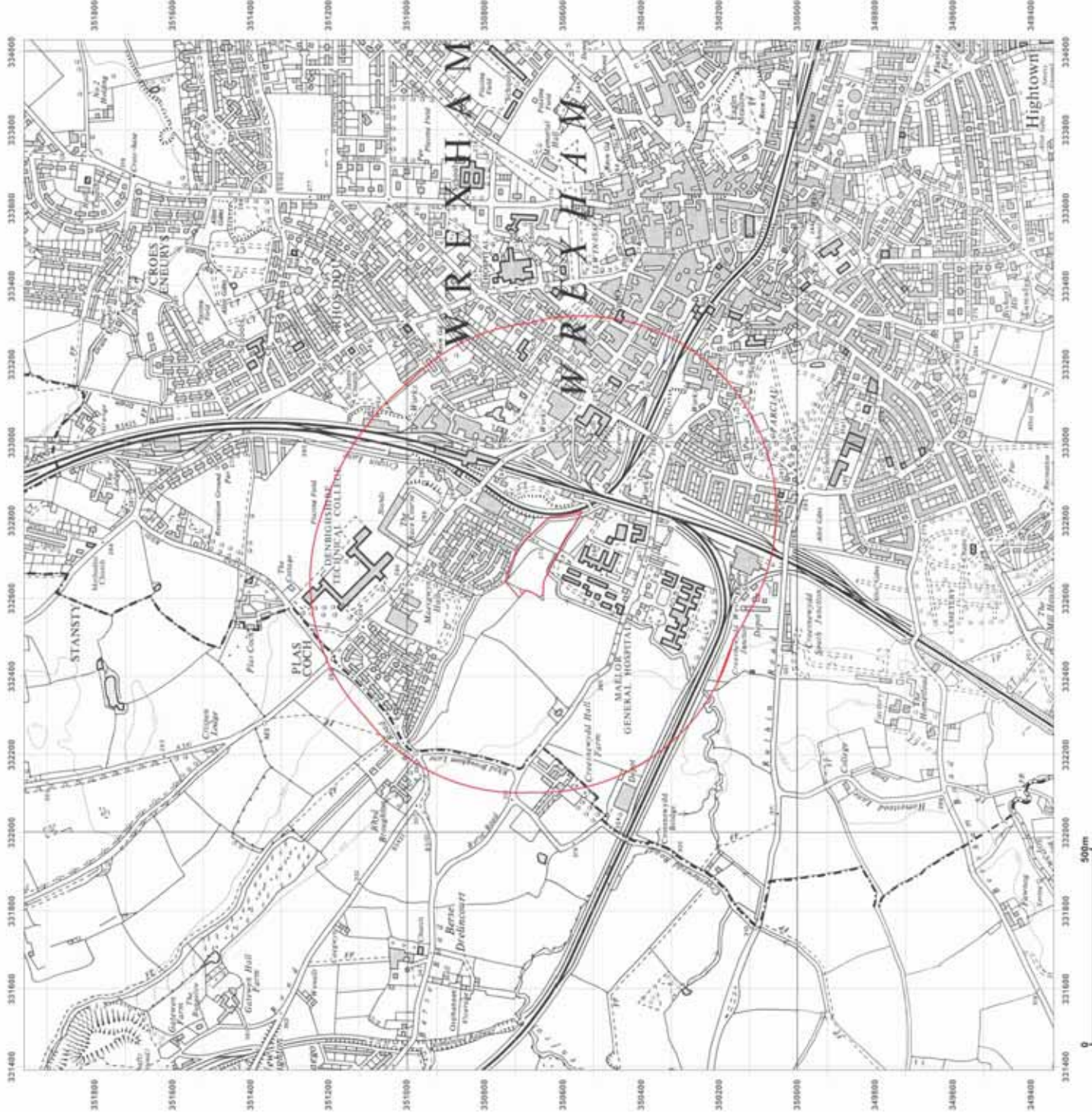


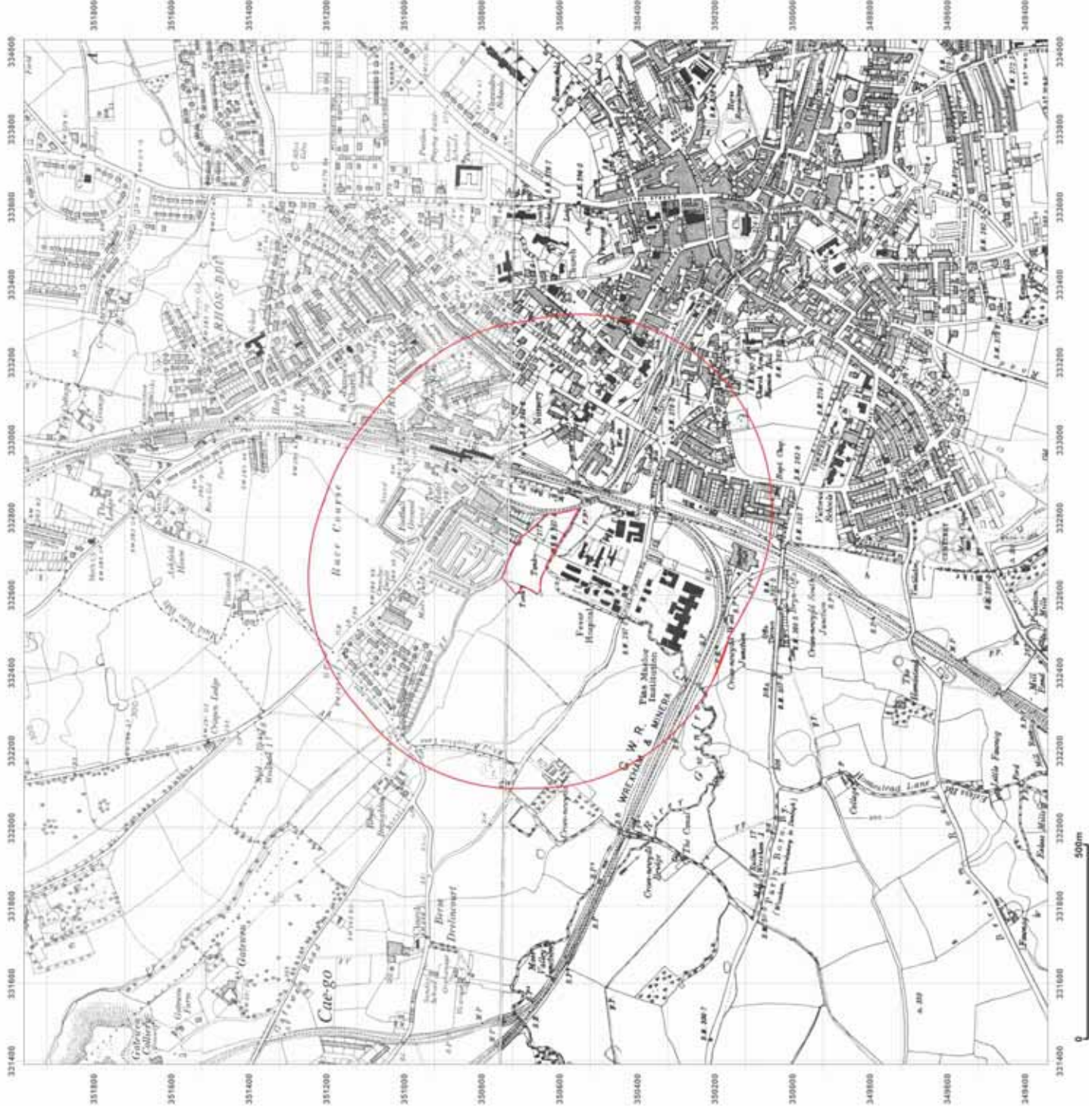
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Site Details:
LL11 2AQ

Client Ref: EMS_158387_232283
Report Ref: EMS-158387_232283
Grid Ref: 332711, 350661

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1871
Revised 1938
Edition N/A
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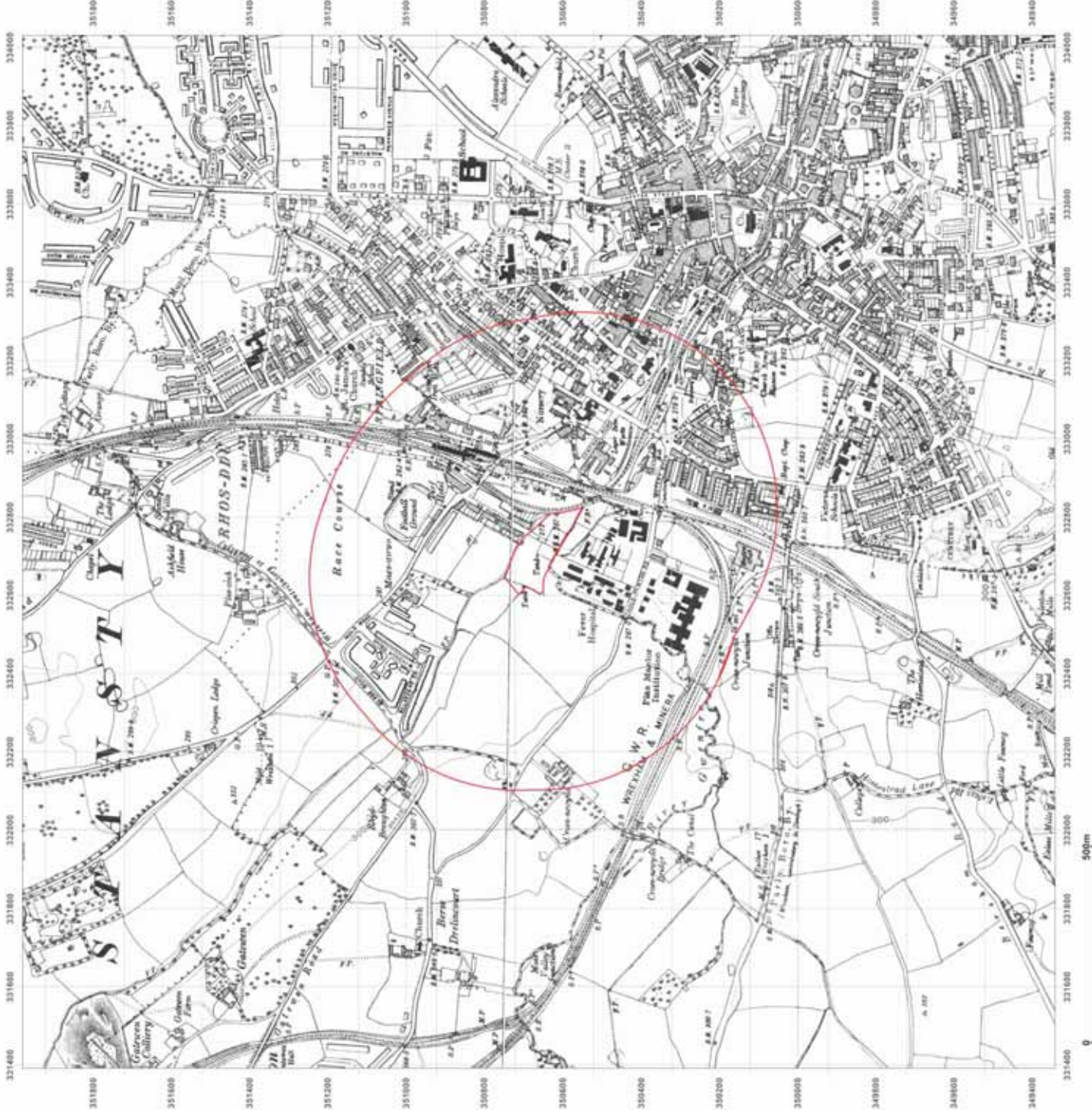
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Site Details:
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Client Ref: EMS_158387_232283
Report Ref: EMS-158387_232283
Grid Ref: 332711, 350661

Map Name: County Series

Map date: 1909-1910

Scale: 1:10,560

Printed at: 1:10,560



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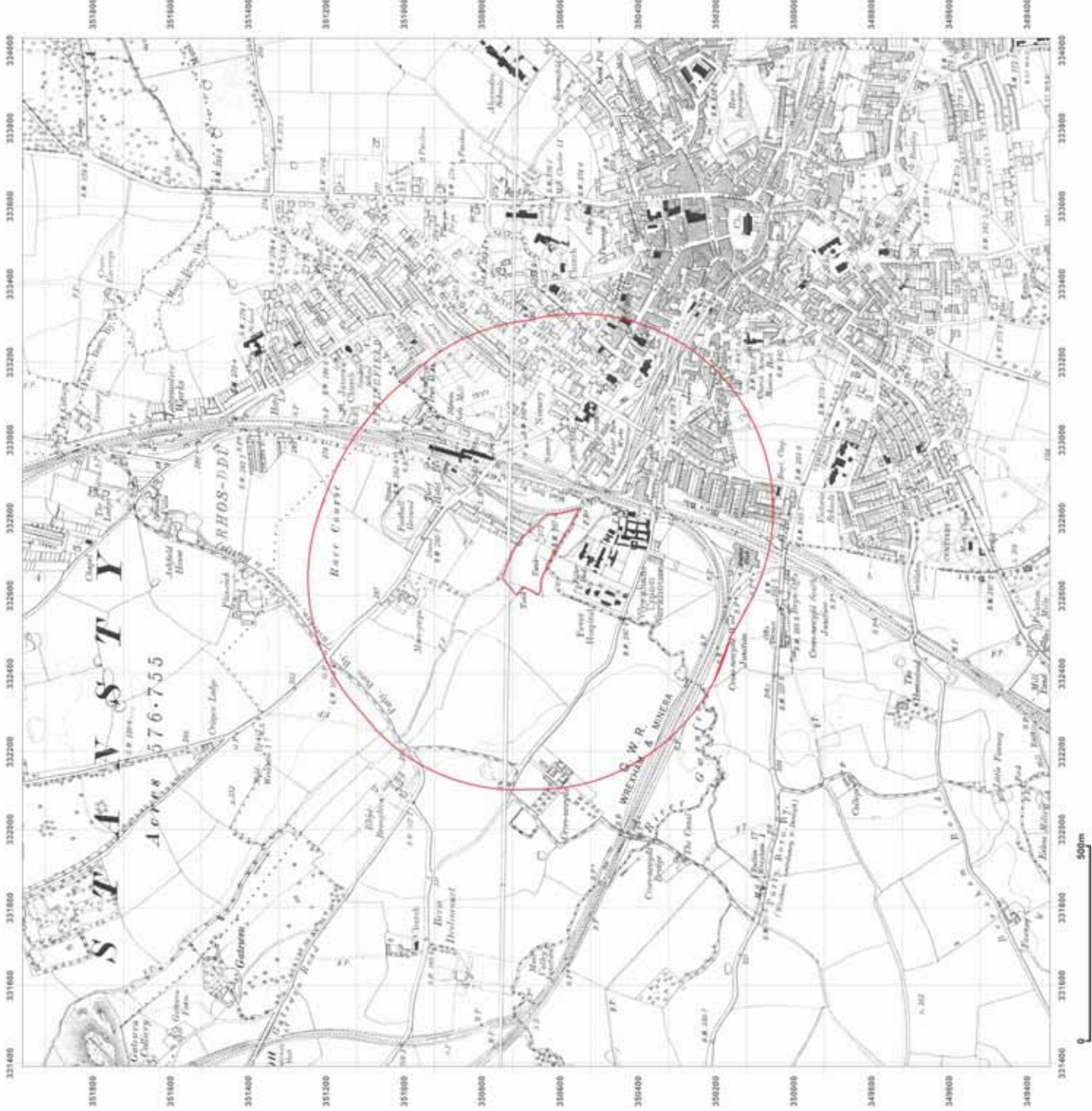


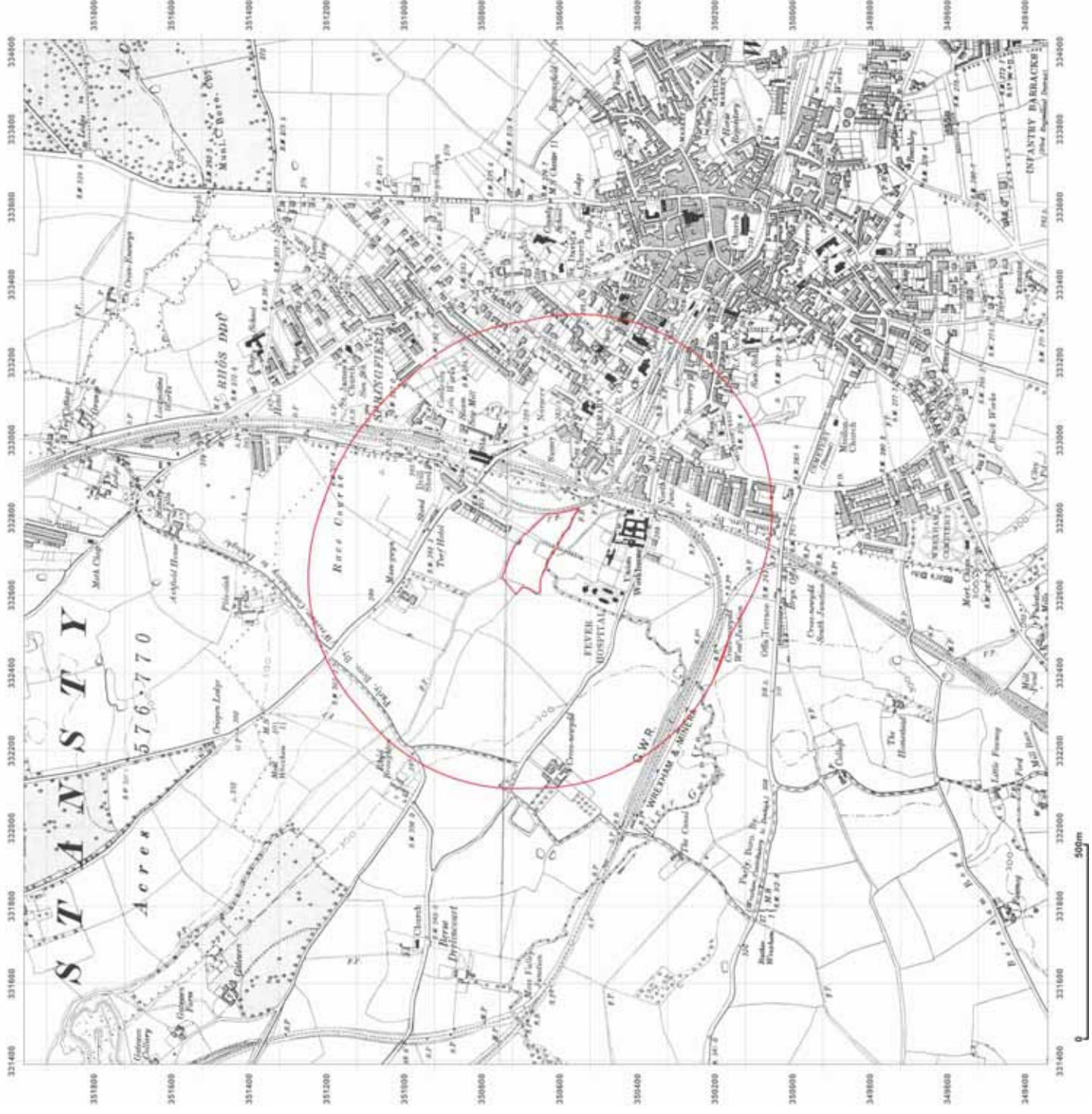
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Site Details:
LL11 2AQ

Client Ref: EMS_158387_232283
Report Ref: EMS-158387_232283
Grid Ref: 332711, 350661

Map Name: County Series

Map date: 1872

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1872
Revised 1872
Edition N/A
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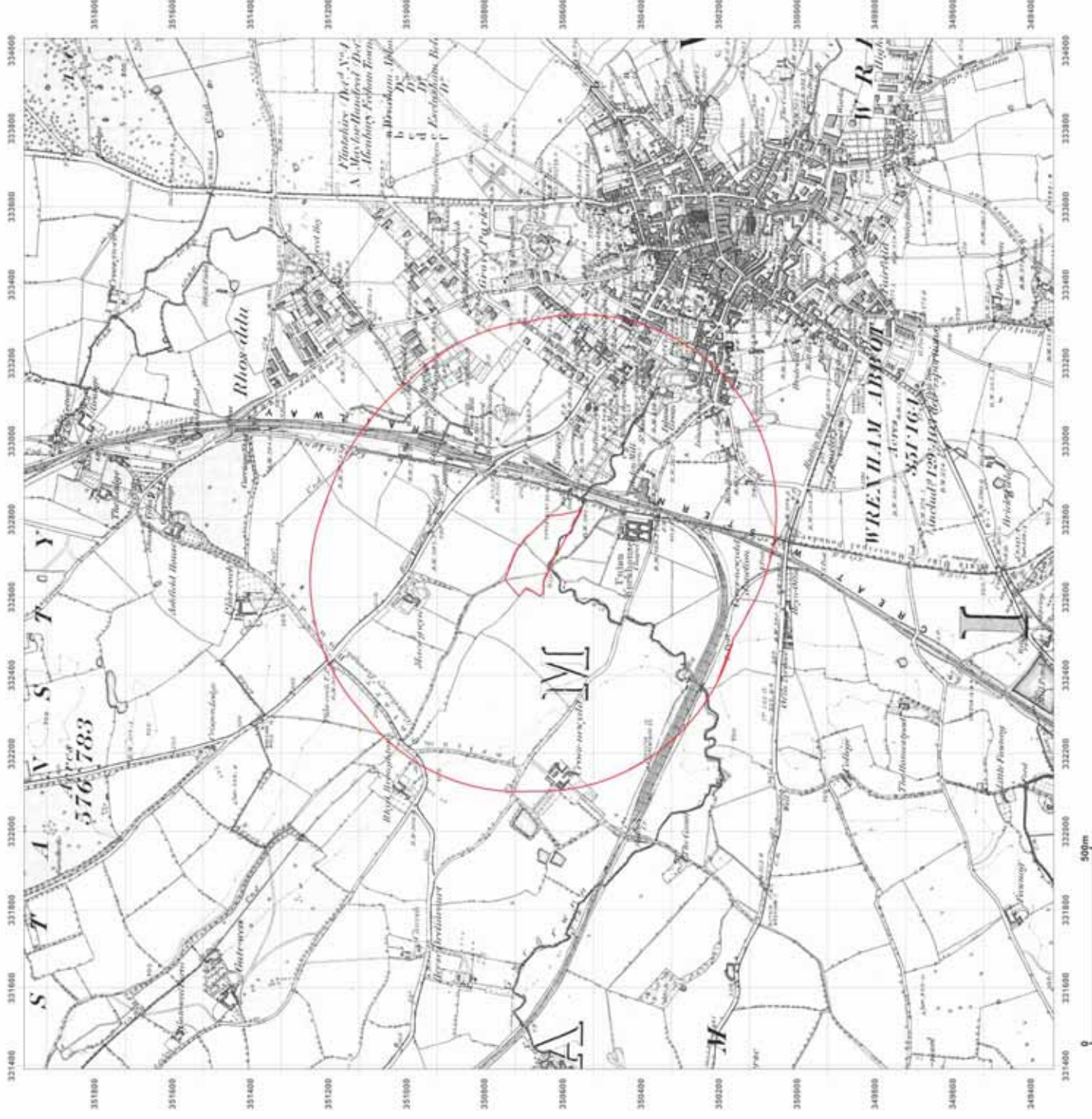
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Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG

Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

**GRM DEVELOPMENT SOLUTIONS
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LAURUS HOUSE
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BURTON-ON-TRENT
STAFFORDSHIRE
DE14 2WH**

Our reference:	51000058091001
Your reference:	P4519
Date of your enquiry:	14 March 2012
Date we received your enquiry:	14 March 2012
Date of issue:	14 March 2012

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report
LAND AT MAESGWYN ROAD, CLWYD, LL11 2AQ

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.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 2 seams of coal at 290m to 340m depth, and last worked in 1932.

Any ground movement from these coal workings should have stopped by now.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

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.

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 31st October 1994.

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

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

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

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.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working facilities orders

The property is not in an area for which 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.

Payments to owners of former copyhold land

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

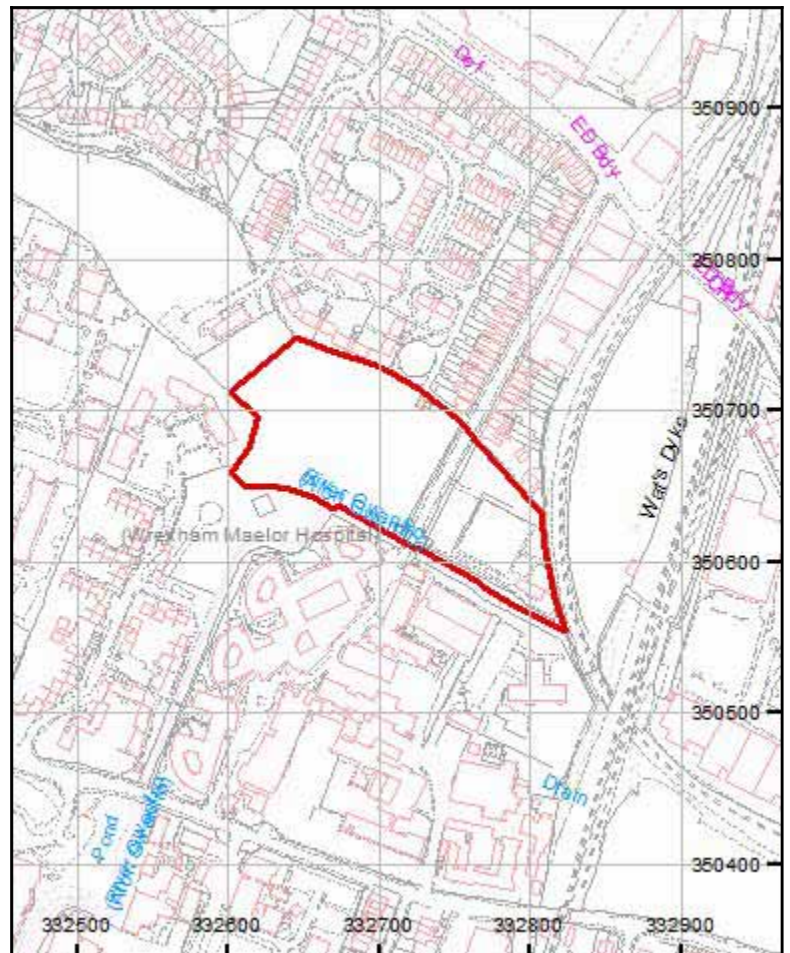
Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

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 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. 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.

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EmapSite
Masdar House,
Eversley, RG27 0RP

Report Reference:	EMS- 158387_232284
Your Reference:	EMS_158387_232 284
Report Date	Mar 14, 2012
Report Delivery Method:	Email - pdf

GroundSure GeoInsight

Address: LL11 2AQ

Dear Sir/Madam,

Thank you for placing your order with GroundSure. Please find enclosed the **GroundSure GeoInsight** as requested.

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

Yours faithfully,

emapsite customer services team

Enc.
GroundSure GeoInsight

GroundSure GeoInsight

Address: LL11 2AQ

Date: Mar 14, 2012

Report Reference: EMS-158387_232284

Your Reference: EMS_158387_232284



Brought to you by emapsite

Aerial Photograph of Study Site



Site Name: LL11 2AQ
Grid Reference: 332711,350661
Size of Site: 1.92 ha

Aerial photography supplied by Getmapping PLC.
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Overview of Findings

The GroundSure GeoInsight 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 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow 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.

Report Section	Number of records found within (X) m of the study site boundary
1. Geology	Description
1.1 Artificial Ground,	
1.1.1 Is there any Artificial Ground /Made Ground present beneath the study site?*	Yes
1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	Yes
1.2 Superficial Geology & Landslips	
1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
1.2.2 Are there any records relating to permeability of superficial geology within the study site* boundary?	Yes
1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
1.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No
1.3 Bedrock, Solid Geology & 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 relating to permeability of bedrock within the study site* boundary?	Yes
1.3.3 Are there any records of faults within 500m of the study site boundary?	Yes
1.3.4 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
1.3.5 Is the property in an area where Radon Protection Measures 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

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

Source:Scale 1:50,000 BGS Sheet No:121

2. Ground Workings	on-site	0-50	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	2	14	-	-
2.2 Historical Underground Workings Features from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	0	0	0	0

3. Mining, Extraction & Natural Cavities	on-site	0-50	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	1	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining*	2	0	0	0	1
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

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

4. Natural Ground Subsidence	on-site*	0-50	51-250	251-500	501-1000
4.1 Shrink-Swell Clay	Very Low	-	-	-	-
4.2 Landslides	Very Low	-	-	-	-
4.3 Ground Dissolution of Soluble Rocks	Negligible	-	-	-	-
4.4 Compressible Deposits	Moderate	-	-	-	-
4.5 Collapsible Deposits	Very Low	-	-	-	-
4.6 Running Sand	Low	-	-	-	-

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

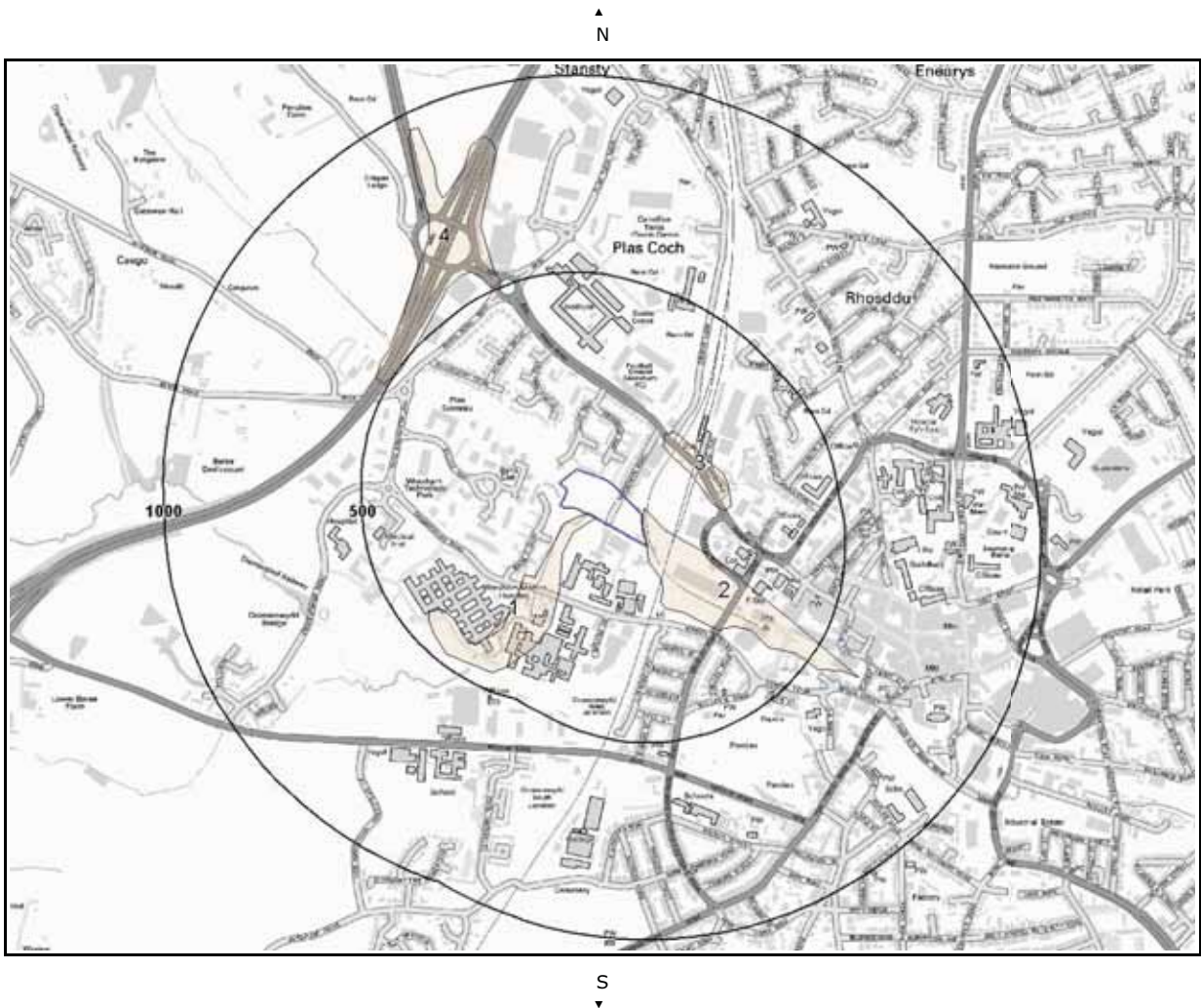
5. Borehole Records	on-site	0-50	51-250	251-500	501-1000
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5.1 BGS Recorded Boreholes	4	15	27	-	-
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6. Estimated Background Soil Chemistry	on-site	0-50	51-250	251-500	501-1000
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6.1 Records of Background Soil Chemistry	4	2	0	-	-
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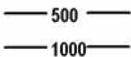
1.1 Artificial Ground Map



Artificial Ground Legend



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

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

1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:121

1.1.1 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	0.0	On Site	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	0.0	On Site	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	155.0	NE	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	494.0	NW	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

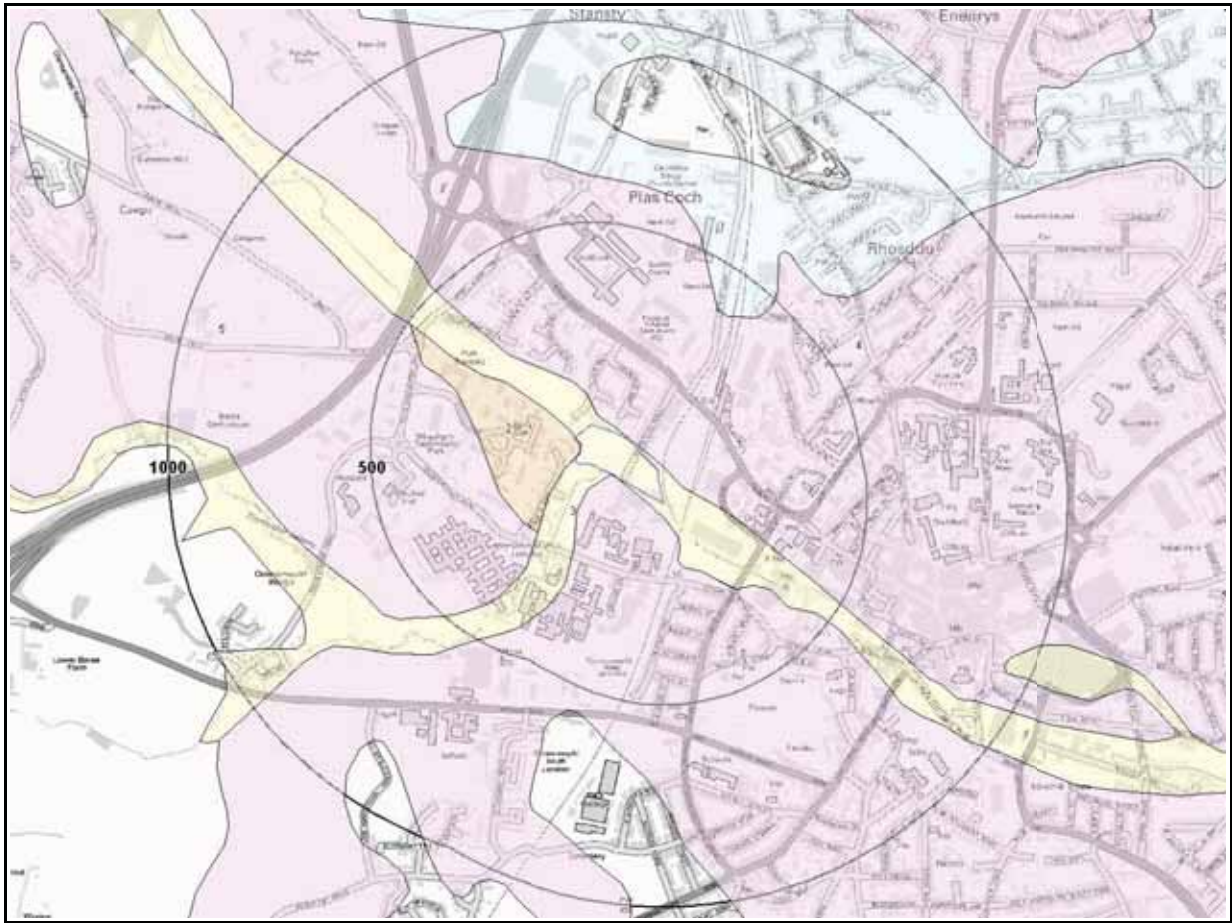
1.1.2 Permeability of Artificial Ground

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

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

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

1.2 Superficial Deposits and Landslips Map



Superficial and Landslips Legend



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

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/Drift Geology

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

ID	Distance (m)	Direction	Lex Code	Description	Rock Description
1	0.0	On Site	GFSDD-SAGR	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
2	0.0	On Site	RTDU-SAGR	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND AND GRAVEL
3	0.0	On Site	ALV-CSSG	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
4	4.0	NE	GFSDD-SAGR	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
5	194.0	SW	GFSDD-SAGR	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
6	391.0	NE	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

1.2.2 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	Intergranular	Very High	High
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Intergranular	High	Very Low
4.0	NE	Intergranular	Very High	High

1.2.3 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, 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.

1.2.4 Landslip Permeability

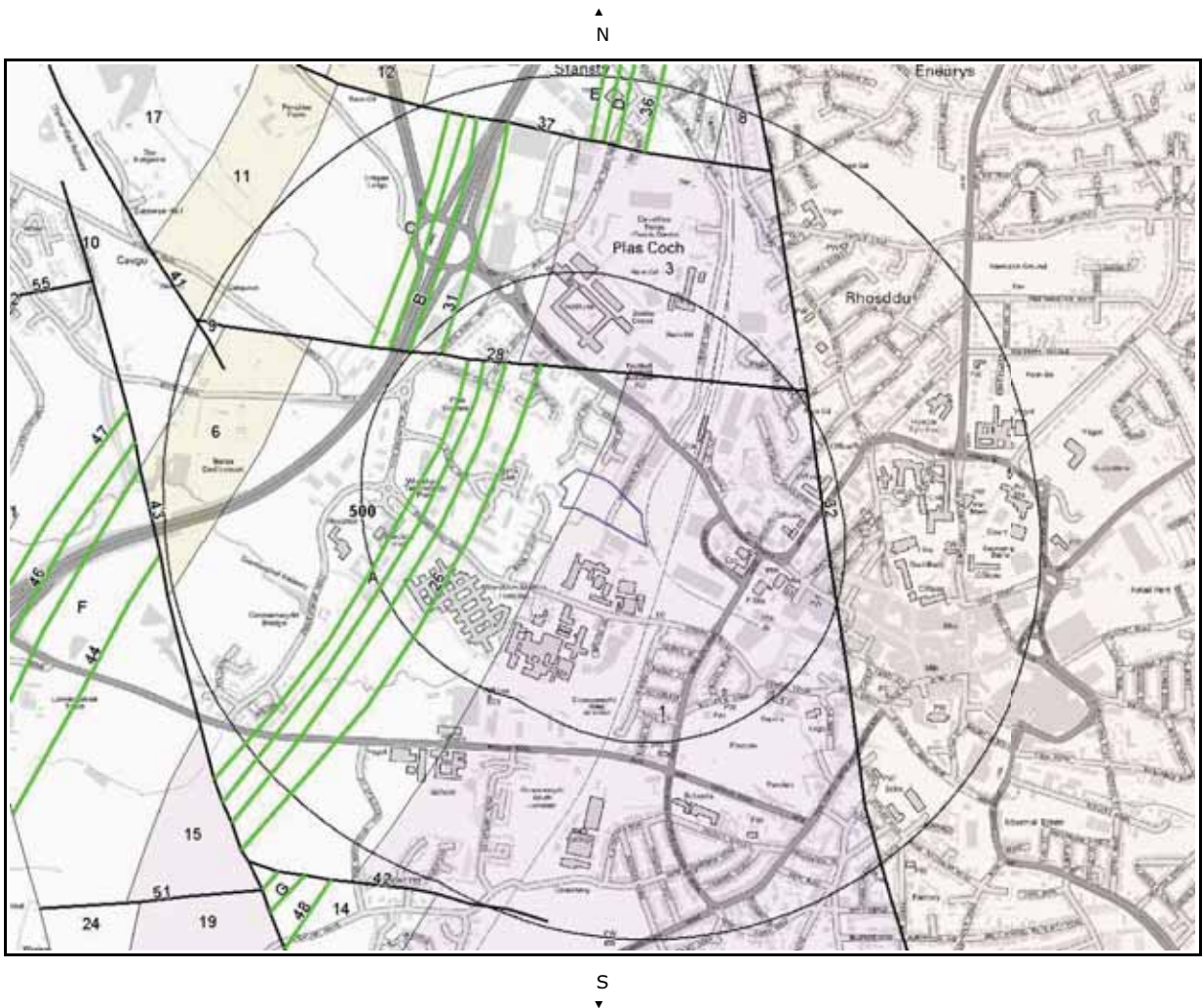
Are there any records relating to permeability of landslips within the study site* boundary?

No

Database searched and no data found.

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

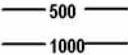
1.3 Bedrock and Faults Map



Bedrock & Faults Deposits Legend



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-  Site Outline
-  Search Buffers (m)

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

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:121

1.3.1 Bedrock/Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	ETM-MDST	Etruria Formation - Mudstone	Westphalian
2A	0.0	On Site	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian (westphalian C) / Langsettian (westphalian A)
3	255.0	N	ETM-MDST	Etruria Formation - Mudstone	Westphalian
4C	305.0	NW	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian (westphalian C) / Langsettian (westphalian A)
5	451.0	E	SAL-MDSC	Salop Formation - Mudstone, Sandstone And Conglomerate	/ Westphalian D

1.3.2 Permeability of Bedrock Ground

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

Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Moderate	Low
0.0	On Site	Fracture	Low	Low

1.3.3 Faults

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

ID	Distance (m)	Direction	Category Description	Feature Description
26	150.0	NW	ROCK	Coal seam, inferred
27	225.0	NW	ROCK	Coal seam, inferred
A				
28	255.0	N	FAULT	Normal fault, inferred
29	276.0	NW	ROCK	Coal seam, inferred
A				
30	314.0	W	ROCK	Coal seam, inferred
A				
31	445.0	NW	ROCK	Coal seam, inferred
32	451.0	E	FAULT	Normal fault, inferred

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

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

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

1.3.4 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?

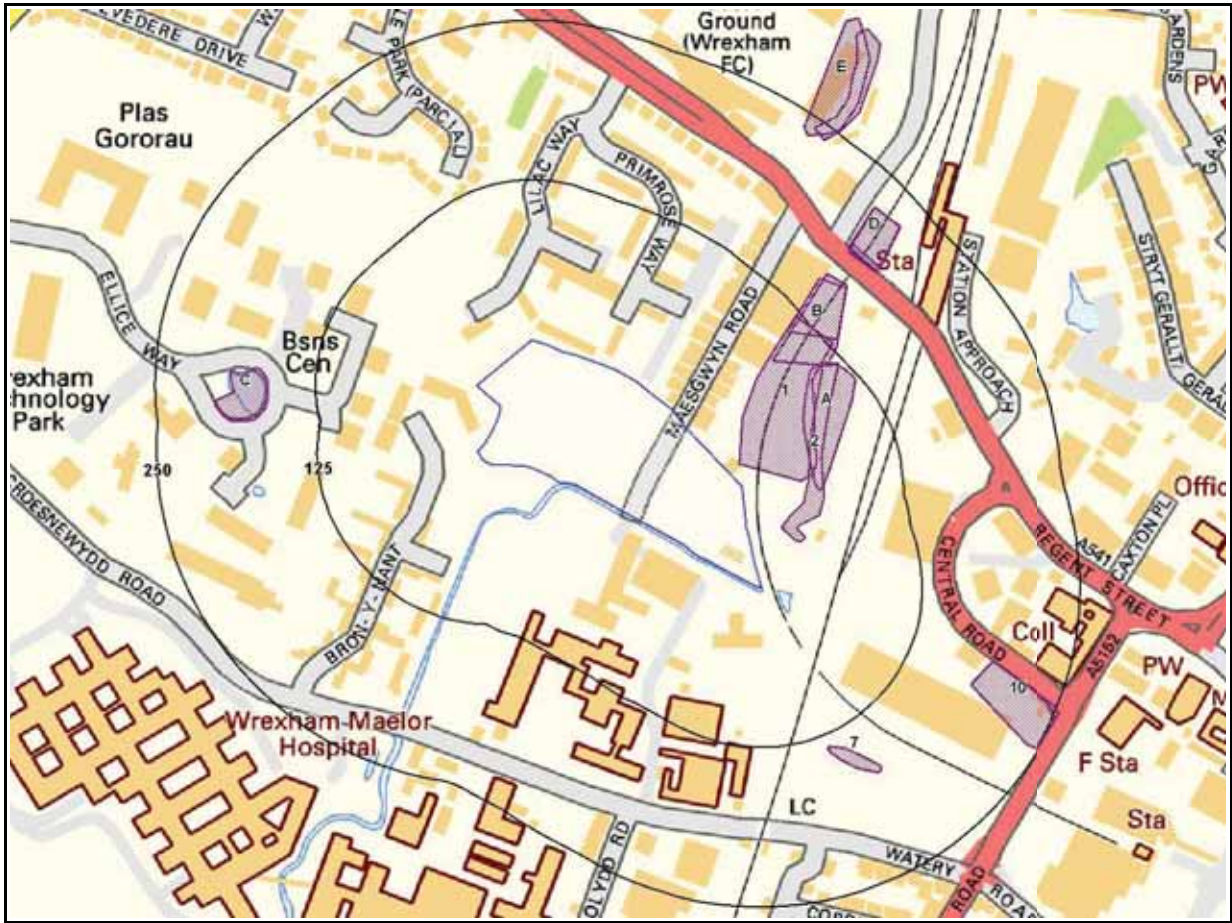
The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level

1.3.5 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

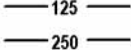
2. Ground Workings Map



Ground Workings Legend



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

2. Ground Workings

2.1 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**

The following Historical Surface Ground Working Features are provided by GroundSure:

ID	Distance (m)	Direction	NGR	Use	Date
1	11.0	NE	332842,350702	Cuttings	1964
2	26.0	E	332861,350660	Unspecified Ground Workings	1898
3A	55.0	E	332876,350680	Unspecified Pit	1937
4A	55.0	E	332876,350680	Unspecified Pit	1938
5B	85.0	NE	332860,350764	Cuttings	1938
6B	108.0	NE	332866,350772	Cuttings	1939
7	135.0	SE	332896,350419	Pond	1898
8C	162.0	W	332418,350705	Pond	1989
9C	162.0	W	332418,350705	Pond	1992
10	179.0	SE	333021,350462	Unspecified Pit	1964
11	184.0	NE	332911,350826	Cuttings	1980
D					
12	186.0	NE	332911,350826	Cuttings	1964
D					
13	190.0	NE	332912,350827	Cuttings	1974
D					
14	234.0	NE	332896,350953	Unspecified Heap	1964
E					
15	239.0	NE	332900,350948	Unspecified Ground Workings	1974
E					
16	239.0	NE	332900,350948	Unspecified Ground Workings	1980
E					

2.2 Historical Underground Workings Features derived from Historical Mapping

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

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

Database searched and no data found.

2.3 Current Ground Workings

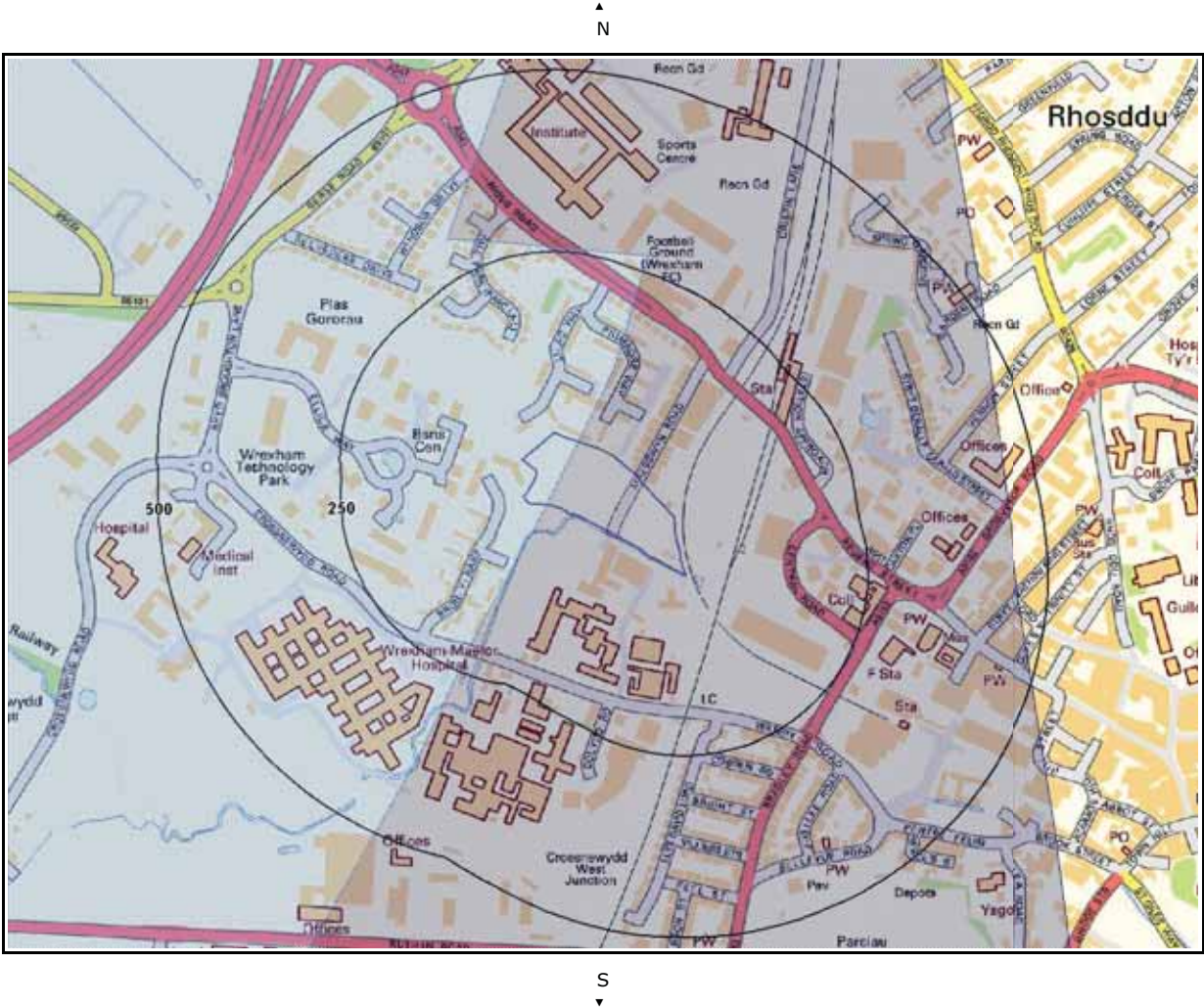
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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

No

Database searched and no data found.

3. Mining, Extraction & Natural Cavities Map



Mining, Extraction & Natural Cavities Legend



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3. Mining, Extraction & Natural Cavities

3.1 Historical Mining

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

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

Database searched and no data found.

3.2 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.

3.3 Johnson Poole and Bloomer

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

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

The following information provided by JPB is not represented on Mapping:

Database searched. No results found.

3.4 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)	Highly Unlikely - Localised small scale mining may have occurred but restricted in extent.
2	0.0	On Site	Not available	Vein Mineral	Rare - Infrequent minor mining may have occurred but restricted in extent.

Not shown	728.0	SW	Not available	Iron Ore (Bedded)	Highly Unlikely - Localised small scale mining may have occurred but restricted in extent.
-----------	-------	----	---------------	-------------------	--

3.5 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.

3.6 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.

3.7 Brine Extraction

This dataset provides information from the Brine Compensation Board which has been discontinued and is now covered by the Coal Authority.

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

Database searched and no data found.

3.8 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.

3.9 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. More detailed information on potential Tin Mining may be found in Section 3.4 – Non-Coal Mining Hazards.

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

Database searched and no data found.

3.10 Clay Mining

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

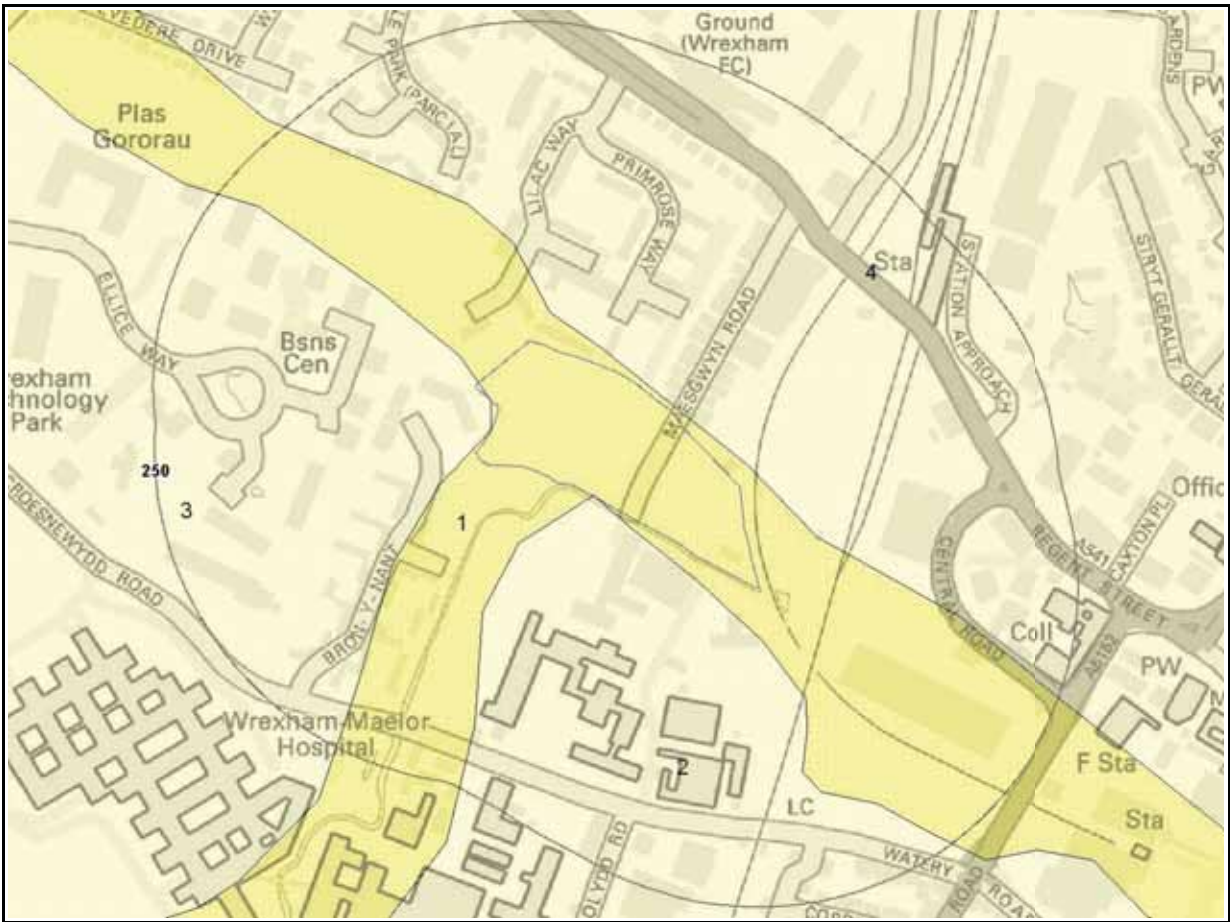
Are there any Clay Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.

4. Natural Ground Subsidence

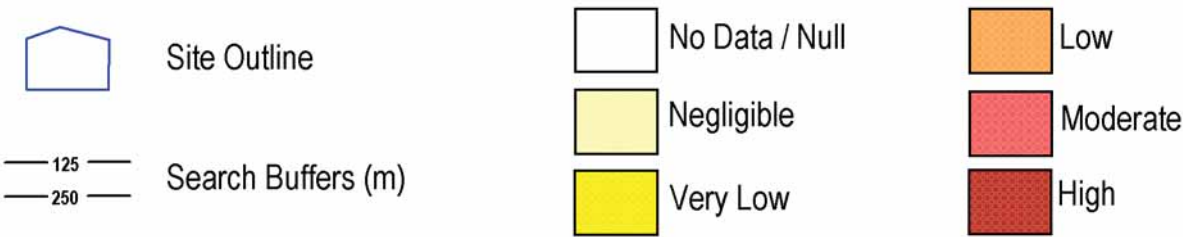
4.1 Shrink-Swell Clay Map



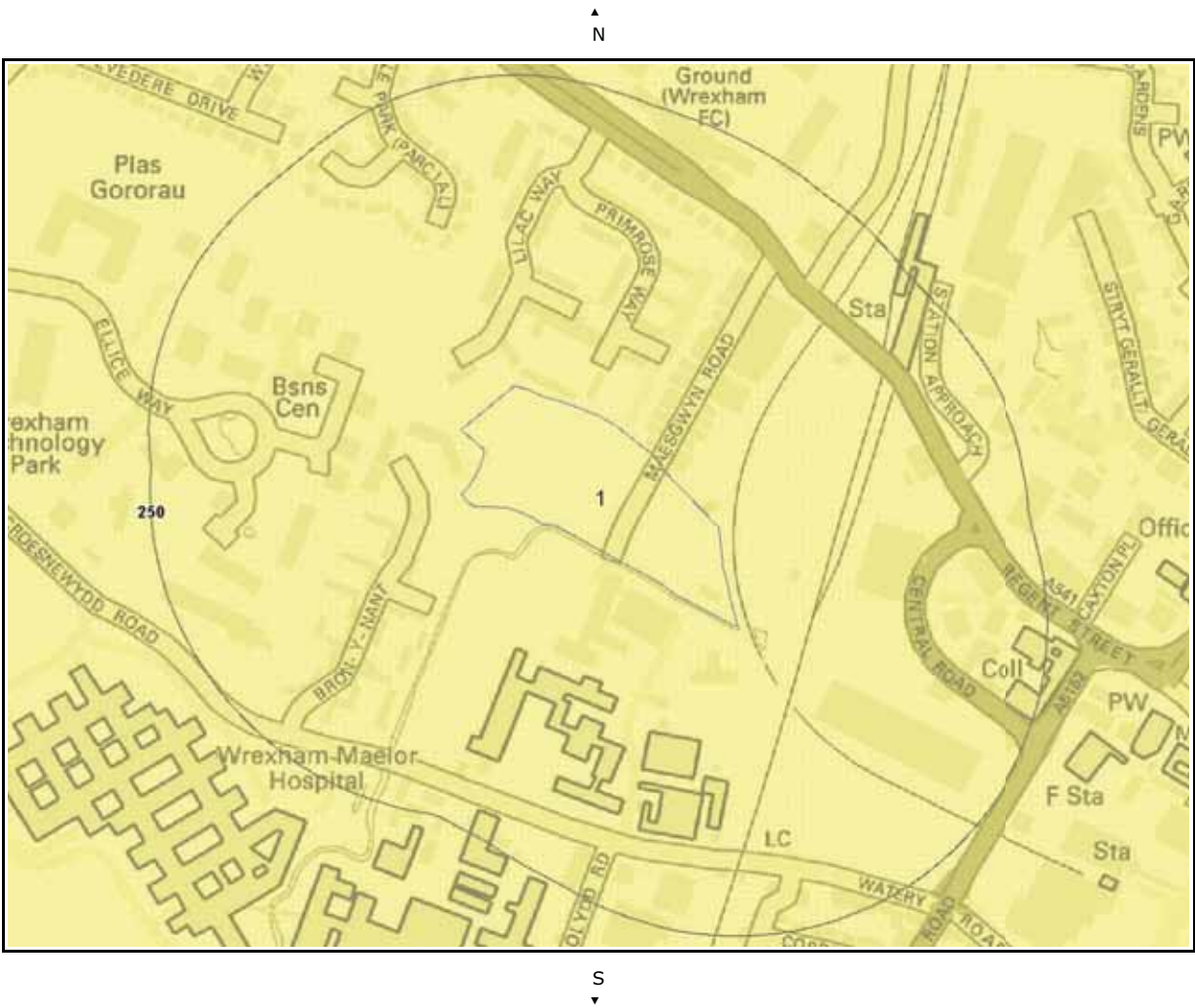
Shrink-Swell Clay Legend



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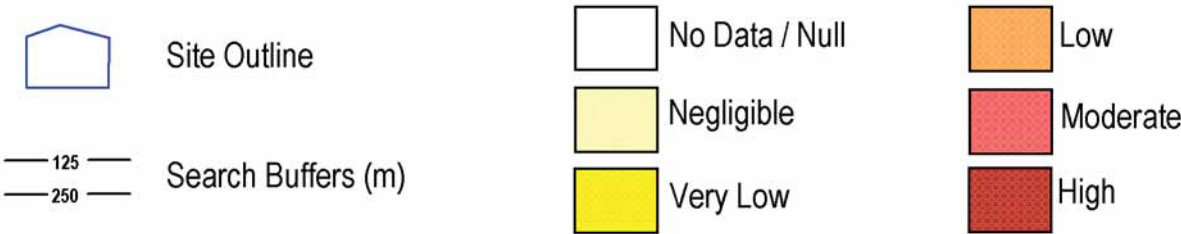
4.2 Landslides Map



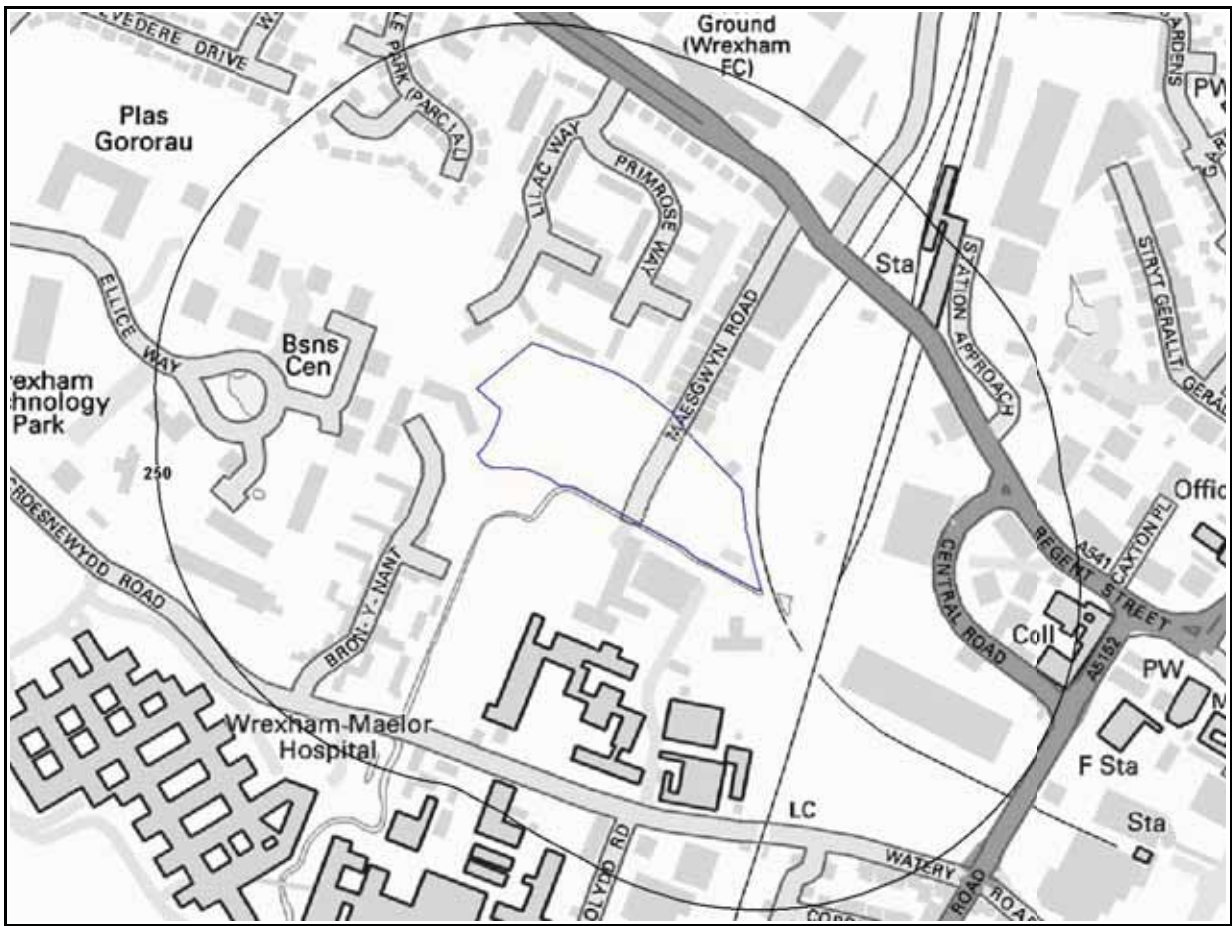
Landslides Legend



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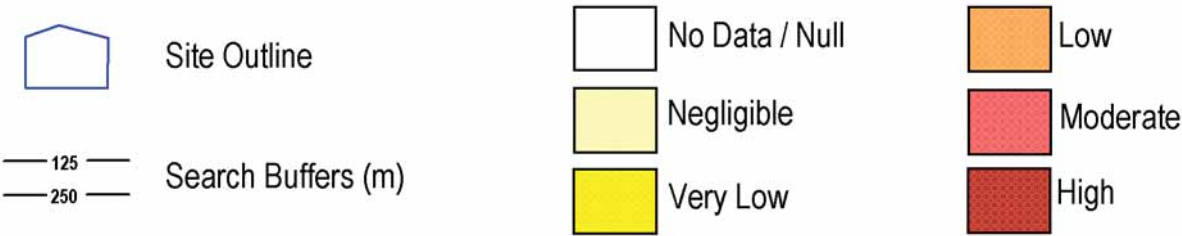
4.3 Ground Dissolution Soluble Rocks Map



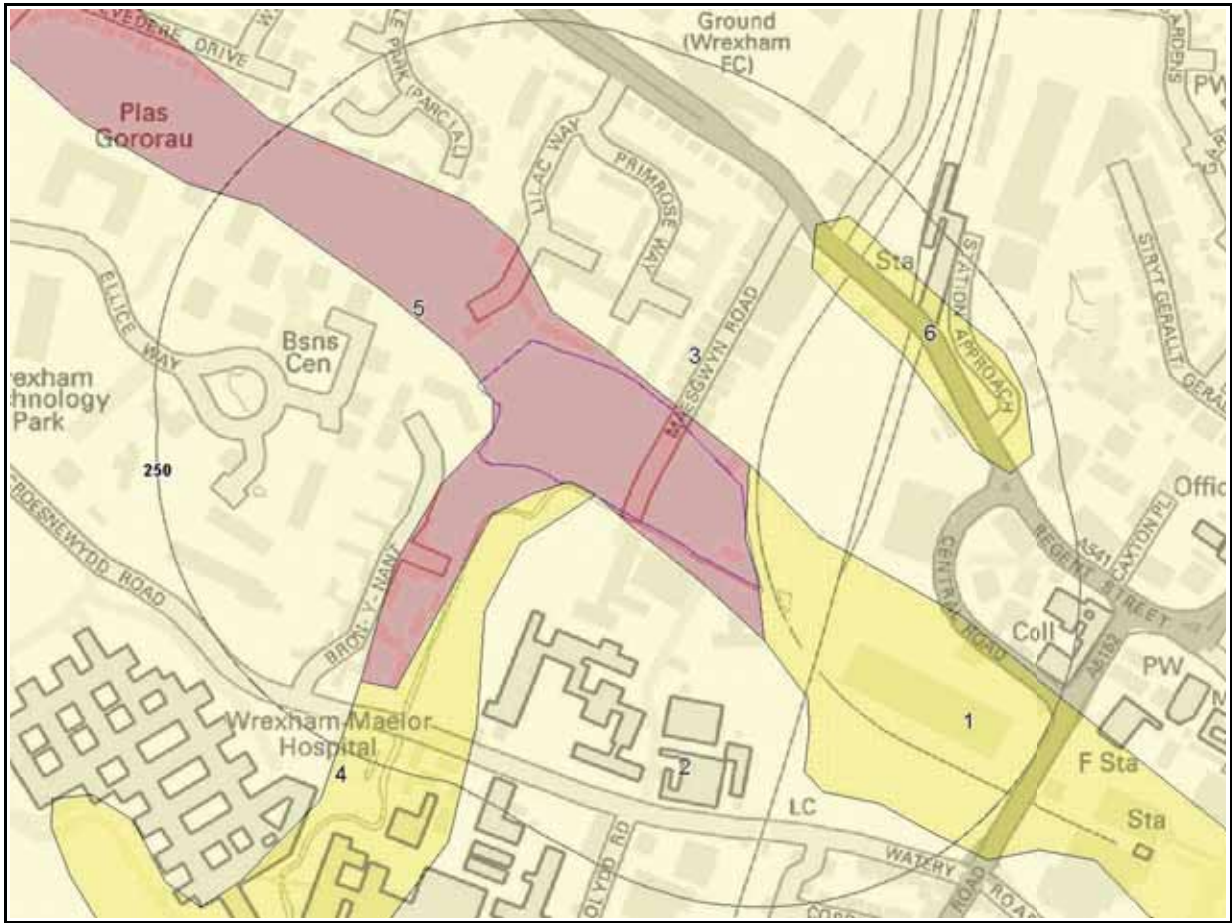
Ground Dissolution Soluble Rocks
Legend

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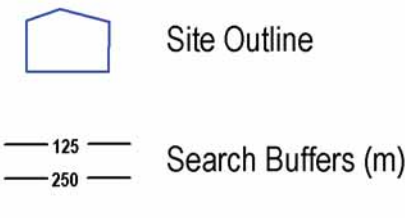
4.4 Compressible Deposits Map



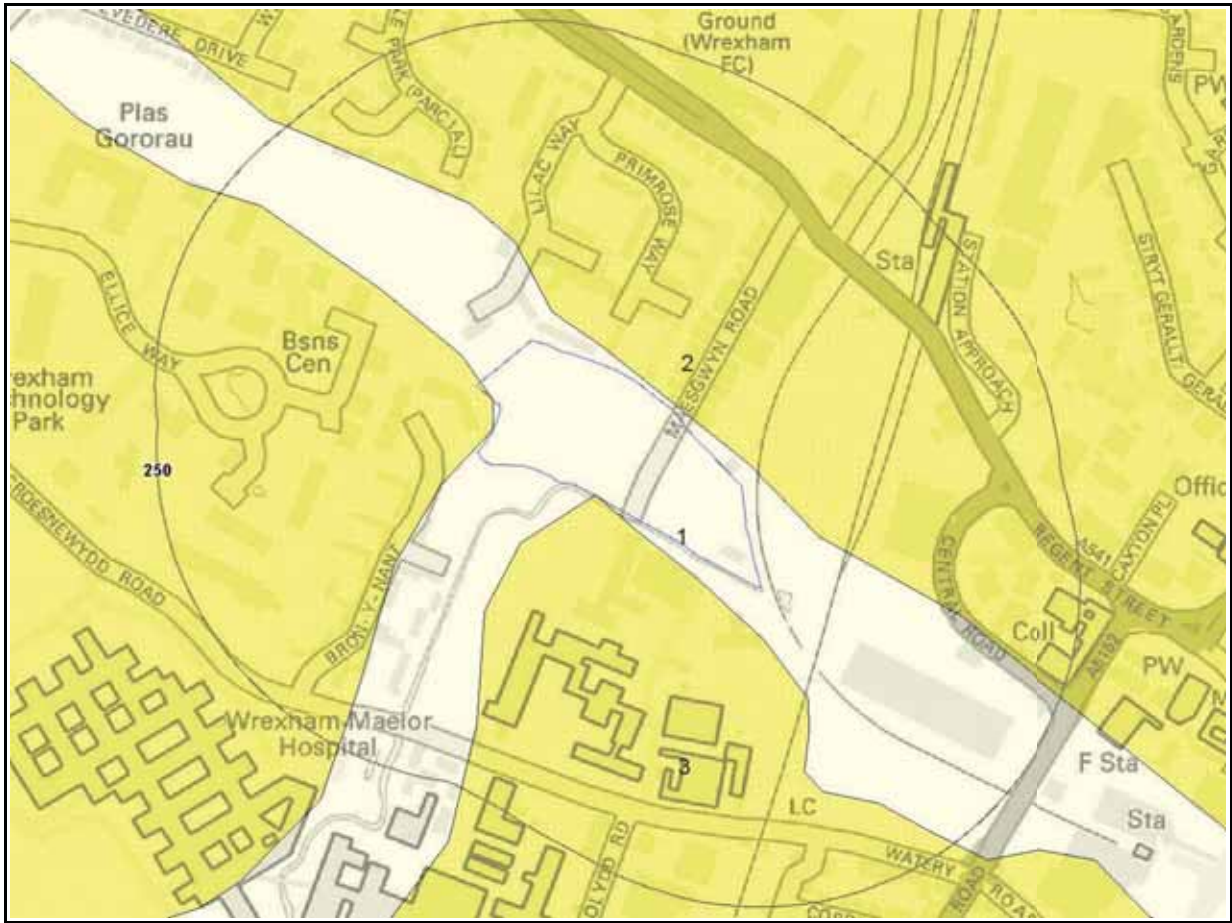
Compressible Deposits Legend



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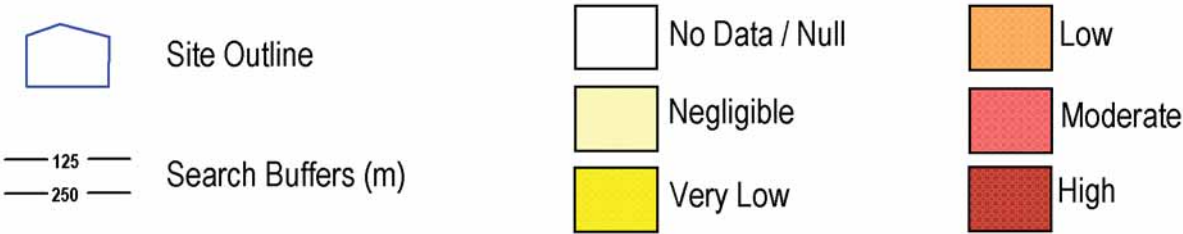
4.5 Collapsible Deposits Map



Collapsible Deposits Legend



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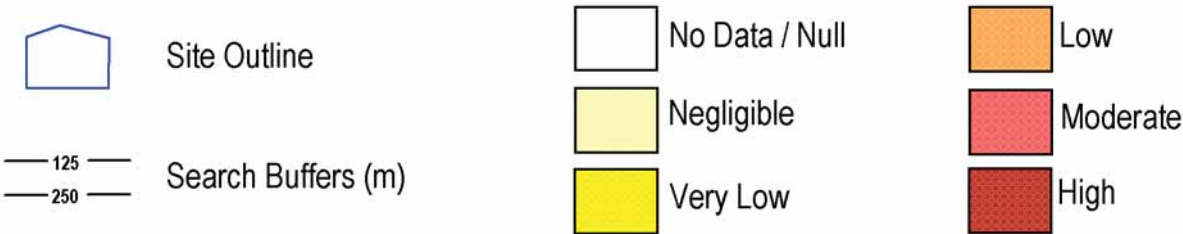
4.6 Running Sand Map



Running Sand Legend



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4. 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? **Moderate**

4.1 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	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.
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	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.
4	4.0	NE	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.

4.2 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.

4.3 Ground Dissolution of Soluble Rocks

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

Distance (m)*	Direction	Hazard Rating	Details
0.0	On site	Null-Negligible	Soluble rocks are not present in the search area. 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 includes an automatically generated 50m buffer zone around the study site boundary.

4.4 Compressible Deposits

The following Compressible Ground 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 compressible deposits to be present. 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.
2	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.
3	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.
4	0.0	On Site	Very Low	Very low potential for compressible deposits to be present. 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.
5	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

4.5 Collapsible Deposits

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

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	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.
3	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.

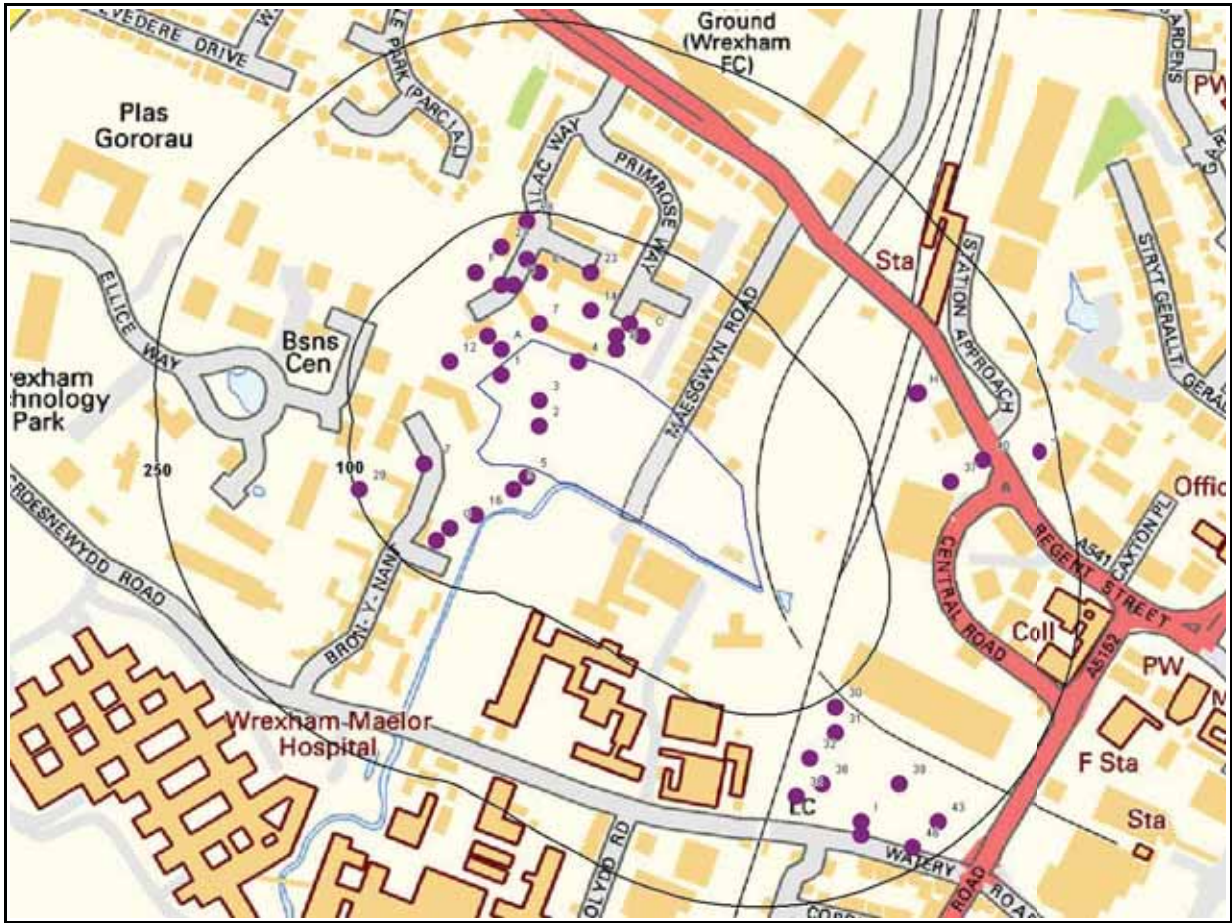
4.6 Running Sands

The following Running Sands information is 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.

2	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.
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5. Borehole Records Map



Borehole Records Legend



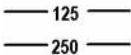
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Site Outline



Borehole Locations



Search Buffers (m)

5. 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:

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ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length (m)	Borehole Name
1	0.0	On Site	332620,350720	SJ35SW1009	13.72	ALLIED BREWERIES NO. 6
2	0.0	On Site	332650,350680	SJ35SW1008	10.67	ALLIED BREWERIES NO. 3
3	0.0	On Site	332650,350700	SJ35SW1017	-1.0	ALLIED BREWERIES
4	0.0	On Site	332680,350730	SJ35SW748	4.26	WREXHAM, MAESGWYN 9
5	8.0	S	332640,350640	SJ35SW1124	-1.0	WREXHAM MAELOR HOSPITAL TP4
6A	9.0	NW	332620,350740	SJ35SW881	-1.0	MAESGWYN PARK 3
7	13.0	N	332650,350760	SJ35SW747	3.66	WREXHAM, MAESGWYN 8
8B	15.0	N	332710,350740	SJ35SW749	4.26	WREXHAM, MAESGWYN 10
9	20.0	S	332630,350630	SJ35SW1120	-1.0	WREXHAM MAELOR HOSPITAL WS2
10A	23.0	NW	332610,350750	SJ35SW880	-1.0	MAESGWYN PARK 2
11B	24.0	N	332710,350750	SJ35SW750	3.66	WREXHAM, MAESGWYN 11
12	28.0	NW	332580,350730	SJ35SW879	-1.0	MAESGWYN PARK 1
13C	32.0	NE	332730,350750	SJ35SW752	3.66	WREXHAM, MAESGWYN 13
14	36.0	N	332690,350770	SJ35SW741	3.66	WREXHAM, MAESGWYN 2
15C	37.0	N	332720,350760	SJ35SW751	3.66	WREXHAM, MAESGWYN 12
16	42.0	S	332600,350610	SJ35SW1123	-1.0	WREXHAM MAELOR HOSPITAL TP3
17	43.0	W	332560,350650	SJ35SW1125	-1.0	WREXHAM MAELOR HOSPITAL TP6
18D	44.0	N	332630,350790	SJ35SW882	-1.0	MAESGWYN PARK 4
19D	48.0	NW	332620,350790	SJ35SW746	3.66	WREXHAM MAESGWYN 7
20E	52.0	N	332650,350800	SJ35SW744	3.66	WREXHAM, MAESGWYN 5
21G	59.0	SW	332580,350600	SJ35SW1119	-1.0	WREXHAM MAELOR HOSPITAL WS1
22E	62.0	N	332640,350810	SJ35SW742	3.66	WREXHAM, MAESGWYN 3
23	65.0	N	332690,350800	SJ35SW743	3.66	WREXHAM, MAESGWYN 4
24F	68.0	NW	332600,350800	SJ35SW15/B	4.6	WREXHAM LAGER 2
25F	68.0	NW	332600,350800	SJ35SW15/A	10.06	WREXHAM LAGER 1
26G	72.0	SW	332570,350590	SJ35SW1122	-1.0	WREXHAM MAELOR HOSPITAL TP2
27	76.0	N	332620,350820	SJ35SW745	3.66	WREXHAM, MAESGWYN 6
28	92.0	N	332640,350840	SJ35SW740	3.66	WREXHAM, MAESGWYN 1
29	97.0	W	332510,350630	SJ35SW1121	-1.0	WREXHAM MAELOR HOSPITAL WS4
30	110.0	SE	332880,350460	SJ35SW1005	13.14	DUSSEK BROS WREXHAM
31	127.0	SE	332880,350440	SJ35SW938	3.5	WATERY ROAD WREXHAM TP 4
32	139.0	S	332860,350420	SJ35SW936	3.0	WATERY ROAD WREXHAM TP 2
33H	153.0	NE	332943,350705	SJ35SW1112	5.0	KIRBY'S OF WREXHAM 2A
34H	155.0	NE	332945,350706	SJ35SW1110	4.5	KIRBY'S OF WREXHAM 1
35H	155.0	NE	332945,350706	SJ35SW1111	1.8	KIRBY'S OF WREXHAM 2
36	161.0	S	332870,350400	SJ35SW937	2.0	WATERY ROAD WREXHAM TP 3
37	162.0	E	332970,350636	SJ35SW1114	4.5	KIRBY'S OF WREXHAM 4
38	166.0	S	332850,350390	SJ35SW935	2.6	WATERY ROAD WREXHAM TP 1
39	188.0	SE	332930,350400	SJ35SW940	1.5	WATERY ROAD WREXHAM TP 6
40	188.0	E	332995,350653	SJ35SW1113	4.5	KIRBY'S OF WREXHAM 3
41I	199.0	SE	332900,350370	SJ35SW939	2.3	WATERY ROAD WREXHAM TP 5
42I	209.0	S	332900,350360	SJ35SW944	2.4	WATERY ROAD WREXHAM TP S2
43	229.0	SE	332960,350370	SJ35SW942	3.5	WATERY ROAD WREXHAM TP 8
44J	234.0	E	333040,350660	SJ35SW974	-1.0	WREXHAM POST OFFICE SORTING OFFICE 2
45J	234.0	E	333040,350660	SJ35SW973	-1.0	WREXHAM POST OFFICE SORTING OFFICE 1
46	235.0	SE	332940,350350	SJ35SW941	3.7	WATERY ROAD WREXHAM TP 7

6. Estimated Background Soil Chemistry

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

6

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

Estimated Geometric Mean Soil Concentrations (mg/kg)							
Distance (m)*	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<150 mg/kg
0.0	On Site	RuSoilExAs	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<150 mg/kg
0.0	On Site	RuSoilExAs	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<150 mg/kg
0.0	On Site	RuSoilExAs	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	150 - 300 mg/kg
4.0	NE	RuSoilExAs	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<150 mg/kg
18.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<150 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.

7. Contacts

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Acknowledgements

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Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

"Beneficiary" means the Client or the customer of the Client for whom the Client has procured the Services.

"Commercial" means any building which is not Residential.

"Commission" means an order for Consultancy Services submitted by a Client.

"Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between GroundSure and the Client for the performance of the Services which arises upon GroundSure's acceptance of an Order or Commission and which shall incorporate these conditions, the relevant GroundSure User Guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with clause 11.

"Client" means the party that submits an Order or Commission.

"Data Provider" means any third party providing Third Party Content to GroundSure.

"Data Report" means reports comprising factual data with no professional interpretation in respect of the level of likely risk and/or liability available from GroundSure.

"GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.

"GroundSure Materials" means all materials prepared by GroundSure as a result of the provision of the Services, including but not limited to Data Reports, Mapping and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, service marks, moral rights, data protection rights, know-how, trade mark or any other intellectual property rights.

"Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure.

"Order" means an order form submitted by the Client requiring Services from GroundSure in respect of a specified Site.

"Order Website" means online platform via which Orders may be placed.

"Report" means a Risk Screening Report or Data Report for commercial or residential property available from GroundSure relating to the Site prepared in accordance with the specifications set out in the relevant User Guide.

"Residential" means any building used as or suitable for use as an individual dwelling.

"Risk Screening Report" means one of GroundSure's risk screening reports, comprising factual data with interpretation in respect of the level of likely risk and/or liability, excluding **"Consultancy Services"**.

"Services" means the provision of any Report, Mapping or Consultancy Services which GroundSure has agreed to carry out for the Client/Beneficiary on these terms and conditions in respect of the Site.

"Site" means the landsite in respect of which GroundSure provides the Services.

"Third Party Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.

"User Guide" means the relevant current version of the user guide, available upon request from GroundSure.

2 Scope of Services

2.1 GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.

2.2 GroundSure shall exercise all the reasonable skill, care and diligence to be expected of experienced environmental consultants in the performance of the Services.

2.3 The Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.

2.4 Terms and conditions appearing on a Client's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives or any terms implied by custom, practice or course of dealing shall be of no effect and these terms and conditions shall prevail over all others.

2.5 If a Client/Beneficiary requests insurance in conjunction with or as a result of the Services, GroundSure shall use reasonable endeavours to procure such insurance, but makes no warranty that such insurance shall be available from insurers or offered on reasonable terms. GroundSure does not endorse or recommend any particular insurance product, policy or insurer. Any insurance purchased shall be subject solely to the terms of the policy issued by insurers and GroundSure will have no liability therefor. The Client/Beneficiary should take independent advice to ensure that the insurance policy requested and/or offered is suitable for its requirements.

2.6 GroundSure's quotations/proposals are valid for a period of 30 days only. GroundSure reserves the right to withdraw any quotation at any time before GroundSure accepts an Order or Commission. GroundSure's acceptance of an Order or Commission shall be effective only where such acceptance is in writing and signed by GroundSure's authorised representative or where accepted via GroundSure's Order Website.

3 The Client's obligations

3.1 The Client shall ensure the Beneficiary complies with and is bound by the terms and conditions set out in the Contract and shall provide that GroundSure may in its own right enforce such terms and conditions against the Beneficiary pursuant to the Contracts (Rights of Third parties) Act 1999. The Client shall be liable for all breaches of the Contract by the Beneficiary as if they were breaches by the Client. The Client shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.

3.2 The Client shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the Site known to the Client/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a Site, facilities and equipment as agreed in the Contract).

3.3 Where Client/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.

3.4 The Client shall not and shall not knowingly permit the Beneficiary to, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping or, in respect of any Services, information given by GroundSure. For the avoidance of doubt, the Client and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party who is considering acquiring the whole or part of the Site, or providing funding in relation to the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.5 The Client is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.

4 Reliance

4.1 Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Client and Beneficiary are granted an irrevocable royalty-free licence to access the information contained in a Report, Mapping or in a report prepared by GroundSure in respect of or arising out of Consultancy Services. The Services may only be used for the benefit of the Client and those persons listed in clauses 4.2 and 4.3.

4.2 In relation to Data Reports, Mapping and Risk Screening Reports, the Client shall be entitled to make Reports available to (i) the Beneficiary, (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate), (iv) the first purchaser or first tenant of the Site (v) the professional advisers and lenders of the first purchaser or tenant of the Site. Accordingly GroundSure shall have the same duties and obligations to those persons in respect of the Services as it has to the Client and those persons shall have the benefit of any of the Client's rights under the Contract as if those persons were parties to the Contract. For the avoidance of doubt, the limitations of GroundSure's liability as set out in clauses 7 and 11.6 shall apply.

4.3 In relation to Consultancy Services, reliance shall be limited to the Client, Beneficiary and named parties on the Report.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise agreed in writing with GroundSure, any other party considering the information supplied by GroundSure as part of the Services, including (but not limited to) insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.

4.5 The Client shall not and shall not knowingly permit any person (including the Beneficiary) who is provided with a copy of any Report, (except as permitted herein or by separate agreement with GroundSure) to: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping.

4.6 Notwithstanding clause 4.5, if the Client acts in a professional capacity, it may make reasonable use of a Report and/or findings made as a result of Consultancy Services to advise Beneficiaries. However, GroundSure shall have no liability in respect of any opinion or report given to such Beneficiaries by the Client or a third party.

5 Fees and Disbursements

5.1 GroundSure shall charge the Client fees at the rate and frequency specified in the Contract together, in the case of Consultancy Services, with all proper disbursements incurred by GroundSure in performing the Services. For the avoidance of doubt, the fees payable for the Services are as set out in GroundSure's written proposal, Order Website or Order acknowledgement form. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services.

5.2 Unless GroundSure requires prepayment, the Client shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such value added tax or other tax as may be required within 30 days from the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client ("**Payment Date**"). GroundSure reserves the right to charge interest which shall accrue on a daily basis from 30 days after the date of Payment Date until the date of payment (whether before or after judgment) at the rate of five per cent per annum above the Bank of England base rate from time to time.

5.3 In the event that the Client disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Client shall be deemed to have agreed the amount thereof. As soon as reasonably practicable following receipt of a notification in respect of any disputed invoice, a member of the management team at GroundSure shall contact the Client and the parties shall use all reasonable endeavours to resolve the dispute.

6 Intellectual Property and Confidentiality

6.1 Subject to the provisions of clause 4.1, the Client and the Beneficiary hereby acknowledge that all Intellectual Property in the Services and Content are and shall remain owned by either GroundSure or the Data Providers and nothing in these terms purports to transfer or assign any rights to the Client or the Beneficiary in respect of the Intellectual Property.

6.2 The Client shall acknowledge the ownership of the **Third Party** Content where such **Third Party** Content is incorporated or used in the Client's own documents, reports, systems or services whether or not these are supplied to a third party.

6.3 Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client acknowledges that the proprietary rights subsisting in copyright, database rights and any other intellectual property rights in respect of any data and information contained in any Report are and shall remain (subject to clause 11.1) the property of GroundSure and/or any third party that has supplied data or information used to create a Report, and that these conditions do not purport to grant, assign or transfer any such rights in respect thereof to a Client and/or a Beneficiary.

6.5 The Client shall (and shall procure that any recipients of the Report as permitted under clause 4.2 shall):

- (i) not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;

- (ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;
 - (iii) not create any product or report which is derived directly or indirectly from the data contained in the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);
 - (iv) not combine the Services with or incorporate such Services into any other information data or service; and
 - (v) not reformat or otherwise change (whether by modification, addition or enhancement), data contained in the Services (save that those acting in a professional capacity to the Beneficiary shall not be in breach of this clause 6.5(v) where such reformatting is in the normal course of providing advice based upon the Services), in each case of parts (iii) to (v) inclusive, whether or not such product or report is produced for commercial profit or not.
- 6.6 The Client and/or Beneficiary shall and shall procure that any party to whom the Services are made available shall notify GroundSure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.
- 6.8 Save as otherwise set out in these terms and conditions, any information provided by one party ("**Disclosing Party**") to the other party ("**Receiving Party**") shall be treated as confidential and only used for the purposes of these terms and conditions, except in so far as the Receiving Party is authorised by the Disclosing Party to provide such information in whole or in part to a third party.

7 Liability

THE CLIENT'S ATTENTION IS DRAWN TO THIS PROVISION

- 7.1 Subject to the provisions of this clause 7, GroundSure shall be liable to the Beneficiary only in relation to any direct losses or damages caused by any negligent act or omission of GroundSure in preparing the GroundSure Materials and provided that the Beneficiary has used all reasonable endeavours to mitigate any such losses.
- 7.2 GroundSure shall not be liable for any other losses or damages incurred by the Beneficiary, including but not limited to:
- (i) loss of profit, revenue, business or goodwill, losses relating to business interruption, loss of anticipated savings, loss of or corruption to data or for any special, indirect or consequential loss or damage which arise out of or in connection with the GroundSure Materials or otherwise in relation to a Contract;
 - (ii) any losses or damages that arise as a result of the use of all or part of the GroundSure Materials in breach of these terms and conditions or contrary to the terms of the relevant User Guide;
 - (iii) any losses or damages that arise as a result of any error, omission or inaccuracy in any part of the GroundSure Materials where such part is based on any Third Party Content or any reasonable interpretation of Third Party Content. The Client accepts, and shall procure that any other Beneficiary shall accept, that it has no claim or recourse to any Data Provider in relation to Third Party Content; and/or
 - (iv) any loss or damage to a Client's computer, software, modem, telephone or other property caused by a delay or loss of use of GroundSure's internet ordering service.
- 7.3 GroundSure's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise, arising in connection with the GroundSure Materials or otherwise in relation to the Contract shall be limited to £10 million in total (i) for any one claim or (ii) for a series of connected claims brought by one or more parties.
- 7.4 For the duration of the liability periods set out in clauses 7.5 and 7.6 below, GroundSure shall maintain professional indemnity insurance in respect of its liability under these terms and conditions provided such insurance is readily available at commercially viable rates. GroundSure shall produce evidence of such insurance if reasonably requested by the Client. A level of cover greater than GroundSure's current level of cover may be available upon request and agreement with the Client.
- 7.5 Any claim under the Contract in relation to Data Reports, Mapping and Risk Screening Reports, must be brought within six years from the date when the Beneficiary became aware that it may have a claim and in no event may a claim be brought twelve years or more after completion of such a Contract. For the avoidance of doubt, any claim in respect of which proceedings are notified to GroundSure in writing prior to the expiry of the time periods referred to in this clause 7.5 shall survive the expiry of those time periods provided the claim is actually commenced within six months of notification.
- 7.6 Any claim under the Contract in relation to Consultancy Services, must be brought within six years from the date the Consultancy Services were completed.
- 7.7 he Client accepts and shall procure that any other Beneficiary shall accept that it has no claim or recourse to any Data Provider or to GroundSure in respect of the acts or omissions of any Data Provider and/or any Third Party Content provided by a Data Provider.
- 7.8 Nothing in these terms and conditions:
- (i) excludes or limits the liability of GroundSure for death or personal injury caused by GroundSure's negligence, or for fraudulent misrepresentation; or
 - (ii) shall affect the statutory rights of a consumer under the applicable legislation.

8 GroundSure right to suspend or terminate

- 8.1 In the event that GroundSure reasonably believes that the Client or Beneficiary as applicable has not provided the information or assistance required to enable the proper performance of the Services, GroundSure shall be entitled on fourteen days written notice to suspend all further performance of the Services until such time as any such deficiency has been made good.
- 8.2 GroundSure may additionally terminate the Contract immediately on written notice in the event that:
- (i) the Client shall fail to pay any sum due to GroundSure within 28 days of the Payment Date; or
 - (ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an Administration Order made against it or if a Receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or
 - (iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or
 - (iv) the Client or the Beneficiary breaches any material term of the Contract (including, but not limited to, the obligations in clause 4) incapable of remedy or if remediable, is not remedied within 14 days of notice of the breach.

9 Client's Right to Terminate and Suspend

- 9.1 Subject to clause 10.2, the Client may at any time after commencement of the Services by notice in writing to GroundSure require GroundSure to terminate or suspend immediately performance of all or any of the Services.
- 9.2 The Client waives all and any right of cancellation it may have under the Consumer Protection (Distance Selling) Regulations 2000 (as amended) in respect of the Order of a Report/Mapping. This does not affect the Beneficiary's statutory rights.

10 Consequences of Withdrawal, Termination or Suspension

- 10.1 Upon termination or any suspension of the Services, GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client/Beneficiary any property of the Client/ Beneficiary in GroundSure's possession or control.
- 10.2 In the event of termination/suspension of the Contract under clauses 8 or 9, the Client shall pay to GroundSure all and any fees payable in respect of the performance of the Services up to the date of termination/suspension. In respect of any Consultancy Services provided, the Client shall also pay GroundSure any additional costs incurred in relation to the termination/suspension of the Contract.

11 General

- 11.1 The mapping contained in the Services is protected by Crown copyright and must not be used for any purpose outside the context of the Services or as specifically provided in these terms.
- 11.2 GroundSure reserves the right to amend these terms and conditions. No variation to these terms shall be valid unless signed by an authorised representative of GroundSure.
- 11.3 No failure on the part of GroundSure to exercise and no delay in exercising, any right, power or provision under these terms and conditions shall operate as a waiver thereof.
- 11.4 Save as expressly provided in clauses 4.2, 4.3, 6.3 and 11.5, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
- 11.5 The Secretary of State for Communities and Local Government acting through Ordnance Survey may enforce breach of clause 6.1 of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
- 11.6 GroundSure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:
- (i) the Client or Beneficiary's failure to provide facilities, access or information;
 - (ii) fire, storm, flood, tempest or epidemic;
 - (iii) Acts of God or the public enemy;
 - (iv) riot, civil commotion or war;
 - (v) strikes, labour disputes or industrial action;
 - (vi) acts or regulations of any governmental or other agency;
 - (vii) suspension or delay of services at public registries by Data Providers; or
 - (viii) changes in law.
- 11.7 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.
- 11.8 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email and on the second working day after the day of posting if sent by first class post.
- 11.9 The Contract constitutes the entire contract between the parties and shall supersede all previous arrangements between the parties.
- 11.10 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.
- 11.11 These terms and conditions shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with these terms and conditions shall be subject to the exclusive jurisdiction of the English courts.
- 11.12 If the Client or Beneficiary has a complaint about the Services, notice can be given in any format eg writing, phone, email to the Compliance Officer at GroundSure who will respond in a timely manner.

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EmapSite
Masdar House, ,
Eversley, RG27 0RP

GroundSure Reference:	EMS-158387_232285
Your Reference:	EMS_158387_232285
Report Date:	Mar 14, 2012
Report Delivery Method:	Email - pdf
Client Email:	sales@emapsite.com

GroundSure EnviroInsight

Address: LL11 2AQ

Dear Sir/Madam,

Thank you for placing your order with emapsite. Please find enclosed the GroundSure EnviroInsight as requested

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

Yours faithfully,

emapsite customer services team

Enc.
GroundSure EnviroInsight

GroundSure EnviroInsight

Address: LL11 2AQ

Date: Mar 14, 2012

GroundSure Reference: EMS-158387_232285

Your Reference: EMS_158387_232285

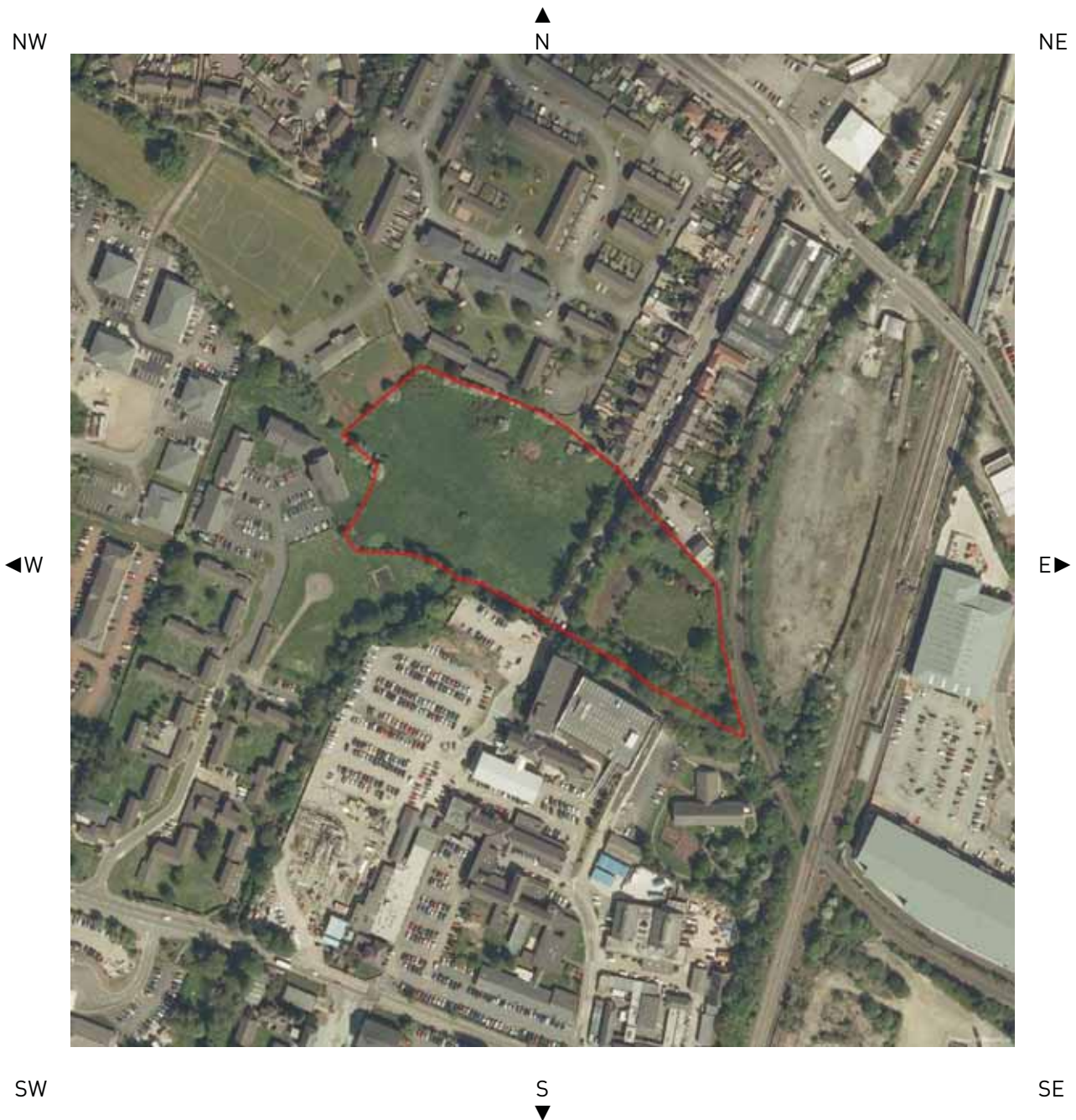
Client: EmapSite



Brought to you by emapsite

emapsite™

Aerial Photograph of Study Site



Site Name: LL11 2AQ
Grid Reference: 332711,350661
Size of Site: 1.92 ha

Aerial photography supplied by Getmapping PLC.
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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.

Report Section	Number of records found within (X) m of the study site boundary					
1. Environmental Permits, Incidents and Registers	on-site	0-50	51-250	251-500	501-1000	1000-1500
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	1	0	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	2	29	-	-
Records of Licensed Discharge Consents	2	1	7	1	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0		
1.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
1.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	0	0	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-
2. Landfill and Other Waste Sites	on-site	0-50	51-250	251-500	501-1000	1000-1500
2.1 Landfill Sites						
Environment Agency Registered Landfill Sites	0	0	0	0	0	-
Landfill Data – Operational Landfill Sites	0	0	0	0	0	-
Environment Agency Historic Landfill Sites	0	0	0	1	0	1
Landfill Data – Non-Operational Landfill Sites	0	0	0	0	0	-
BGS/DoE Landfill Site Survey	0	0	0	0	0	0
GroundSure Local Authority Landfill Sites Data	0	0	0	1	1	0
2.2 Landfill and Other Waste Sites Findings						
Operational Waste Treatment, Transfer and Disposal Sites	0	0	1	0	-	-
Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	1	0	-	-
Environment Agency Licensed Waste Sites	0	0	1	0	0	1

3. Current Land Uses	on-site	0-50	51-250	251-500	501-1000	1000-1500
3.1 Current Industrial Sites Data	2	0	27	-	-	-
3.2 Records of Petrol and Fuel Sites	0	0	2	0	-	-
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0	-	-

4. Geology	Description
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site? *	Yes
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site? *	Yes
4.3 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
Source: Scale: 1:50,000 BGS Sheet 121	

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

5. Hydrogeology and Hydrology	on-site	0-50	51-250	251-500	501-1000	1001-2000
5.1 Are there any records of Productive Strata in the Superficial Geology within 500m of the study site?				Yes		
5.2 Are there any records of Productive Strata in the Bedrock Geology within 500m of the study site?				Yes		
5.3 Groundwater Abstraction Licences (within 1000m of the study site).	1	1	1	0	0	-
5.4 Surface Water Abstraction Licences (within 1000m of the study site).	0	0	0	1	2	-
5.5 Potable Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.6 Are there any Source Protection Zones within 500m of the study site?				No		
5.7 River Quality	on-site	0-50	51-250	251-500	501-1000	1001-1500
Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	Yes	No	Yes	Yes
5.8 Detailed River Network entries within 500m of the site	1	3	2	1	-	-
5.9 Surface water features within 250m of the study site	Yes	Yes	Yes	-	-	-

6. Flooding	
6.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	Yes
6.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	Yes
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Very High
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate

7. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-1500
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	-	-

7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.3 Records of Local Nature Reserves (LNR)	0	0	0	0	-	-
7.4 Records of Special Areas of Conservation (SAC)	0	0	0	0	-	-
7.5 Records of Special Protection Areas (SPA)	0	0	0	0	-	-
7.6 Records of Ramsar sites	0	0	0	0	-	-
7.7 Records of World Heritage Sites	0	0	0	0	-	-
7.8 Records of Environmentally Sensitive Areas	0	0	0	0	-	-
7.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	-	-
7.10 Records of National Parks	0	0	0	0	-	-
7.11 Records of Nitrate Sensitive Areas	0	0	0	0	-	-
7.12 Records of Nitrate Vulnerable Zones	0	0	0	0	-	-

8. Natural Hazards

8.1 What is the maximum risk of natural ground subsidence?	Moderate
--	----------

9. Mining

9.1 Are there any coal mining areas within 75m of the study site?	Yes
9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site?	Negligible
9.3 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. 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.

2. 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.

3. 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 underground oil and gas pipelines.

4. Geology

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

5. 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.

6. Flooding

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

7. 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. These searches are conducted using radii of up to 500m.

8. 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.

9. Mining

Provides information on areas of coal and shallow mining.

10. 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.

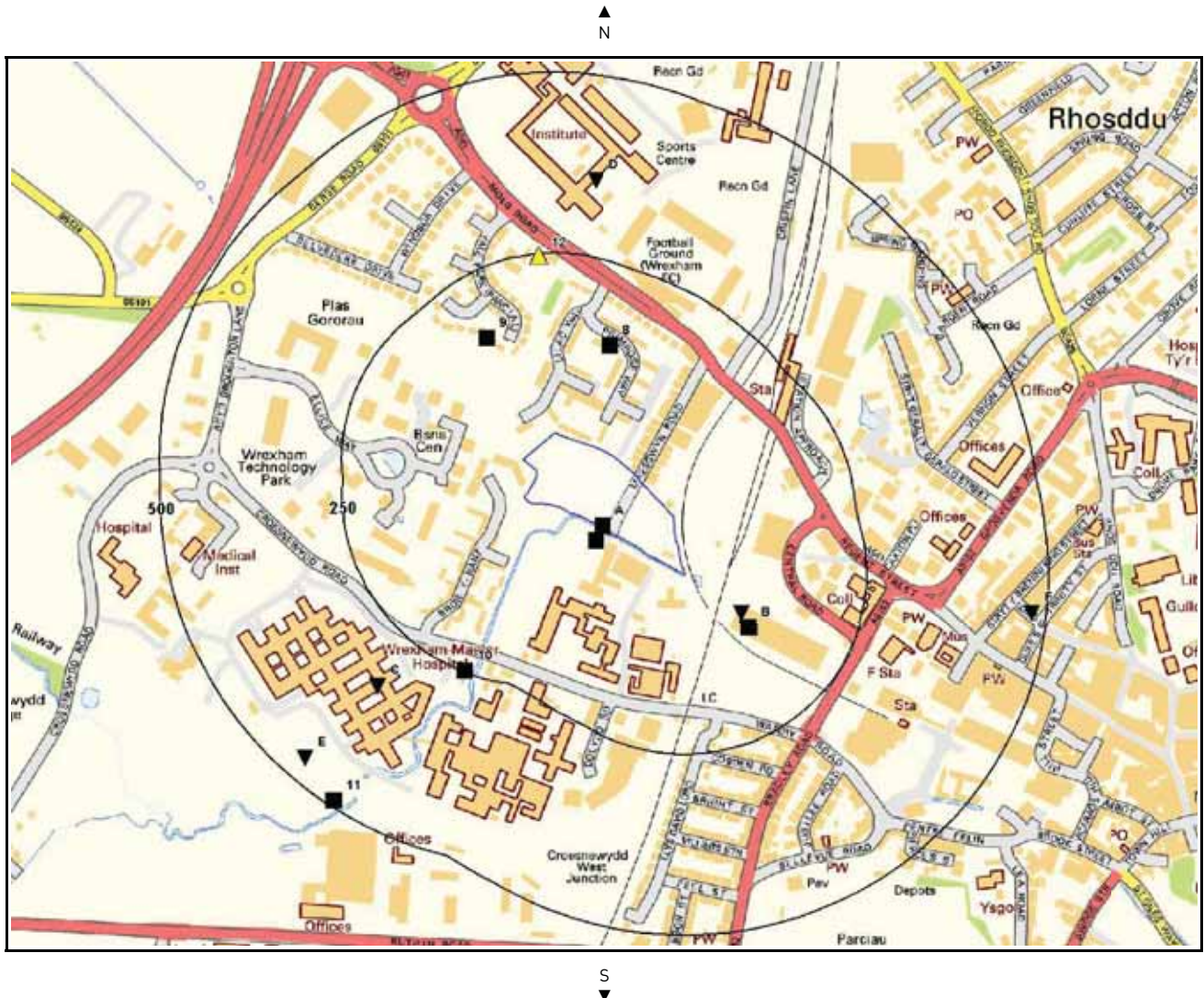
Note: Maps

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. Environmental Permits, Incidents and Registers Map



Authorisations, Incidents and Registers Legend

Enabled by
Ordnance Survey

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Licence Number: 100035207

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

1.Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

Records of historic IPC Authorisations within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(1) and IPPC Authorised Activities within 500m of the study site: **0**

Database searched and no data found.

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.

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.

Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: **1**

The following Part A(2) and Part B Activities are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details
12	245.0	N	332622, 350992	Address: Shell UK Wrexham, Mold Road, Wrexham, LL11 2AF Process: Petrol Filling Station Status: Current Permit Permit Type: Part B Enforcement: No Enforcement Notified. Date of Enforcement: No Enforcement Notified. Comment: No Enforcement Notified.

Records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site: **31**

Report Reference: EMS-158387_232285

The following RAS Licence (3 or 4) records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance [m]	Direction	Address	Operator	Type	Permission Number	Dates	Status
44B	94.0	SE	Carlsberg Tetley Brewing Ltd, Central Road, Wrexham, Clwyd, LL13 7SS	Carlsberg Tetley Brewing Ltd	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AQ8336	Date of Approval: 31-3-1991 Effective from: 31-3-1991 Last date of update: 2003-12-01	Superseded By Variation
45B	94.0	SE	Carlsberg Tetley Brewing Ltd, Central Road, Wrexham, Clwyd, LL13 7SS	Carlsberg Tetley Brewing Ltd	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AQ8336	Date of Approval: 21-4-1995 Effective from: 21-4-1995 Last date of update: 2003-12-01	Revoked/ cancelled
46C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4115	Date of Approval: 15-7-1993 Effective from: 15-7-1993 Last date of update: 2005-01-06	Superseded By Variation
47C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	North Wales Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	BF4857	Date of Approval: 6/8/2008 Effective from: 6/8/2008 Last date of update: 2012-01-01	Revoked/ cancelled
48C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	North Wales Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	BF4768	Date of Approval: 6/8/2008 Effective from: 6/8/2008 Last date of update: 2012-01-01	Revoked/ cancelled
49C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Ysbyty Maelor, Wrexham, Clwyd,	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG9612	Date of Approval: 31/3/1991 Effective from: 31/3/1991 Last date of update: 2012-01-01	Revoked/ cancelled
50C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AI4131	Date of Approval: 5/12/1995 Effective from: 5/1/1996 Last date of update: 2012-01-01	Superseded By Variation

51C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AI4131	Date of Approval: 6/10/1997 Effective from: 6/11/1997 Last date of update: 2012-01-01	Revoked/cancelled
52C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	North Wales Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	BF4768	Date of Approval: 31/3/1999 Effective from: 1/4/1999 Last date of update: 2012-01-01	Superseded By Variation
53C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	North Wales Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	BF4768	Date of Approval: 1/12/2003 Effective from: 1/1/2004 Last date of update: 2012-01-01	Superseded By Variation
54C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	North Wales Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	BF4768	Date of Approval: 6/11/2007 Effective from: 4/12/2007 Last date of update: 2012-01-01	Superseded By Variation
55C	327.0	SW	North Wales Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	North Wales Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	BF4857	Date of Approval: 17/12/2001 Effective from: 17/12/2001 Last date of update: 2012-01-01	Superseded By Variation
56C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Maelor Wrexham Hospital, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG2057	Date of Approval: 31/3/1991 Effective from: 31/3/1991 Last date of update: 2012-01-01	Revoked/cancelled
57C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AI4131	Date of Approval: 4/11/1994 Effective from: 2/12/1994 Last date of update: 2012-01-01	Superseded By Variation
58C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL13 7NT	Wrexham Maelor Hospital Nhs Trust	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AI4131	Date of Approval: 24/7/1995 Effective from: 24/8/1995 Last date of update: 2012-01-01	Superseded By Variation

59C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL17 3TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4107	Date of Approval: 31-10-1994 Effective from: 31-10-1994 Last date of update: 2003-12-01	Superseded By Variation
60C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Maelor Wrexham Hospital, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Mobile Radioactive Sources (was Rsa60 Section 3)	AG2065	Date of Approval: 6-6-1991 Effective from: 6-6-1991 Last date of update: 2003-12-01	Revoked/ cancelled
61C	327.0	SW	North East Wales Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	North East Wales Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	BF4857	Date of Approval: - Effective from: - Last date of update: 2001-06-01	-
62C	327.0	SW	North East Wales Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL17 3TD	North East Wales Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	BF4865	Date of Approval: - Effective from: - Last date of update: 2001-06-01	-
63C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL17 3TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4107	Date of Approval: 2-2-1996 Effective from: 2-2-1996 Last date of update: 2003-12-01	Revoked/ cancelled
64C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4115	Date of Approval: 7-3-1995 Effective from: 7-3-1995 Last date of update: 2003-12-01	Superseded By Variation
65C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4115	Date of Approval: 26-1-1996 Effective from: 26-1-1996 Last date of update: 2003-12-01	Superseded By Variation
66C	327.0	SW	Wrexham Maelor Hospital Nhs Trust, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Wrexham Maelor Hospital Nhs Trust	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AI4115	Date of Approval: 30-7-1997 Effective from: 30-7-1997 Last date of update: 2003-12-01	Revoked/ cancelled

67C	327.0	SW	Conwy And Denbighshire Nhs Trust, Wrexham Maelor Hospital, Wrexham, Clwyd, LL17 3TD	Conwy And Denbighshire Nhs Trust	Keeping And Use Of Mobile Radioactive Sources (was Rsa60 Section 3)	AI4123	Date of Approval: 1-2-1996 Effective from: 1-2-1996 Last date of update: 2003-12-01	Revoked/cancelled
68D	356.0	N	Glyndwr University, Multidisciplinary Research And Innovation Centre, north East Wales Institute, plas Coch, Wrexham, Clwyd, LL11 2AW	Glyndwr University	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AW1209	Date of Approval: 21/1/1997 Effective from: 21/1/1997 Last date of update: 2012-01-01	Revoked/cancelled
69D	356.0	N	Glyndwr University, Multidisciplinary Research And Innovation Centre, North East Wales Institute, Plas Coch, Wrexham, Clwyd, LL11 2AW	Glyndwr University	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AW1233	Date of Approval: 15/1/1997 Effective from: 21/1/1997 Last date of update: 2012-01-01	Superseded By Variation
70D	356.0	N	Glyndwr University, Multidisciplinary Research And Innovation Centre, North East Wales Institute, Plas Coch, Wrexham, Clwyd, LL11 2AW	Glyndwr University	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AW1233	Date of Approval: 1/12/2003 Effective from: 1/1/2004 Last date of update: 2012-01-01	Revoked/cancelled
71D	356.0	N	North East Wales Institute, Faculty Of Science And Technology, mold Road, Wrexham, LL11 2AW	North East Wales Institute	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AU3464	Date of Approval: - Effective from: - Last date of update: 2001-06-01	-
72E	468.0	SW	Betsi Cadwaladr University Local Health Board, Wrexham Maelor Hospital, Croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Betsi Cadwaladr University Local Health Board	Disposal Of Radioactive Waste (was Rsa60 Section 6).	CE0265	Date of Approval: 15/3/2010 Effective from: 15/3/2010 Last date of update: 2012-01-01	Effective
73E	468.0	SW	Betsi Cadwaladr University Local Health Board, Wrexham Maelor Hospital, croesnewydd Road, Wrexham, Clwyd, LL13 7TD	Betsi Cadwaladr University Local Health Board	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	CE0281	Date of Approval: 15/3/2010 Effective from: 15/3/2010 Last date of update: 2012-01-01	Effective
74F	480.0	E	Zzzz Employment Service, New Job Centre, Wrexham, Clwyd,	Zzzz Employment Service	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AG5447	Date of Approval: 4-11-1993 Effective from: 4-11-1993 Last date of update: 2003-12-01	Revoked/cancelled

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

11

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
1A	0.0	On Site	332710, 350620	Address: Measgwyn Sewage Pumping Station, Measgwyn Pumping Station, Measgwyn Road, Wrexham Effluent Type: Miscellaneous Discharges - Emergency Discharges Permit Number: CM0194101 Permit Version: 2	Receiving Water: Afon Gwenfro Status: Varied By Application - (wra 91 Sched 10 - As Amended By Env Act 1995) Issue date: 28/3/2002 Effective Date: 29/3/2002 Revocation Date: -
2A	0.0	On Site	332710, 350620	Address: Measgwyn Sewage Pumping Station, Measgwyn Pumping Station, Measgwyn Road, Wrexham Effluent Type: Sewage Discharges - Pumping Station - Water Company Permit Number: CM0194101 Permit Version: 2	Receiving Water: Afon Gwenfro Status: Varied By Application - (wra 91 Sched 10 - As Amended By Env Act 1995) Issue date: 28/3/2002 Effective Date: 29/3/2002 Revocation Date: -
3A	19.0	SW	332700, 350600	Address: Maesgwyn Ps, Maesgwyn Ps Effluent Type: Unspecified Permit Number: CM0194101 Permit Version: 1	Receiving Water: Gwenfro Status: New Consent, By Application (wra 91, Section 88) Issue date: - Effective Date: - Revocation Date: 28/3/2002
4B	114.0	SE	332910, 350480	Address: Wrexham Lager Brewery Central Road, Wrexham Lager Brewery Central Ro, Central Road Wrexham, Wrexham, Wrexham, WREXHAM Effluent Type: Trade Discharges - Unspecified Permit Number: CM0088101 Permit Version: 1	Receiving Water: River Gwenfro Status: Revoked - Unspecified Issue date: 6/2/1980 Effective Date: 6/2/1980 Revocation Date: -
5B	114.0	SE	332910, 350480	Address: Wrexham Lager Brewery Central Road, Wrexham Lager Brewery Central Ro, Central Road Wrexham, Wrexham, Wrexham, WREXHAM Effluent Type: Trade Discharges - Unspecified Permit Number: CM0088101 Permit Version: 2	Receiving Water: River Gwenfro Status: Revoked (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: - Effective Date: - Revocation Date: 6/3/2001
6B	114.0	SE	332910, 350480	Address: Wrexham Lager Brewery Central Road, Wrexham Lager Brewery Central Ro, Central Road Wrexham, Wrexham, Wrexham, WREXHAM Effluent Type: Unspecified Permit Number: CM0024701 Permit Version: 1	Receiving Water: Gwenfro Status: Consent Expired - Time Limit Issue date: 22/9/1964 Effective Date: 22/9/1964 Revocation Date: 17/2/1986
7B	114.0	SE	332910, 350480	Address: Wrexham Lager Brewery Central Road, Wrexham Lager Brewery Central Ro, Central Road Wrexham, Wrexham, Wrexham, WREXHAM Effluent Type: Unspecified Permit Number: CM0024702 Permit Version: 1	Receiving Water: Gwenfro Status: New Consent (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: 22/9/1964 Effective Date: 22/9/1964 Revocation Date: 17/2/1986
8	140.0	N	332720, 350870	Address: Wrexham Mold Road Depot, Wrexham Mold Road Depot, Mold Road Depot Effluent Type: Unspecified Permit Number: CM0062401 Permit Version: 1	Receiving Water: Un-named Trib. Of Gwenfro Status: Consent Expired - Time Limit Issue date: 16/6/1970 Effective Date: 16/6/1970 Revocation Date: 6/1/1993
9	162.0	NW	332550, 350880	Address: Wrexham Mold Road Depot, Wrexham Mold Road Depot, Mold Road Depot Effluent Type: Unspecified Permit Number: CM0026101 Permit Version: 1	Receiving Water: Un-named Trib. Of Gwenfro Status: Consent Expired - Time Limit Issue date: - Effective Date: - Revocation Date: 6/1/1993
10	248.0	S	332520, 350420	Address: Wrexham District General Hospital W, Wrexham District General Hospital, District General Hospital Watery, Watery Road Effluent Type: Unspecified Permit Number: CM0146501 Permit Version: 1	Receiving Water: Gwenfro Status: Consent Expired - Time Limit Issue date: - Effective Date: - Revocation Date: 18/2/1993
11	491.0	SW	332340, 350240	Address: Wrexham Ruthin Road. Ambul.h.q.& Co, Wrexham Ruthin Road. Ambul.h.q.&, Ruthin Road. Ambul.h.q.& Council, Ambul.h.q.& Council Offices Effluent Type: Unspecified Permit Number: CM0034201 Permit Version: 1	Receiving Water: Gwenfro Status: Consent Expired - Time Limit Issue date: 22/6/1966 Effective Date: 22/6/1966 Revocation Date: -

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

1.3 Environment Agency Recorded Pollution Incidents

Records of National Incidents Recording System, List 2 within 250m of the study site: 0

Database searched and no data found.

Records of National Incidents Recording System, List 1 within 250m of the study site: 0

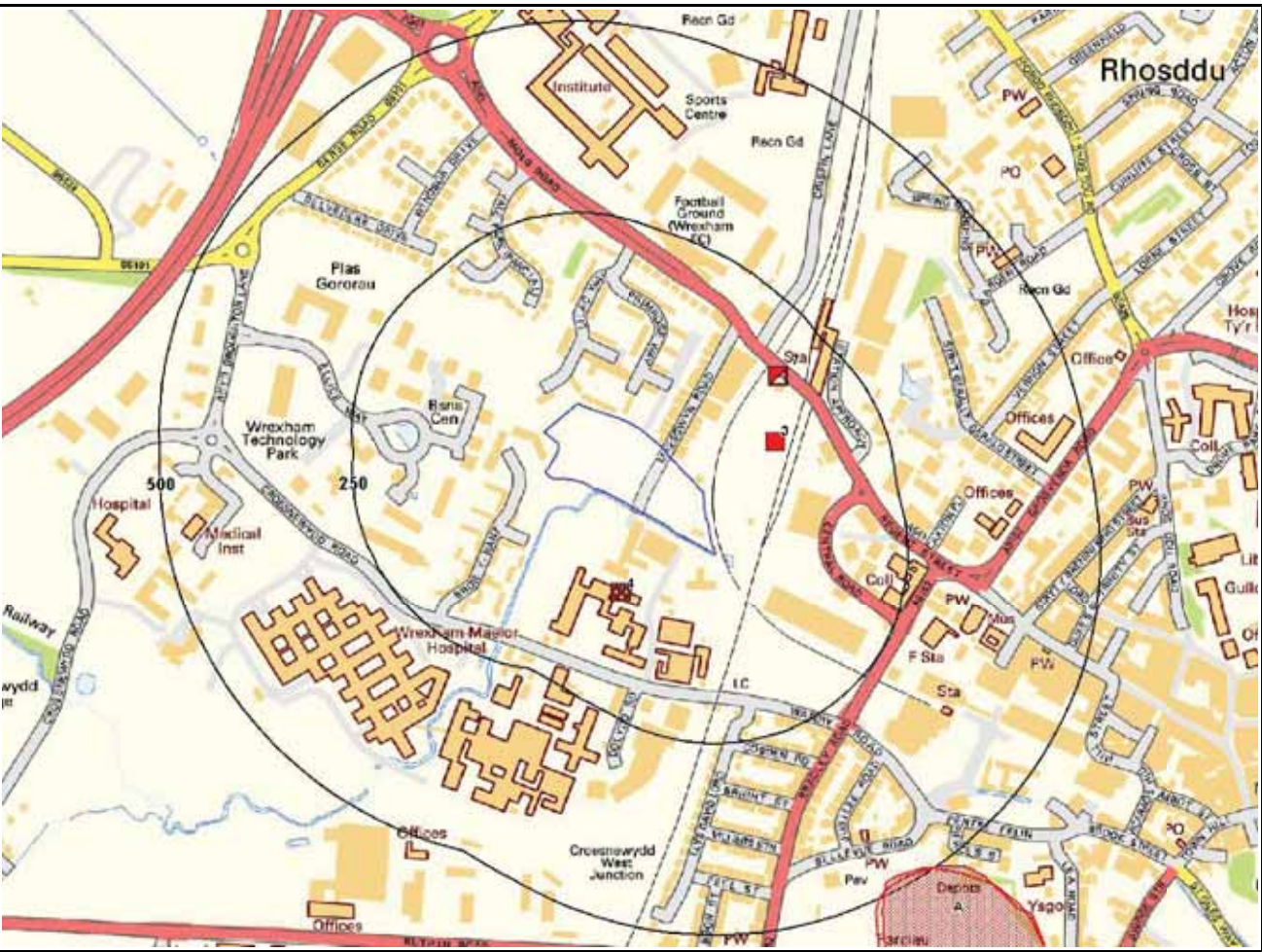
Database searched and no data found.

1.4 Sites Determined as Contaminated Land under Part IIA 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.

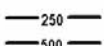
2. Landfill and Other Waste Sites Map



Landfill & Other Waste Sites Legend



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- | | | |
|--|---|--|
|  Site Outline |  E.A. Active Landfill |  Operational Waste Treatment Licence |
|  Search Buffers (m) |  E.A. Historic Landfill (Area Data) |  Closed Waste Treatment Licence |
| |  E.A. Historic Landfill (Point Data) |  REGIS Waste Licence |
| |  BGS / DoE Survey Landfill |  Operational Landfill |
| |  Local Authority Landfill (Area Data) |  Closed Landfill |
| |  Local Authority Landfill (Point Data) | |

2. Landfill and Other Waste Sites

2.1 Landfill Sites

Records from Environment Agency landfill data within 1000m of the study site: **0**

Database searched and no data found.

Records of operational landfill sites sourced from Landmark within 1000m of the study site: **0**

Database searched and no data found.

Records of Environment Agency historic landfill sites within 1500m of the study site: **2**

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

ID	Distance	Direction	NGR	Details
5A	491.0	SE	333100, 350000	Site Address: Parciau, Wrexham, Clwyd Waste Licence: - Site Reference: - Waste Type: Inert, Industrial, Commercial, Household Regis Reference: - Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: Wrexham Borough Council
Not shown	1002.0	W	331500, 350700	Site Address: Berse Drelincourt, Berse Road, Wrexham, Lower Berse Waste Licence: Yes Site Reference: WMBC L/34 Waste Type: Inert Regis Reference: - Licence Issue: 29-May-1981 Licence Surrendered: Licence Hold Address: - Operator: -

Records of non-operational landfill sites sourced from Landmark within 1000m of the study site: **0**

Database searched and no data found.

Records of BGS/DoE non-operational landfill sites within 1500m of the study site: **0**

Database searched and no data found.

Records of Local Authority landfill sites within 1500m of the study site: **2**

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

ID	Distance	Direction	Site Address	Source	Data Type
9A	484.0	SE	Parciau	Wrexham Council	Polygon
Not shown	677.0	SE	Refuse Tip	1971 mapping	Polygon

2.2 Other Waste Sites

Records of operational waste treatment, transfer or disposal sites within 500m of the study site: **1**

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details
3	114.0	NE	332900, 350700	Site Address: Jacques Garage (Vehicle Dismantlers), Mold Road, WREXHAM, Clwyd, LL11 2AD Landfill Licence: W1FAMEAL EA Reference: EAWML37037 Waste Type: Non-Hazardous Rating: Non-Hazardous Scrapyard Known Restrictions: No known restriction on source of waste Record Date: 01-Sep-1992 Transfer Date: Modification Date: 01-Mar-1999 Status: Operational as far as is known Category: SCRAPYARD Regulator: EA - Welsh Region - Northern Area (Buckley) Size: Very Small (<10,000 tonnes/year)

Records of non-operational waste treatment, transfer or disposal sites within 500m of the study site: 1

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

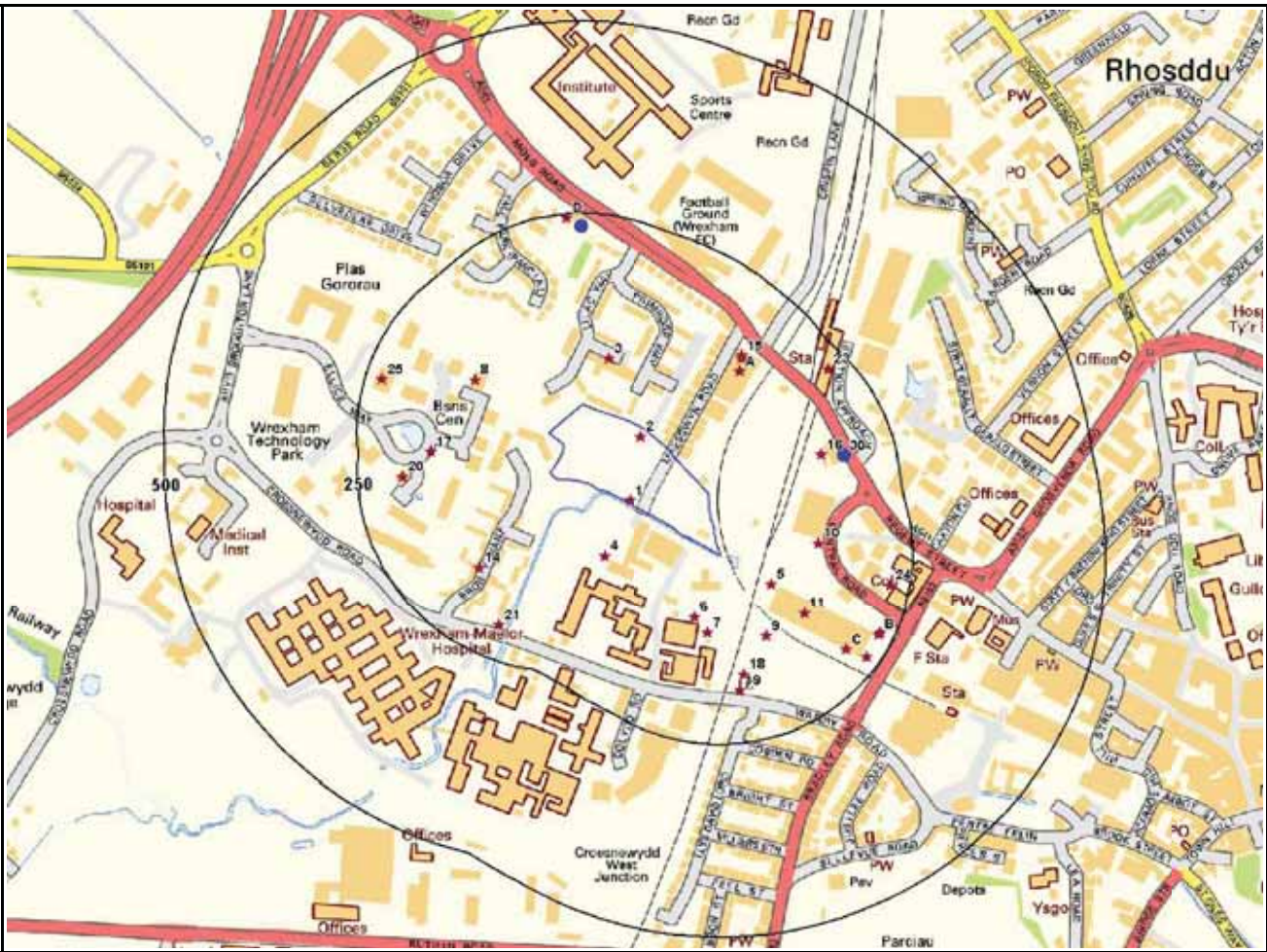
ID	Distance	Direction	NGR	Details
4	107.0	SW	332700, 350500	Site Address: Ysbyty Maelor Wrexham Hospital, Watery Road, WREXHAM, Clwyd, LL13 TTD Landfill Licence: W1FAMNAL EA Reference: - Waste Type: Difficult Waste Description: Difficult Known Restrictions: Waste produced/controlled by licence holder Record Date: 01-Oct-1992 Transfer Date: Modification Date: Status: Site now exempt from licensing Category: STORAGE - with transfer Regulator: EA - Welsh Region - Northern Area (Buckley) Size: Undefined

Records of Environment Agency licensed waste sites within 1500m of the study site: 2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details
7	175.0	NE	332905, 350785	Site Address: Mold Road, Wrexham, Clwyd, LL11 2AD Type: Metal Recycling Site (Vehicle Dismantler) Size: < 25000 tonnes Regis Licence Number: JAC001 EPR reference: EA/EPR/LP3194FV/V002 Operator: Jacques Garage Waste Management licence No: 37037 Annual Tonnage: 4999.99 Issue Date: 29/09/1992 Effective Date: - Modified: 30/11/2001 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Jacques Garage Correspondence Address: -, -
Not shown	1459.0	SE	334099, 349846	Site Address: 49, Rivulet Road, Wrexham, Clwyd, LL13 8DU Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Regis Licence Number: MCD001 EPR reference: EA/EPR/EP3294FF/S002 Operator: H McDermott & Son Waste Management licence No: 37159 Annual Tonnage: 30000.0 Issue Date: 22/03/1999 Effective Date: - Modified: - Surrendered Date: 26/10/2006 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: H McDermott & Son Correspondence Address: -, -

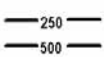
3. Current Land Use Map



Current Land Use Legend



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-  Site Outline
-  Current Industrial Sites
-  Petrol & Fuel Sites
-  Underground High Pressure Oil & Fuel Pipelines
-  Search Buffers (m)
 - 250
 - 500

3. Current Land Uses

3.1 Current Industrial Data

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

29

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

ID	Distance	Direction	Company	Address	Activity	Category
1	0.0	On Site	Pumping Station	LL11	Water Pumping Stations	Industrial Features
2	0.0	On Site	Electricity Sub Station	LL11	Electrical Features	Infrastructure and Facilities
3	67.0	N	Electricity Sub Station	LL11	Electrical Features	Infrastructure and Facilities
4	76.0	SW	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
5	77.0	SE	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
6	89.0	S	Tanks	LL13	Tanks (Generic)	Industrial Features
7	105.0	S	Water Tower	LL13	Water Pumping Stations	Industrial Features
8	119.0	NW	Micro Materials Ltd	Unit D Yale Business Village, Ellice Way, Wrexham, LL13 7YL	Measurement and Inspection Equipment	Industrial Products
9	123.0	SE	Tanks	LL13	Tanks (Generic)	Industrial Features
10	128.0	E	Tanks	LL13	Tanks (Generic)	Industrial Features
11	134.0	SE	Dreams Bed Superstores	Unit 3 Central Retail Park, Bradley Road, Wrexham, LL13 7SU	Beds and Bedding	Consumer Products
12 A	136.0	NE	Dave Bennett Accident Repair Specialists	Mold Road, Wrexham, LL11 2AD	Vehicle Repair, Testing and Servicing	Repair and Servicing
13 A	151.0	NE	Kwik-Fit GB Ltd	Mold Road, Wrexham, LL11 2AD	Vehicle Repair, Testing and Servicing	Repair and Servicing
14	152.0	SW	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
15	154.0	NE	Depot	LL11	Container and Storage	Transport, Storage and Delivery
16	154.0	E	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
17	156.0	W	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
18	161.0	S	Tanks	LL13	Tanks (Generic)	Industrial Features
19	181.0	S	Croesnewydd North Junction	LL13	Railway Stations, Junctions and Halts	Public Transport, Stations and Infrastructure
20	193.0	W	Ove Arup & Partners	Nyquist House, Ellice Way, Wrexham Technology Park, Wrexham, LL13 7YT	Civil Engineers	Engineering Services
21	205.0	S	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities
22 C	205.0	SE	Tank	LL13	Tanks (Generic)	Industrial Features
23	224.0	NE	Wrexham General Station	LL11	Railway Stations, Junctions and Halts	Public Transport, Stations and Infrastructure
24	225.0	E	Tank	LL11	Tanks (Generic)	Industrial Features
25	228.0	W	Industrial Electronic Control by Design	Ellice Way, Wrexham Technology Park, Wrexham, LL13 7YT	Electrical and Electronic Engineers	Engineering Services
26 B	230.0	SE	Tanks	LL13	Tanks (Generic)	Industrial Features
27 B	231.0	SE	Electricity Sub Station	LL13	Electrical Features	Infrastructure and Facilities

Report Reference: EMS-158387_232285

28 C	233.0	SE	Tanks	LL13	Tanks (Generic)	Industrial Features
29 D	245.0	N	Shell Wrexham	Mold Road, Wrexham, Clwyd, LL11 2AF	Petrol and Fuel Stations	Road and Rail

3.2 Petrol and Fuel Sites

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

2

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

ID	Distance	Direction	NGR	Company	Address	LPG	Status
30	183.0	E	332984, 350682	Obsolete	Regent Service Station, Regent Street, Regent Street, Wrexham, Clwyd, LL11 1PF	Not Applicable	Obsolete
31D	233.0	N	332642, 350981	Shell	Shell Wrexham, Mold Road, Mold Road, Wrexham, Clwyd, LL11 2AF	No	Open

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site:

0

Database searched and no data found.

4. Geology

4.1 Artificial Ground and Made Ground

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

LEX Code	Description	Rock Type
MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

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

4.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
GFSDD-SAGR	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
RTDU-SAGR	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND AND GRAVEL
ALV-CSSG	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
GFSDD-SAGR	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL

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

4.3 Bedrock and Solid Geology

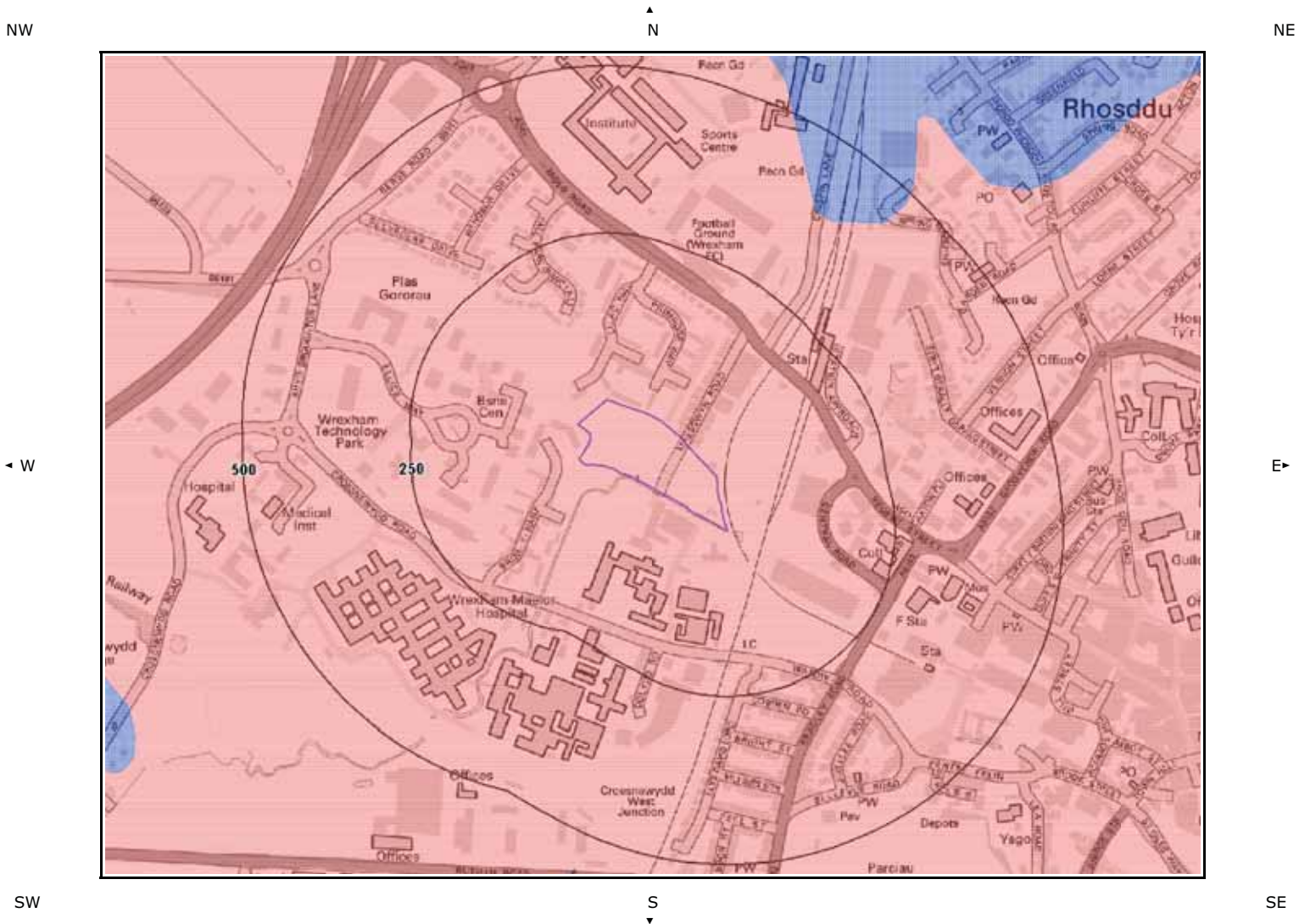
The database has been searched on site, including a 50m buffer.

LEX Code	Description	Rock Type
ETM-MDST	ETRURIA FORMATION	MUDSTONE
PLMC-MDSS	PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	MUDSTONE, SILTSTONE AND SANDSTONE

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

For more detailed geological and ground stability data please refer to the "GroundSure GeoInsight". Available from our website.

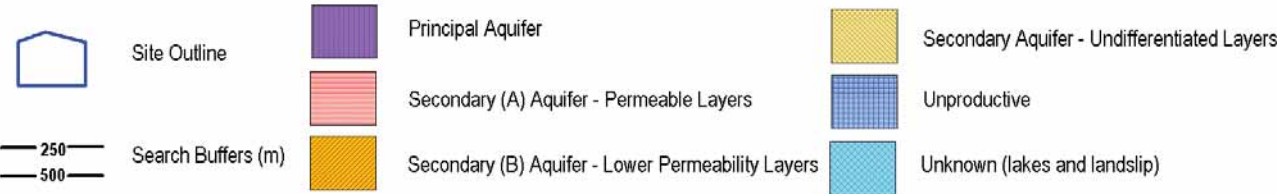
5a. Hydrogeology - Aquifer Within Superficial Geology



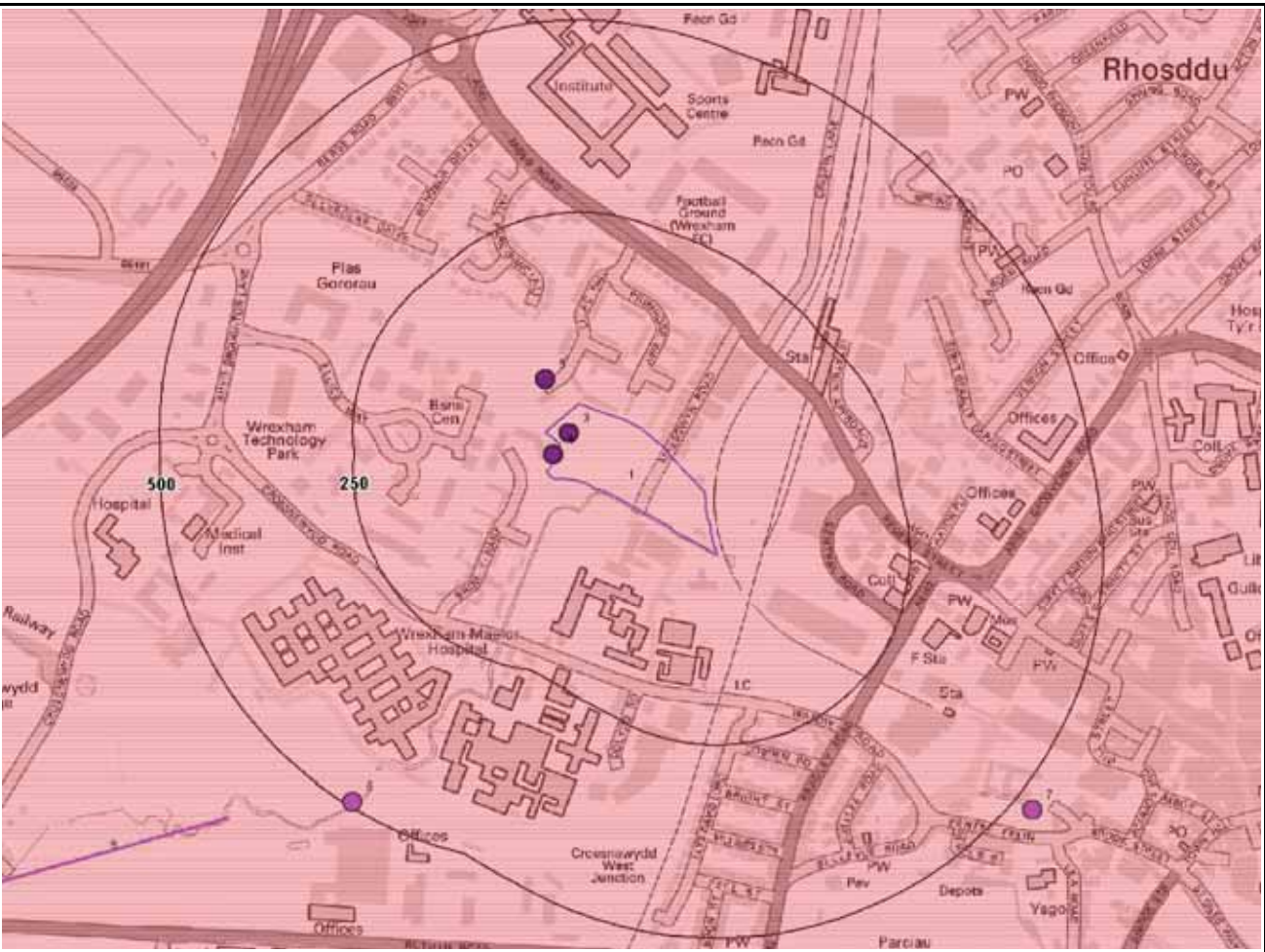
Aquifer Within Superficial Geology Legend



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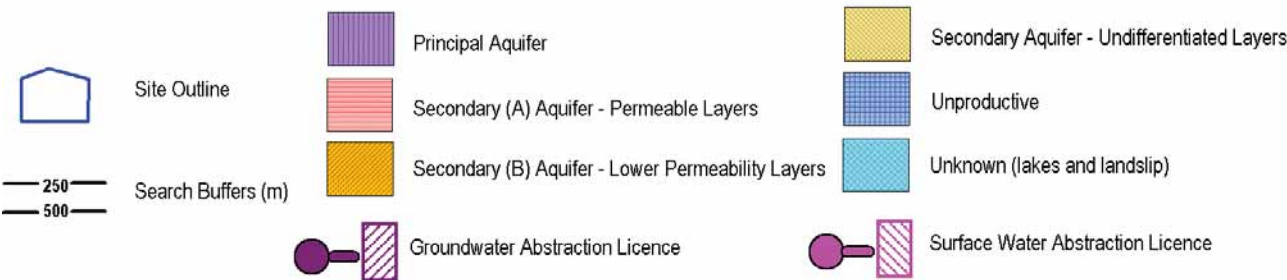
5b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses



Aquifer Within Bedrock Geology Legend

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5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



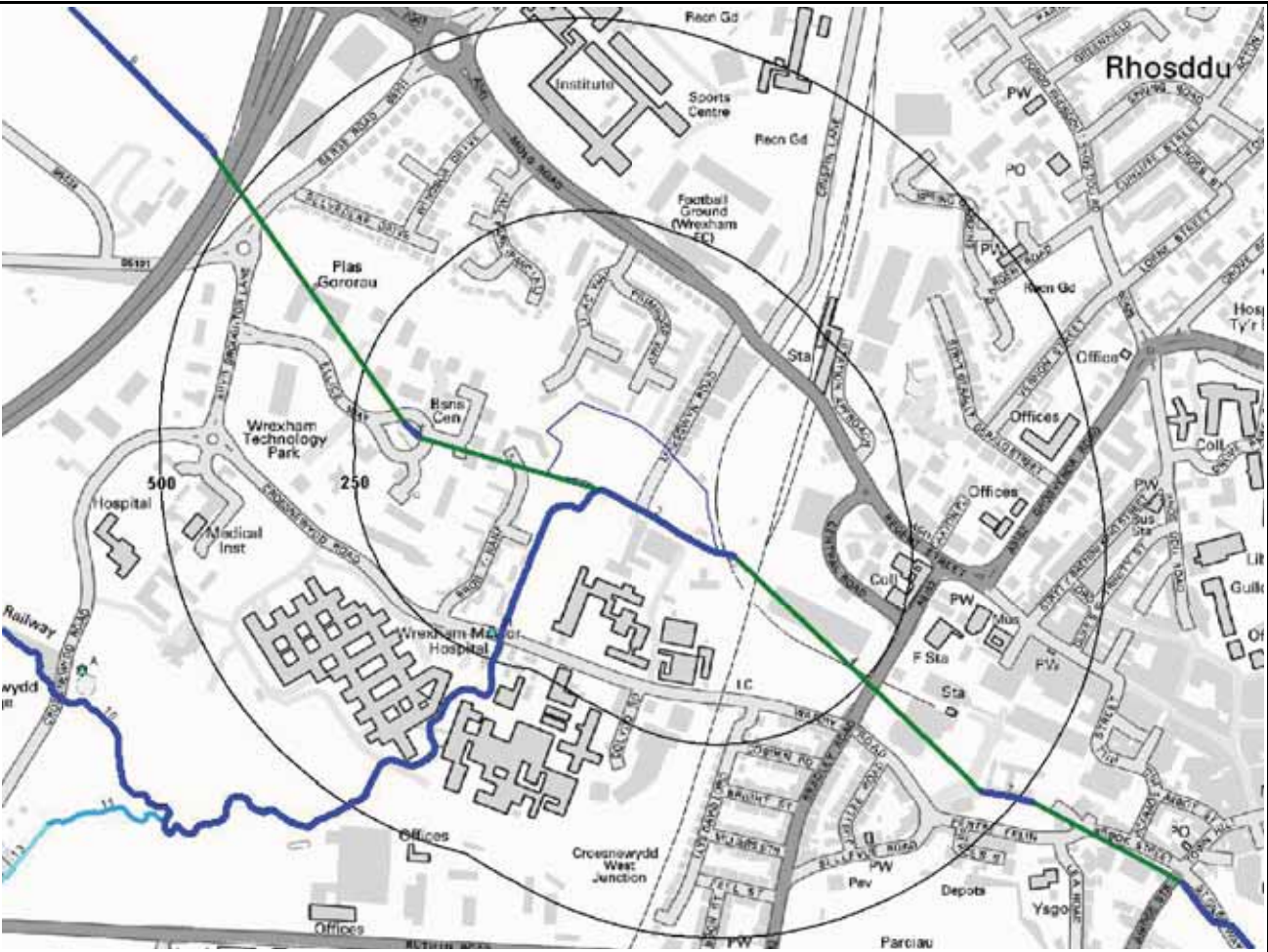
SPZ and Potable Water Abstraction Licenses
Legend

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5d. Hydrology – Detailed River Network and River Quality



Hydrology Legend



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5. Hydrogeology and Hydrology

5.1 Aquifer within Superficial Deposits

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

Yes

From 1 April 2010, the Environment Agency'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 Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (5a):

ID	Distance [m]	Direction	Designation	Description
1	0.0	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
5	391.0	NE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

5.2 Aquifer within Bedrock Deposits

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

Yes

From 1 April 2010, the Environment Agency'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 Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (5b):

ID	Distance [m]	Direction	Designation	Description
1	0.0	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

5.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 1000m of the study site?

Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance	Direction	NGR	Details
3	0.0	On Site	332630, 350710	Licence No: 24/67/7/0012 Details: Process water Direct Source: Eaw Groundwater Point: Well No.3 Data Type: Point Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 319 Original Start Date: 25/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 4/5/1970 Version End Date:

4	5.0	NW	332610, 350681	Licence No: 24/67/7/0012 Details: Process water Direct Source: Eaw Groundwater Point: Well No.2 Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 319 Original Start Date: 25/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 4/5/1970 Version End Date:
5	53.0	NW	332600, 350780	Licence No: 24/67/7/0012 Details: Process water Direct Source: Eaw Groundwater Point: Well No.1 Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 319 Original Start Date: 25/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 4/5/1970 Version End Date:

5.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 1000m of the study site?

Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance	Direction	NGR	Details	
6	494.0	SW	332350, 350230	Licence No: 24/67/7/0135 Details: Spray Irrigation - Direct Direct Source: Eaw Surface Water Point: River Gwenfro Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Application No: 328 Original Start Date: 24/2/1967 Expiry Date: - Issue No: 100 Version Start Date: 28/1/1983 Version End Date:
7	527.0	SE	333230, 350220	Licence No: 24/67/7/0147 Details: Effluent/Slurry Dilution Direct Source: Eaw Surface Water Point: River Gwenfro Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Application No: L30 Original Start Date: 24/2/1967 Expiry Date: - Issue No: 100 Version Start Date: 24/2/1967 Version End Date:
8	608.0	SW	331800, 350100	Licence No: 24/67/7/0135 Details: Spray Irrigation - Direct Direct Source: Eaw Surface Water Point: Tributary Of River Gwenfro Data Type: Line	Annual Volume (m³): 4546 Max Daily Volume (m³): 511.43 Application No: - Original Start Date: 24/2/1967 Expiry Date: - Issue No: 101 Version Start Date: 13/6/2003 Version End Date:

5.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site?

No

Database searched and no data found.

5.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site?

No

Database searched and no data found.

5.7 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site?

Yes

Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (5d):

ID	Distance [m]	Direction	NGR	River Details	Biological Quality Grade				
					2005	2006	2007	2008	2009
19A	656.0	SW	332000, 350400	River Name: Gwenfro Reach: Hospital - Conf. Trib. Nr. South Sea End/Start of Stretch: End of Stretch NGR	C	C	C	C	C
Not shown	1037.0	SE	333700, 350000	River Name: Gwenfro Reach: Conf.r.clywedog - Willow Road Wrexham End/Start of Stretch: Start of Stretch NGR	D	D	C	C	C

Chemical Quality:

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 (5d):

ID	Distance [m]	Direction	NGR	River Details	Chemical Quality Grade (Headline Indicator)				
					2005	2006	2007	2008	2009
21	216.0	S	332530, 350450	River Name: Gwenfro Reach: Hospital - Conf. Trib. Nr. South Sea End/Start of Stretch: Sample Point NGR	A	B	B	C	-
22A	656.0	SW	332000, 350400	River Name: Gwenfro Reach: Willow Rd.wrexham - Hospital End/Start of Stretch: Start of Stretch NGR	B	B	B	B	-
23A	656.0	SW	332000, 350400	River Name: Gwenfro Reach: Hospital - Conf. Trib. Nr. South Sea End/Start of Stretch: End of Stretch NGR	A	B	B	C	-
Not shown	1037.0	SE	333700, 350000	River Name: Gwenfro Reach: Conf.r.clywedog - Willow Road Wrexham End/Start of Stretch: Start of Stretch NGR	B	B	B	B	-
Not shown	1037.0	SE	333700, 350000	River Name: Gwenfro Reach: Willow Rd.wrexham - Hospital End/Start of Stretch: End of Stretch NGR	B	B	B	B	-
Not shown	1138.0	SE	333800, 349970	River Name: Gwenfro Reach: Willow Rd.wrexham - Hospital End/Start of Stretch: Sample Point NGR	B	B	B	B	-

Not shown	1270.0	S	332495, 349327	River Name: Clywedog Reach: Conf.black Bk.erddig Pk-conf.trib. End/Start of Stretch: Sample Point NGR	A	A	A	A	-
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5.8 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 (5d):

ID	Distance	Direction	Details	
1	0.0	On Site	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Extended Culvert (greater than 50m) Catchment: - Drain: NO Main River Status: Currently Undefined
2	1.0	SW	River Name: (Afon Gwenfro) Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Catchment: - Drain: NO Main River Status: Currently Undefined
3	1.0	S	River Name: (Afon Gwenfro) Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Catchment: - Drain: NO Main River Status: Currently Undefined
4	23.0	E	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Extended Culvert (greater than 50m) Catchment: - Drain: NO Main River Status: Currently Undefined
5	164.0	W	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Catchment: - Drain: NO Main River Status: Currently Undefined
6	185.0	W	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Extended Culvert (greater than 50m) Catchment: - Drain: NO Main River Status: Currently Undefined
7	457.0	SE	River Name: River Gwenfro (Afon Gwenfro) Water Course Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Catchment: - Drain: NO Main River Status: Currently Undefined

5.9 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 to Surface Water (m)	on-site	0-50	51-250
Surface water features within 250m of the study site	Yes	Yes	Yes

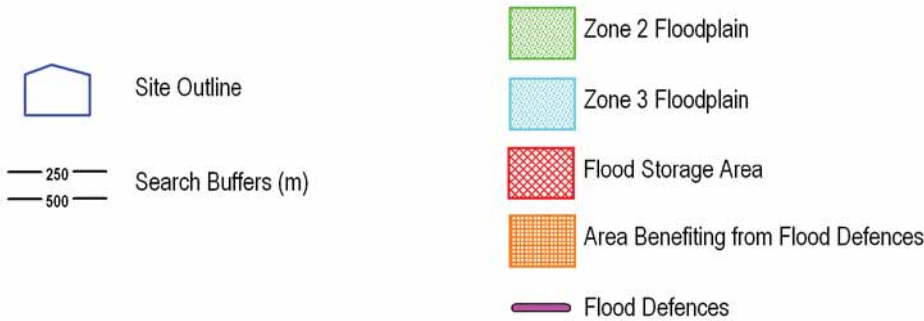
6. Environment Agency Flood Map



Environment Agency Flood Legend



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6. Flooding

6.1 Zone 2 Flooding

Zone 2 floodplain estimates the annual probability of flooding as one in one thousand (0.1%) or greater from rivers and the sea but less than 1% from rivers or 0.5% from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 2 floodplain?

Yes

The following floodplain records are represented as green shading on the Flood Map:

ID	Distance	Direction	Update	Type
1	0.0	On Site	24-Feb-2012	Zone 2 - (Fluvial Models)

6.2 Zone 3 Flooding

Zone 3 estimates the annual probability of flooding as one in one hundred (1%) or greater from rivers and a one in two hundred (0.5%) or greater from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 3 floodplain?

Yes

The following floodplain records are represented as blue shading on the Flood Map:

ID	Distance	Direction	Update	Type
5	0.0	On Site	24-Feb-2012	Zone 3 - (Fluvial Models)
6	0.0	On Site	24-Feb-2012	Zone 3 - (Fluvial Models)

6.3 Flood Defences

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

No

6.4 Areas benefiting from Flood Defences

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

No

6.5 Areas used for Flood Storage

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

No

6.6 Groundwater Flooding Susceptibility Areas

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

Yes

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

Very High

6.7 Groundwater Flooding Confidence Areas

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

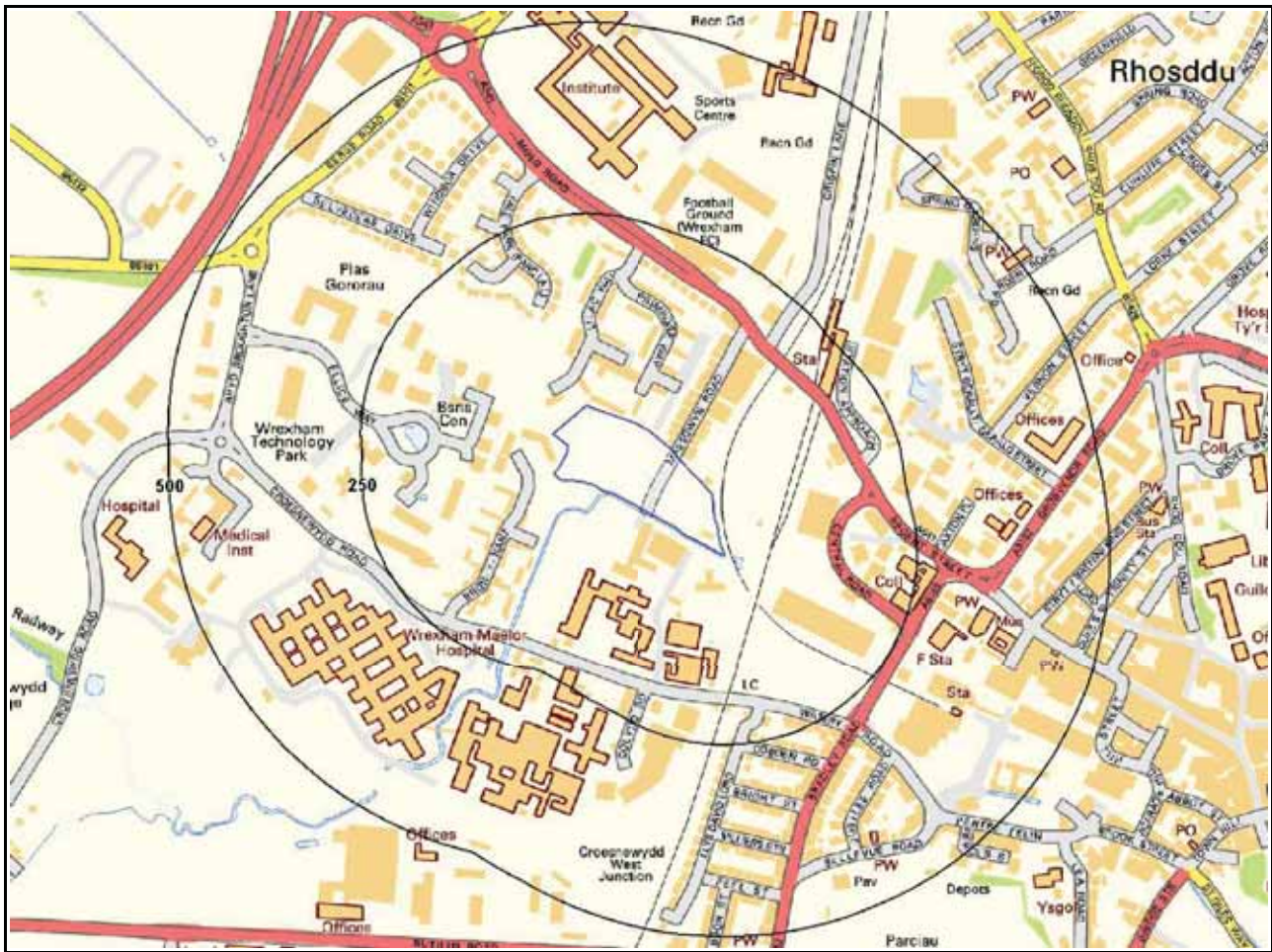
Moderate

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.

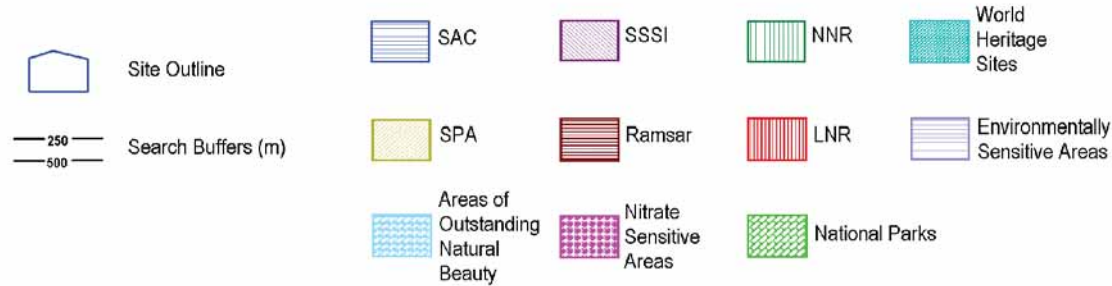
7.Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

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7. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 500m of the study site? **No**

Records of Sites of Special Scientific Interest (SSSI) within 500m of the study site: **0**

Database searched and no data found.

Records of National Nature Reserves (NNR) within 500m of the study site: **0**

Database searched and no data found.

Records of Special Areas of Conservation (SAC) within 500m of the study site: **0**

Database searched and no data found.

Records of Special Protection Areas (SPA) within 500m of the study site: **0**

Database searched and no data found.

Records of Ramsar sites within 500m of the study site: **0**

Database searched and no data found.

Records of Local Nature Reserves (LNR) within 500m of the study site: **0**

Database searched and no data found.

Records of World Heritage Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Environmentally Sensitive Areas within 500m of the study site: **0**

Database searched and no data found.

Records of Areas of Outstanding Natural Beauty (AONB) within 500m of the study site: **0**

Database searched and no data found.

Records of National Parks (NP) within 500m of the study site: **0**

Database searched and no data found.

Records of Nitrate Sensitive Areas within 500m of the study site:	0
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Database searched and no data found.

Records of Nitrate Vulnerable Zones within 500m of the study site:	0
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Database searched and no data found.

8. Natural Hazards Findings

8.1 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 GeoInsight, available from our website. The following information has been found:

8.1.1 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.

8.1.2 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.

8.1.3 Soluble Rocks

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

Null - Negligible

Soluble rocks are not present in the search area. 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.

8.1.4 Compressible Ground

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

Moderate

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

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

8.1.5 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.

8.1.6 Running Sand

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

Low

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

Hazard

Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

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

9. Mining

9.1 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	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.

9.2 Shallow Mining

What is the subsidence hazard relating to shallow mining on-site*?

Negligible

*Please note this data is searched with a 150m buffer.

9.3 Brine Affected Areas

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

No

Database searched and no data found.

10. Contacts

EmapSite

Telephone: 0118 9736883
sales@emapsite.com



British Geological Survey (England & Wales)

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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



Environment Agency

National Customer Contact Centre
PO Box 544
Rotherham
S60 1BY
Tel: 08708 506 506
Web: www.environment-agency.gov.uk
Email: enquiries@environment-agency.gov.uk



Health Protection Agency

Chilton, Didcot, Oxon, OX11 0RQ
Tel: 01235 822622 www.hpa.org.uk/radiation
Radon measures and general radon information and
guidance



The Coal Authority

200 Lichfield Lane, Mansfield, Notts NG18 4RG
Tel: 0845 762 6848. DX 716176 Mansfield 5
www.coal-authority.co.uk
Coal mining reports and related enquiries



Ordnance Survey

Romsey Road
Southampton SO16 4GU
Tel: 08456 050505



Local Authority

Authority: Wrexham County Borough Council
Phone: 01978 292000
Web: www.wrexham.gov.uk
Address: The Guildhall, Wrexham, LL11 1AY

Get Mapping PLC

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



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Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

"Beneficiary" means the Client or the customer of the Client for whom the Client has procured the Services.

"Commercial" means any building which is not Residential.

"Commission" means an order for Consultancy Services submitted by a Client.

"Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between GroundSure and the Client for the performance of the Services which arises upon GroundSure's acceptance of an Order or Commission and which shall incorporate these conditions, the relevant GroundSure User Guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with clause 11.

"Client" means the party that submits an Order or Commission.

"Data Provider" means any third party providing Third Party Content to GroundSure.

"Data Report" means reports comprising factual data with no professional interpretation in respect of the level of likely risk and/or liability available from GroundSure.

"GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.

"GroundSure Materials" means all materials prepared by GroundSure as a result of the provision of the Services, including but not limited to Data Reports, Mapping and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, service marks, moral rights, data protection rights, know-how, trade mark or any other intellectual property rights.

"Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure.

"Order" means an order form submitted by the Client requiring Services from GroundSure in respect of a specified Site.

"Order Website" means online platform via which Orders may be placed.

"Report" means a Risk Screening Report or Data Report for commercial or residential property available from GroundSure relating to the Site prepared in accordance with the specifications set out in the relevant User Guide.

"Residential" means any building used as or suitable for use as an individual dwelling.

"Risk Screening Report" means one of GroundSure's risk screening reports, comprising factual data with interpretation in respect of the level of likely risk and/or liability, excluding **"Consultancy Services"**.

"Services" means the provision of any Report, Mapping or Consultancy Services which GroundSure has agreed to carry out for the Client/Beneficiary on these terms and conditions in respect of the Site.

"Site" means the landsite in respect of which GroundSure provides the Services.

"Third Party Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.

"User Guide" means the relevant current version of the user guide, available upon request from GroundSure.

2 Scope of Services

2.1 GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.

2.2 GroundSure shall exercise all the reasonable skill, care and diligence to be expected of experienced environmental consultants in the performance of the Services.

2.3 The Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.

2.4 Terms and conditions appearing on a Client's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives or any terms implied by custom, practice or course of dealing shall be of no effect and these terms and conditions shall prevail over all others.

2.5 If a Client/Beneficiary requests insurance in conjunction with or as a result of the Services, GroundSure shall use reasonable endeavours to procure such insurance, but makes no warranty that such insurance shall be available from insurers or offered on reasonable terms. GroundSure does not endorse or recommend any particular insurance product, policy or insurer. Any insurance purchased shall be subject solely to the terms of the policy issued by insurers and GroundSure will have no liability therefor. The Client/Beneficiary should take independent advice to ensure that the insurance policy requested and/or offered is suitable for its requirements.

2.6 GroundSure's quotations/proposals are valid for a period of 30 days only. GroundSure reserves the right to withdraw any quotation at any time before GroundSure accepts an Order or Commission. GroundSure's acceptance of an Order or Commission shall be effective only where such acceptance is in writing and signed by GroundSure's authorised representative or where accepted via GroundSure's Order Website.

3 The Client's obligations

3.1 The Client shall ensure the Beneficiary complies with and is bound by the terms and conditions set out in the Contract and shall provide that GroundSure may in its own right enforce such terms and conditions against the Beneficiary pursuant to the Contracts (Rights of Third Parties) Act 1999. The Client shall be liable for all breaches of the Contract by the Beneficiary as if they were breaches by the Client. The Client shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.

3.2 The Client shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the Site known to the Client/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a Site, facilities and equipment as agreed in the Contract).

3.3 Where Client/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.

3.4 The Client shall not and shall not knowingly permit the Beneficiary to, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping or, in respect of any Services, information given by GroundSure. For the avoidance of doubt, the Client and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party who is considering acquiring the whole or part of the Site, or providing funding in relation to the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.5 The Client is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.

4 Reliance

4.1 Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Client and Beneficiary are granted an irrevocable royalty-free licence to access the information contained in a Report, Mapping or in a report prepared by GroundSure in respect of or arising out of Consultancy Services. The Services may only be used for the benefit of the Client and those persons listed in clauses 4.2 and 4.3.

4.2 In relation to Data Reports, Mapping and Risk Screening Reports, the Client shall be entitled to make Reports available to (i) the Beneficiary, (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate), (iv) the first purchaser or first tenant of the Site (v) the professional advisers and lenders of the first purchaser or tenant of the Site. Accordingly GroundSure shall have the same duties and obligations to those persons in respect of the Services as it has to the Client and those persons shall have the benefit of any of the Client's rights under the Contract as if those persons were parties to the Contract. For the avoidance of doubt, the limitations of GroundSure's liability as set out in clauses 7 and 11.6 shall apply.

4.3 In relation to Consultancy Services, reliance shall be limited to the Client, Beneficiary and named parties on the Report.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise agreed in writing with GroundSure, any other party considering the information supplied by GroundSure as part of the Services, including (but not limited to) insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.

4.5 The Client shall not and shall not knowingly permit any person (including the Beneficiary) who is provided with a copy of any Report, (except as permitted herein or by separate agreement with GroundSure) to: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping.

4.6 Notwithstanding clause 4.5, if the Client acts in a professional capacity, it may make reasonable use of a Report and/or findings made as a result of Consultancy Services to advise Beneficiaries. However, GroundSure shall have no liability in respect of any opinion or report given to such Beneficiaries by the Client or a third party.

5 Fees and Disbursements

5.1 GroundSure shall charge the Client fees at the rate and frequency specified in the Contract together, in the case of Consultancy Services, with all proper disbursements incurred by GroundSure in performing the Services. For the avoidance of doubt, the fees payable for the Services are as set out in GroundSure's written proposal, Order Website or Order acknowledgement form. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services.

5.2 Unless GroundSure requires prepayment, the Client shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such value added tax or other tax as may be required within 30 days from the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client ("**Payment Date**"). GroundSure reserves the right to charge interest which shall accrue on a daily basis from 30 days after the date of Payment Date until the date of payment (whether before or after judgment) at the rate of five per cent per annum above the Bank of England base rate from time to time.

5.3 In the event that the Client disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Client shall be deemed to have agreed the amount thereof. As soon as reasonably practicable following receipt of a notification in respect of any disputed invoice, a member of the management team at GroundSure shall contact the Client and the parties shall use all reasonable endeavours to resolve the dispute.

6 Intellectual Property and Confidentiality

6.1 Subject to the provisions of clause 4.1, the Client and the Beneficiary hereby acknowledge that all Intellectual Property in the Services and Content are and shall remain owned by either GroundSure or the Data Providers and nothing in these terms purports to transfer or assign any rights to the Client or the Beneficiary in respect of the Intellectual Property.

6.2 The Client shall acknowledge the ownership of the **Third Party Content** where such **Third Party Content** is incorporated or used in the Client's own documents, reports, systems or services whether or not these are supplied to a third party.

6.3 Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client acknowledges that the proprietary rights subsisting in copyright, database rights and any other intellectual property rights in respect of any data and information contained in any Report are and shall remain (subject to clause 11.1) the property of GroundSure and/or any third party that has supplied data or information used to create a Report, and that these conditions do not purport to grant, assign or transfer any such rights in respect thereof to a Client and/or a Beneficiary.

6.5 The Client shall (and shall procure that any recipients of the Report as permitted under clause 4.2 shall):

(i) not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

Report Reference: EMS-158387_232285

- (iii) not create any product or report which is derived directly or indirectly from the data contained in the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);
 - (iv) not combine the Services with or incorporate such Services into any other information data or service; and
 - (v) not reformat or otherwise change (whether by modification, addition or enhancement), data contained in the Services (save that those acting in a professional capacity to the Beneficiary shall not be in breach of this clause 6.5(v) where such reformatting is in the normal course of providing advice based upon the Services), in each case of parts (iii) to (v) inclusive, whether or not such product or report is produced for commercial profit or not.
- 6.6 The Client and/or Beneficiary shall and shall procure that any party to whom the Services are made available shall notify GroundSure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.
- 6.8 Save as otherwise set out in these terms and conditions, any information provided by one party ("**Disclosing Party**") to the other party ("**Receiving Party**") shall be treated as confidential and only used for the purposes of these terms and conditions, except in so far as the Receiving Party is authorised by the Disclosing Party to provide such information in whole or in part to a third party.

7 Liability

THE CLIENT'S ATTENTION IS DRAWN TO THIS PROVISION

- 7.1 Subject to the provisions of this clause 7, GroundSure shall be liable to the Beneficiary only in relation to any direct losses or damages caused by any negligent act or omission of GroundSure in preparing the GroundSure Materials and provided that the Beneficiary has used all reasonable endeavours to mitigate any such losses.
- 7.2 GroundSure shall not be liable for any other losses or damages incurred by the Beneficiary, including but not limited to:
- (i) loss of profit, revenue, business or goodwill, losses relating to business interruption, loss of anticipated savings, loss of or corruption to data or for any special, indirect or consequential loss or damage which arise out of or in connection with the GroundSure Materials or otherwise in relation to a Contract;
 - (ii) any losses or damages that arise as a result of the use of all or part of the GroundSure Materials in breach of these terms and conditions or contrary to the terms of the relevant User Guide;
 - (iii) any losses or damages that arise as a result of any error, omission or inaccuracy in any part of the GroundSure Materials where such part is based on any Third Party Content or any reasonable interpretation of Third Party Content. The Client accepts, and shall procure that any other Beneficiary shall accept, that it has no claim or recourse to any Data Provider in relation to Third Party Content; and/or
 - (iv) any loss or damage to a Client's computer, software, modem, telephone or other property caused by a delay or loss of use of GroundSure's internet ordering service.
- 7.3 GroundSure's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise, arising in connection with the GroundSure Materials or otherwise in relation to the Contract shall be limited to £10 million in total (i) for any one claim or (ii) for a series of connected claims brought by one or more parties.
- 7.4 For the duration of the liability periods set out in clauses 7.5 and 7.6 below, GroundSure shall maintain professional indemnity insurance in respect of its liability under these terms and conditions provided such insurance is readily available at commercially viable rates. GroundSure shall produce evidence of such insurance if reasonably requested by the Client. A level of cover greater than GroundSure's current level of cover may be available upon request and agreement with the Client.
- 7.5 Any claim under the Contract in relation to Data Reports, Mapping and Risk Screening Reports, must be brought within six years from the date when the Beneficiary became aware that it may have a claim and in no event may a claim be brought twelve years or more after completion of such a Contract. For the avoidance of doubt, any claim in respect of which proceedings are notified to GroundSure in writing prior to the expiry of the time periods referred to in this clause 7.5 shall survive the expiry of those time periods provided the claim is actually commenced within six months of notification.
- 7.6 Any claim under the Contract in relation to Consultancy Services, must be brought within six years from the date the Consultancy Services were completed.
- 7.7 The Client accepts and shall procure that any other Beneficiary shall accept that it has no claim or recourse to any Data Provider or to GroundSure in respect of the acts or omissions of any Data Provider and/or any Third Party Content provided by a Data Provider.
- 7.8 Nothing in these terms and conditions:
- (i) excludes or limits the liability of GroundSure for death or personal injury caused by GroundSure's negligence, or for fraudulent misrepresentation; or
 - (ii) shall affect the statutory rights of a consumer under the applicable legislation.

8 GroundSure right to suspend or terminate

- 8.1 In the event that GroundSure reasonably believes that the Client or Beneficiary as applicable has not provided the information or assistance required to enable the proper performance of the Services, GroundSure shall be entitled on fourteen days written notice to suspend all further performance of the Services until such time as any such deficiency has been made good.
- 8.2 GroundSure may additionally terminate the Contract immediately on written notice in the event that:
- (i) the Client shall fail to pay any sum due to GroundSure within 28 days of the Payment Date; or
 - (ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an Administration Order made against it or if a Receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or
 - (iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or
 - (iv) the Client or the Beneficiary breaches any material term of the Contract (including, but not limited to, the obligations in clause 4) incapable of remedy or if remediable, is not remedied within 14 days of notice of the breach.

9 Client's Right to Terminate and Suspend

- 9.1 Subject to clause 10.2, the Client may at any time after commencement of the Services by notice in writing to GroundSure require GroundSure to terminate or suspend immediately performance of all or any of the Services.
- 9.2 The Client waives all and any right of cancellation it may have under the Consumer Protection (Distance Selling) Regulations 2000 (as amended) in respect of the Order of a Report/Mapping. This does not affect the Beneficiary's statutory rights.

10 Consequences of Withdrawal, Termination or Suspension

- 10.1 Upon termination or any suspension of the Services, GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client/Beneficiary any property of the Client/ Beneficiary in GroundSure's possession or control.
- 10.2 In the event of termination/suspension of the Contract under clauses 8 or 9, the Client shall pay to GroundSure all and any fees payable in respect of the performance of the Services up to the date of termination/suspension. In respect of any Consultancy Services provided, the Client shall also pay GroundSure any additional costs incurred in relation to the termination/suspension of the Contract.

11 General

- 11.1 The mapping contained in the Services is protected by Crown copyright and must not be used for any purpose outside the context of the Services or as specifically provided in these terms.
- 11.2 GroundSure reserves the right to amend these terms and conditions. No variation to these terms shall be valid unless signed by an authorised representative of GroundSure.
- 11.3 No failure on the part of GroundSure to exercise and no delay in exercising, any right, power or provision under these terms and conditions shall operate as a waiver thereof.
- 11.4 Save as expressly provided in clauses 4.2, 4.3, 6.3 and 11.5, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
- 11.5 The Secretary of State for Communities and Local Government acting through Ordnance Survey may enforce breach of clause 6.1 of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
- 11.6 GroundSure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:
- (i) the Client or Beneficiary's failure to provide facilities, access or information;
 - (ii) fire, storm, flood, tempest or epidemic;
 - (iii) Acts of God or the public enemy;
 - (iv) riot, civil commotion or war;
 - (v) strikes, labour disputes or industrial action;
 - (vi) acts or regulations of any governmental or other agency;
 - (vii) suspension or delay of services at public registries by Data Providers; or
 - (viii) changes in law.
- 11.7 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.
- 11.8 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email and on the second working day after the day of posting if sent by first class post.
- 11.9 The Contract constitutes the entire contract between the parties and shall supersede all previous arrangements between the parties.
- 11.10 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.
- 11.11 These terms and conditions shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with these terms and conditions shall be subject to the exclusive jurisdiction of the English courts.
- 11.12 If the Client or Beneficiary has a complaint about the Services, notice can be given in any format eg writing, phone, email to the Compliance Officer at GroundSure who will respond in a timely manner.

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A P P E N D I X G

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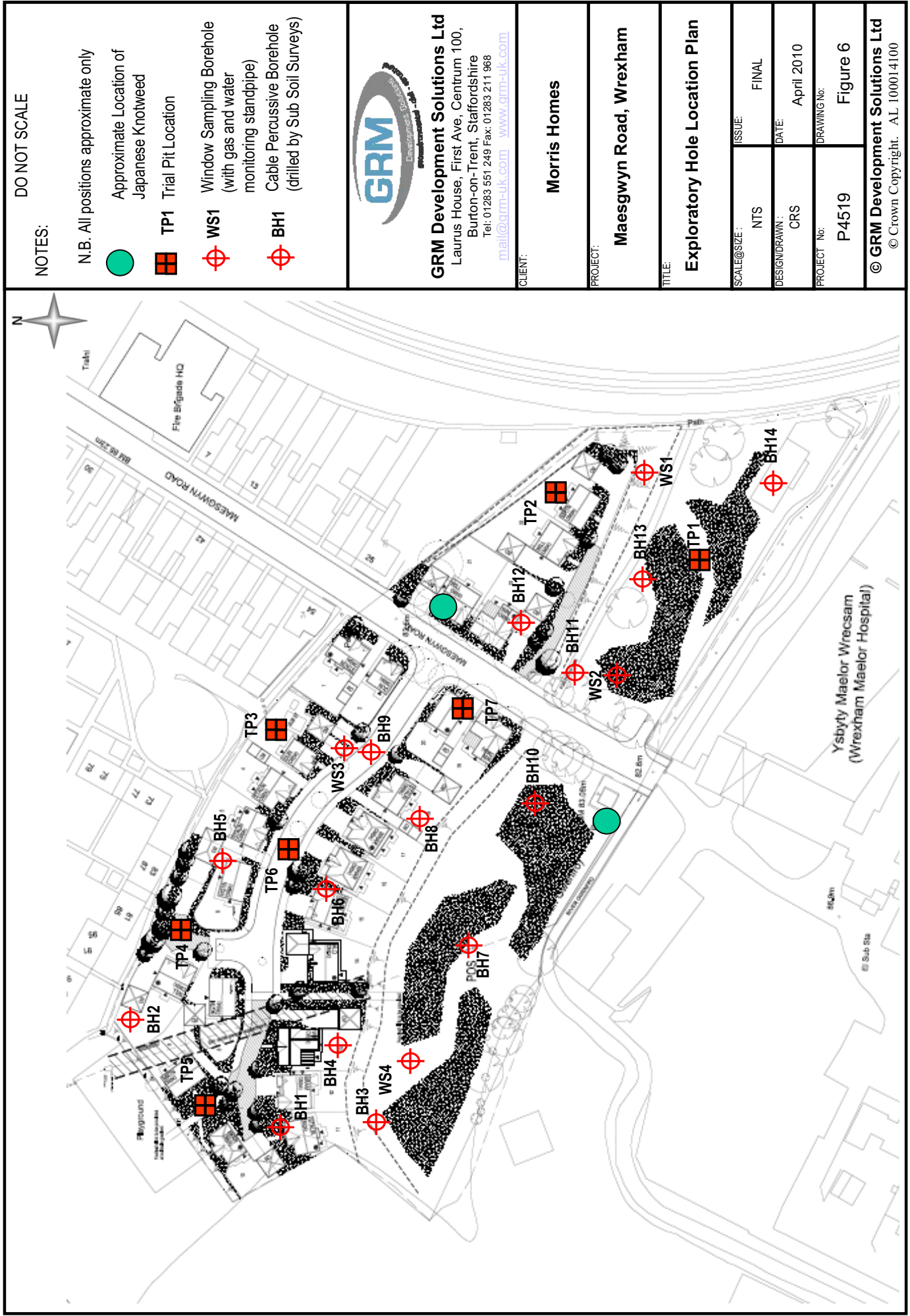
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- Construction Management
- Site Services

Tel: 01283 551249

info@grm-uk.com

Fax: 01283 211968

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DO NOT SCALE

NOTES:

- N.B. All positions approximate only
- Approximate Location of Japanese Knotweed
 - TP1 Trial Pit Location
 - WS1 Window Sampling Borehole (with gas and water monitoring standpipe)
 - BH1 Cable Percussive Borehole (drilled by Sub Soil Surveys)



GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:

Morris Homes

PROJECT:

Maesgwyn Road, Wrexham

TITLE:

Exploratory Hole Location Plan

SCALE@SIZE:	NTS	ISSUE:	FINAL
DESIGNED/DRAWN:	CRS	DATE:	April 2010
PROJECT No:	P4519	DRAWING No:	Figure 6
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A P P E N D I X H

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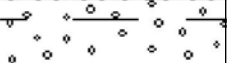
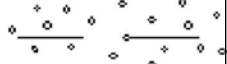
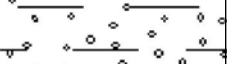
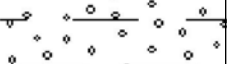
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- Structural Engineering Services
- Construction Management
- Site Services

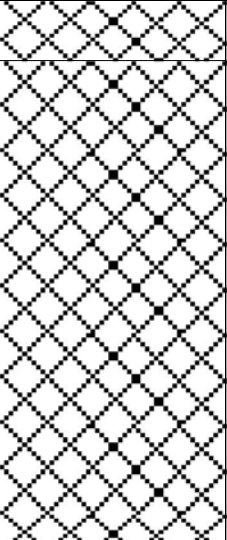
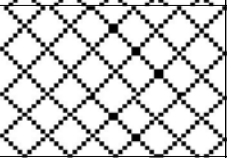
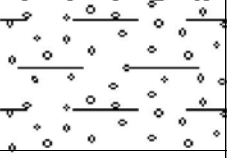
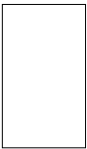
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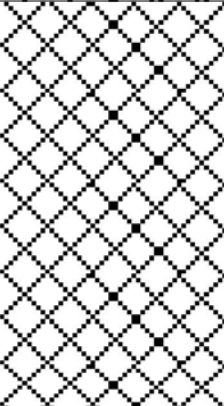
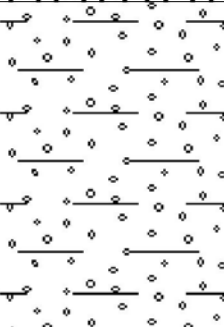
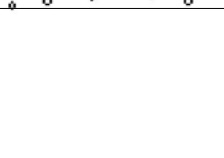
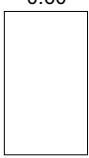
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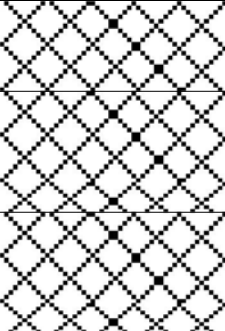
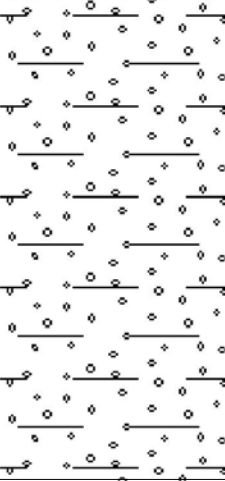
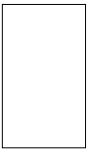
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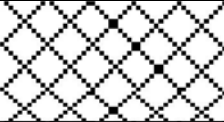
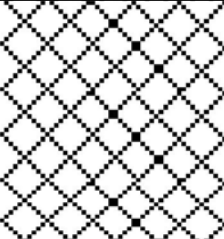
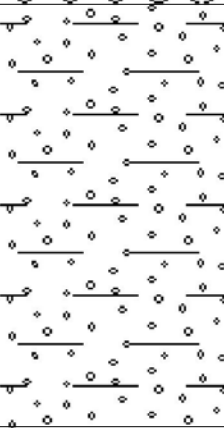
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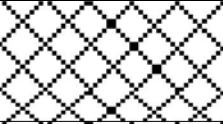
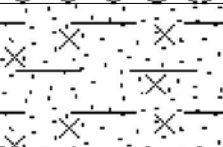
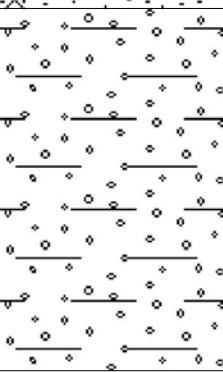
 Development Solutions geoenvironmental - civil - structural		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log			Trial Pit Number TP1		
Site Maesgwyn Road, Wrexham							Ground Level mAOD 0.000		
Client Morris Homes North Ltd				GRM Project ref: P4519			Coordinates: 0.00E 0.00N		
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.10-0.20/D/1			0.20	-0.20		Rough grass over brown silty fine to coarse sand with occasional angular to subangular fine to coarse gravel including limestone.(MADE GROUND)	
		0.10-0.20/D/2							
		0.20-0.40/D/3							
		0.40-0.60/D/4			0.40	-0.40		Limestone gravel.(MADE GROUND)	
		0.40-0.60/D/5						(Medium dense) dark grey locally brown sandy gravel including limestone, brick, tarmac fragments and ash. Slight fuel odour.(MADE GROUND)	
		1.10-1.30/D/6			1.10	-1.10		Soft and firm green grey slightly sandy very silty clay with occasional carbonaceous material. Possible alluvium.(MADE / DISTURBED GROUND)	
		1.50-1.70/D/7			1.50	-1.50			
2								(Medium dense) orange brown slightly sandy clayey GRAVEL including subangular to rounded fine to coarse quartzite, sandstone and igneous material. Clay content reduces with depth. Wet below 2.3m.(GLACIAL SAND AND GRAVEL)	
									
									
									
		2.30-2.50/D/8			3.10	-3.10			
							End of Trial Pit at 3.10 m		
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Stable during excavation Plant: JCB-3CX Logged by: KAB					0.60 2.30 Final Depth (m): 3.10		Wet below 2.3m		
General Remarks: Trial pit position checked by Ecologist, and path cleared by tree fellers.									
Strata strengths/densities determined by observation only.									

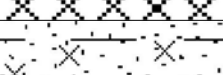
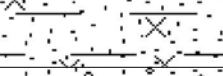
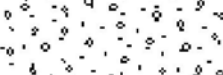
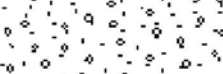
		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP2			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.10-0.20/D/1			0.20	-0.20		Rough grass over brown silty fine to coarse sand with occasional subangular to rounded fine to coarse gravel including quartzite, sandstone and igneous material.(MADE / DISTURBED GROUND) (Loose) brown and orange brown silty (locally slightly clayey) fine to coarse sand with some angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material, brick and concrete. Cobbles and boulders of concrete.(MADE GROUND)	
		0.10-0.20/D/2							
		0.30-0.50/D/3							
		0.30-0.50/D/4							
2		1.90-2.10/D/5			1.80	-1.80		Soft and firm green grey slightly sandy very silty clay with occasional carbonaceous material. Possible alluvium.(MADE GROUND)	
		2.30-2.50/D/6			2.30	-2.30		(Medium dense) orange brown slightly sandy clayey GRAVEL including subangular to rounded fine to coarse quartzite, sandstone and igneous material. Clay content reduces with depth. Wet.(GLACIAL SAND AND GRAVEL)	
					2.80	-2.80			End of Trial Pit at 2.80 m
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Constant collapse of wet gravels Plant: JCB-3CX Logged by: KAB							Wet below 2.3m		
					Final Depth (m): 2.80				
General Remarks: Trial pit position checked by Ecologist, and path cleared by tree fellers.									
Strata strengths/densities determined by observation only.									

		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP3			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.10-0.30/D/1 0.10-0.30/D/2			0.35	-0.35		Rough grass over brown silty fine to coarse sand with occasional angular to rounded fine to coarse gravel including quartzite and brick fragments.(MADE / DISTURBED GROUND)	
		0.40-0.60/D/3						(Medium dense) brown silty fine to coarse sand with some angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material, bricks and occasional concrete cobbles. Discontinuous band of dark grey silty sand with occasional ash between 0.8-1.1m.(MADE / DISTURBED GROUND)	
		0.80-1.00/D/4			1.70	-1.70		(Medium dense) brown silty sand and gravel including subrounded to rounded fine to coarse quartzite, rare brick fragments and occasional quartzite cobbles.(MADE / DISTURBED GROUND)	
	2		1.80-2.00/D/5						(Medium dense) orange brown slightly sandy clayey GRAVEL including subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet below 2.8m.(GLACIAL SAND AND GRAVEL)
			2.30-2.50/D/6			3.20	-3.20		
									End of Trial Pit at 3.20 m
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Sable during excavation Plant: JCB-3CX Logged by: KAB							Wet below 2.8m		
					Final Depth (m): 3.20				
General Remarks: Trial pit position checked by Ecologist. Raised area along north eastern boundary (western side of Maesgwyn Road).									
Strata strengths/densities determined by observation only.									

		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP4			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.10-0.30/D/1 0.10-0.30/D/2			0.30	-0.30		Rough grass over brown slightly clayey silty fine to coarse sand.(MADE / DISTURBED GROUND)	
		0.40-0.60/D/3			0.70	-0.70		(Loose) brown locally orange brown slightly clayey silty fine to coarse sand with some angular to rounded fine to coarse gravel including quartzite, sandstone and igneous material.(MADE / DISTURBED GROUND)	
		0.80-1.00/D/4			1.10	-1.10		Soft and firm dark grey slightly sandy very silty clay. Possible alluvium.(MADE / DISTURBED GROUND)	
	2		1.20-1.40/D/5			2.70	-2.70		(Medium dense) dark brown sandy slightly clayey GRAVEL including subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet.(GLACIAL SAND AND GRAVEL)
		2.20-2.40/D/6			End of Trial Pit at 2.70 m				
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Constant collapse of wet gravels Plant: JCB-3CX Logged by: KAB							Wet below 1.1m		
					Final Depth (m): 2.70				
General Remarks:									
Strata strengths/densities determined by observation only.									

		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP5			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.20-0.40/D/1 0.20-0.40/D/2			0.40	-0.40		Rough grass over brown slightly clayey silty fine to coarse sand with occasional angular to rounded fine to coarse gravel including quartzite and brick fragments.(MADE / DISTURBED GROUND)	
		0.50-0.70/D/3						(Medium dense) brown locally orange brown or grey slightly clayey silty fine to coarse sand with some angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material, rare brick fragments and cobbles. Gravel content increases with depth.(MADE / DISTURBED GROUND)	
		1.20-1.40/D/4			1.20	-1.20		(Medium dense) brown sandy slightly clayey GRAVEL including subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet from 1.4m.(GLACIAL SAND AND GRAVEL)	
2		2.10-2.30/D/5			2.60	-2.60		End of Trial Pit at 2.60 m	
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Constant collapse of wet gravels Plant: JCB-3CX Logged by: KAB							Wet below 1.4m		
					Final Depth (m): 2.60				
General Remarks:									
Strata strengths/densities determined by observation only.									

		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP6			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.20-0.40/D/1 0.20-0.40/D/2			0.40	-0.40		Rough grass over brown slightly clayey silty fine to coarse sand.(MADE / DISTURBED GROUND)	
		0.50-0.70/D/3			0.90	-0.90		(Loose and medium dense) brown and orange brown slightly clayey silty fine to coarse sand with occasional angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material and occasional cobbles.(MADE / DISTURBED GROUND)	
		1.00-1.20/D/4			1.40	-1.40		(Medium dense) orange brown and grey slightly clayey silty fine to coarse sand with occasional angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material and occasional cobbles.(GLACIAL SAND AND GRAVEL)	
		1.40/D/5			2.60	-2.60		(Medium dense) brown sandy slightly clayey GRAVEL including subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet.(GLACIAL SAND AND GRAVEL)	
2		2.10-2.30/D/6						End of Trial Pit at 2.60 m	
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Constant collapse of wet gravels Plant: JCB-3CX Logged by: KAB							Wet below 1.4m		
					Final Depth (m): 2.60				
General Remarks:									
Strata strengths/densities determined by observation only.									

		Burton-on-Trent (HQ) Tel: 01283 551249 Market Harborough Tel: 01858 414981 Email: mail@grm-uk.com Web: www.grm-uk.com		Trial Pit Log		Trial Pit Number TP7			
Site Maesgwyn Road, Wrexham						Ground Level mAOD 0.000			
Client Morris Homes North Ltd				GRM Project ref: P4519		Coordinates: 0.00E 0.00N			
GROUNDWATER		SAMPLES	INSITU TESTING		STRATA		STRATA RECORD		Scale: 1:25
Strike	Depth (m)	Depth/Type/Ref (m)	Depth (m)	Hand Vane Strength (kN/m²)	Depth (m)	Level (mAOD)	Legend	Description	
1		0.10-0.25/D/1			0.25	-0.25		Rough grass over brown sandy silty clay with occasional subrounded to rounded fine to coarse gravel including quartzite.(MADE / DISTURBED GROUND)	
		0.10-0.25/D/2						Soft and firm brown slightly sandy very silty clay with occasional carbonaceous material. Possible alluvium.(MADE / DISTURBED GROUND)	
		0.30-0.40/D/3			0.80	-0.80			
		0.90-1.10/D/4						(Medium dense) orange brown locally mottled grey clayey silty fine to coarse SAND with some subangular to rounded fine to coarse gravel including quartzite, sandstone, igneous material and occasional cobbles. Gravel content increases with depth.(GLACIAL SAND AND GRAVEL)	
		1.40-1.60/D/5			1.20	-1.20			
2					2.30	-2.30		(Medium dense) brown slightly clayey SAND and GRAVEL including subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet.(GLACIAL SAND AND GRAVEL)	
									
							End of Trial Pit at 2.30 m		
Excavation Details					Dimensions (m)		Groundwater Observations		
Date excavated: 26/03/2012 Date backfilled: 26/03/2012 Shoring: None Stability: Constant collapse of wet gravels Plant: JCB-3CX Logged by: KAB							Wet below 1.2m		
					Final Depth (m): 2.30				
General Remarks:									
Strata strengths/densities determined by observation only.									



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Window Sample Borehole

Borehole
Number

WS1

Site: Maesgwyn Road, Wrexham

GRM Project ref: **P4519**

Ground Level mAOD
0.000

Client: Morris Homes North Ltd

Equipment: Hand held

Coordinates:
0E
0N

Crew: TH/SM Logger KAB

Scale: 1:25

GROUNDWATER		SAMPLES	INSITU TESTING			STRATA RECORD			
Installation	Depth (m)	Depth/Type/Ref (m)	Depth/Type (m)	N Value	Casing Depth (m)	Depth (m)	Level (mAOD)	Key	Description
						0.20	-0.20		Rough grass over brown silty fine to coarse sand with occasional angular to subangular fine to coarse gravel including limestone.(MADE GROUND) Dark grey locally brown sandy gravel including limestone, brick , tarmac fragments and wood.(MADE GROUND)
						1.20	-1.20		Soft and firm green grey slightly sandy very silty clay with occasional carbonaceous material. Possible alluvium.(MADE / DISTURBED GROUND)
						1.80	-1.80		(Medium dense) orange brown slightly sandy clayey GRAVEL including subangular to rounded fine to coarse quartzite, sandstone and igneous material. Clay content reduces with depth. Wet below 2.3m.(GLACIAL SAND AND GRAVEL)
						3.00	-3.00		End of Borehole at 3.00 m

Hole Started 26/03/2012

Hole Complete 26/03/2012

General Remarks: Window sample hole position checked by Ecologist, and path cleared by tree fellers.

Groundwater Remarks: Wet below 2.7m

Test Type: S = Standard Penetration Test, C = Cone Penetration Test. N values reported are uncorrected. N value 50/275 = 50 blows in 275mm.



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Window Sample Borehole

Borehole
Number

WS2

Site: Maesgwyn Road, Wrexham

GRM Project ref: **P4519**

Ground Level mAOD
0.000

Client: Morris Homes North Ltd

Equipment: Hand held

Coordinates:
0E
0N

Crew: TH/SM Logger KAB

Scale: 1:25

GROUNDWATER		SAMPLES	INSITU TESTING			STRATA RECORD			
Installation	Depth (m)	Depth/Type/Ref (m)	Depth/Type (m)	N Value	Casing Depth (m)	Depth (m)	Level (mAOD)	Key	Description
						0.25	-0.25		Tarmac over limestone gravel.(MADE GROUND)
						0.65	-0.65		Brown clayey gravel including subangular to rounded fine to coarse gravel including quartzite, igneous material and limestone.(MADE GROUND)
						0.85	-0.85		Limestone gravel and cobbles.(MADE GROUND)
						1.40	-1.40		Brown becoming dark grey and brown clayey gravel including subangular to rounded fine to coarse gravel including quartzite, igneous material and limestone.(MADE GROUND)
						1.80	-1.80		Soft and firm green grey slightly sandy very silty clay with occasional carbonaceous material. Possible alluvium.(MADE GROUND)
						3.00	-3.00		(Medium dense) orange brown slightly sandy clayey GRAVEL including subangular to rounded fine to coarse quartzite, sandstone and igneous material. Wet below 2.7m.(GLACIAL SAND AND GRAVEL)
									End of Borehole at 3.00 m

Hole Started 26/03/2012

Hole Complete 26/03/2012

General Remarks: Window sample hole position checked by Ecologist, and path cleared by tree fellers.

Groundwater Remarks: Wet below 2.7m

Test Type: S = Standard Penetration Test, C = Cone Penetration Test. N values reported are uncorrected. N value 50/275 = 50 blows in 275mm.



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Window Sample Borehole

Borehole
Number

WS3

Site: Maesgwyn Road, Wrexham

GRM Project ref: **P4519**

Ground Level mAOD
0.000

Client: Morris Homes North Ltd

Equipment: Hand held

Coordinates:
0E
0N

Crew: TH/SM Logger KAB

Scale: 1:25

GROUNDWATER		SAMPLES	INSITU TESTING			STRATA RECORD			
Installation	Depth (m)	Depth/Type/Ref (m)	Depth/Type (m)	N Value	Casing Depth (m)	Depth (m)	Level (mAOD)	Key	Description
						0.15	-0.15		Rough grass over brown silty fine to coarse sand with occasional angular to rounded fine to coarse gravel including quartzite and brick fragments.(MADE GROUND)
						0.50	-0.50		Brown silty fine to coarse sand with some angular to rounded fine to coarse gravel including quartzite, sandstone, igneous material and brick fragments.(MADE GROUND)
						0.90	-0.90		Brown slightly sandy silty clay with rare brick fragments.(MADE GROUND)
						1.70	-1.70		Firm orange brown slightly sandy silty CLAY with occasional subangular to rounded fine to coarse gravel including quartzite, sandstone and igneous material.(GLACIAL SAND AND GRAVEL)
						3.00	-3.00		(Medium dense) orange brown slightly clayey SAND and GRAVEL including subrounded to rounded fine to coarse quartzite. Wet.(GLACIAL SAND AND GRAVEL)
									End of Borehole at 3.00 m

Hole Started 26/03/2012 Hole Complete 26/03/2012

General Remarks: Window sample hole position checked by Ecologist.

Groundwater Remarks: Wet below 1.7m

Test Type: S = Standard Penetration Test, C = Cone Penetration Test. N values reported are uncorrected. N value 50/275 = 50 blows in 275mm.



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Window Sample Borehole

Borehole
Number

WS4

Site: Maesgwyn Road, Wrexham

GRM Project ref: **P4519**

Ground Level mAOD
0.000

Client: Morris Homes North Ltd

Equipment: Hand held

Coordinates:
0E
0N

Crew: TH/SM Logger KAB

Scale: 1:25

GROUNDWATER		SAMPLES	INSITU TESTING			STRATA RECORD			
Installation	Depth (m)	Depth/Type/Ref (m)	Depth/Type (m)	N Value	Casing Depth (m)	Depth (m)	Level (mAOD)	Key	Description
	0.25					0.25	-0.25		Rough grass over brown slightly clayey silty fine to coarse sand.(MADE / DISTURBED GROUND)
	1.50					1.50	-1.50		Firm brown and orange brown sandy silty CLAY.(GLACIAL SAND AND GRAVEL)
	2.00					2.00	-2.00		(Medium dense) brown slightly sandy silty CLAY with some subrounded to rounded fine to coarse quartzite and occasional cobbles. Wet from 1.7m.(GLACIAL SAND AND GRAVEL)
									End of Borehole at 2.00 m

Hole Started 26/03/2012

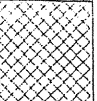
Hole Complete 26/03/2012

General Remarks:

Groundwater Remarks:Wet below 1.7m

Test Type: S = Standard Penetration Test, C = Cone Penetration Test. N values reported are uncorrected. N value 50/275 = 50 blows in 275mm.

SUB SOIL Surveys Ltd MANCHESTER M29 7LD 0942 883565		Ground Level	Site Reference 2004/294	Borehole No. 2 1 of 1	
		Boring Method Light Cable Percussion			CASING 150mm to depth of 5.5m
		Site Wrexham Client Morris Developments (North) Limited			

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
12.01.05				Topsoil, clay, sand, stone, glass (MADE GROUND)		1D	0.10			
			0.70	Greyish brown very sandy gravelly CLAY/clayey SAND AND GRAVEL		2D	0.80			
			1.20	Stiff 'friable' brown very sandy CLAY/clayey SAND AND GRAVEL		3X	1.35	1.65	15	
			2.00	Dense brown clayey SAND AND GRAVEL		4X	1.95	2.25	37	
			2.50	Medium dense brown SAND AND GRAVEL with clayey zones		5X 6W	2.65 1.40	2.95	25	
12.01.05 13.01.05	2.5	1.4	2.95							
			3.50	Dense brown SAND AND GRAVEL with clayey zones		7X	3.65	3.95	30	
						8X	4.65	4.95	31	
						9D	5.00			
						10X	5.65	5.95	30	
13.01.05	5.5		5.95							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.00	1.60	1.40	1.40	1.40	Fast				

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
 Time Spent Chiselling/Boring when N>30: (1 hour)
 Time Spent Re-instating: (30 mins)
 Waiting water level rise - 20 minutes.

SUB SOIL Surveys Ltd	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 3 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.0m	
		Site Wrexham		
		Client Morris Developments (North) Limited		

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
13.01.05			1.20 1.80 </							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.00	1.70	1.50	1.40	1.40	Fast				

Water Added to Assist Boring at:

REMARKS

Standpipe inserted to 3.0m, gravel response zone 1.0-3.0m
Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 30 mins)
Waiting water level rise - 20 minutes.

1 of 1

Boring Method
Light Cable Percussion

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log	
							From	To			
14.01.05			0.30	Topsoil, clay, stone, sand (MADE GROUND)		1D	0.10				
				Firm/stiff and stiff grey and brown mottled sandy CLAY with organic flecks and sand lenses		2D	0.40				
			1.10	Medium dense to dense grey and brown SAND AND GRAVEL with clayey zones		3X	1.35	1.65	26		
			1.80	Cobble/boulder		4X	1.95	2.25	86		
			2.30	Dense brown clayey SAND AND GRAVEL		5D 6X	2.30 2.65	2.95	48		
			3.50	Very dense brown clayey SAND AND GRAVEL		7X	3.65	3.95	54		
			4.50	Dense brown clayey SAND AND GRAVEL		8D 9X	4.00 4.65	4.95	37		
						10X 11W	5.65 1.50	5.95	33		
14.01.05	5.0		5.95								

[illegible]

REMARKS

SUB SOIL Surveys Ltd	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 5 1 of 2
	Boring Method Light Cable Percussion		CASING 150mm to depth of 9.5m	
			Site Wrexham	
Client Morris Developments (North) Limited				

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
14.01.05				Topsoil, stone, brick, clay, sand (MADE GROUND)		1D	0.10			
			0.80	Firm dark brown mottled very sandy CLAY with much gravel/clayey SAND AND GRAVEL		2D	1.00			
						3X	1.35	1.65	13	
			1.80	Dense brown clayey SAND AND GRAVEL		4X	1.95	2.25	30	
						5D	2.30			
						6X	2.65	2.95	44	
						7W	1.50			
14.01.05 17.01.05	2.5	1.5	2.95							
			3.50	Dense and medium dense brown SAND AND GRAVEL with clayey zones		8X	3.65	3.95	37	
						9X	4.65	4.95	16	
						10D	5.00			
			5.60	Stiff brown sandy CLAY with some gravel and sand lenses		11X	5.65	5.95	34	
						12X	6.65	6.95	34	
			6.70	Dense brown silty SAND with bands of stiff and very stiff clay						
						13U	7.50	7.70		
						14X	7.85	8.15	45	
			8.00			15D	8.00			

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.		
2.00	1.60	1.50	1.50	1.50	Fast	
Water Added to Assist Boring at:						

Water level in Cased/Uncased Borehole on Completion depth below ground level		
Date	Water Level	Depth of Casing

Water Added to Assist Boring at:

REMARKS

Standpipe inserted to 3.0m, gravel response zone 1.0-3.0m
Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 45 mins)
Waiting water level rise - 20 minutes.

SUB SOIL		MANCHESTER M29 7LD 0942 883565		Ground Level		Site Reference 2004/294		Borehole No. 5																																																																																												
Boring Method Light Cable Percussion				CASING 150mm to depth of 9.5m		Site Wrexham																																																																																														
						Client Morris Developments (North) Limited																																																																																														
Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler From To		Number of Blows	Symbolic Log																																																																																										
17.01.05	9.5		9.95	Dense brown silty SAND with occasional bands of clay		16X	8.65	8.95	37																																																																																											
				17X		9.65	9.95	33																																																																																												
Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test <table border="1" style="width: 100%;"><thead><tr><th colspan="5">Water Level Observations during boring depths below ground level</th><th rowspan="2">Estimated Seepage</th><th rowspan="2">Depth of Casing when sealed N.S. - Not Sealed</th><th colspan="3">Water level in Cased/Uncased Borehole on Completion depth below ground level</th></tr><tr><th>depth observed</th><th>after 5 mins.</th><th>after 10 mins.</th><th>after 15 mins.</th><th>after 20 mins.</th><th>Date</th><th>Water Level</th><th>Depth of Casing</th></tr></thead><tbody><tr><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></tr><tr><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></tr><tr><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></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td colspan="6">Water Added to Assist Boring at:</td><td> </td><td> </td><td> </td></tr></tbody></table> REMARKS											Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level			depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.	Date	Water Level	Depth of Casing																																																																Water Added to Assist Boring at:								
Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level																																																																																													
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Water Added to Assist Boring at:																																																																																																				

SUB SOIL

17.01.05

17.01.05
18.01.05

18.01.05

Sample Key: B.Bulk

D. Disturbed

U.Open Tube

V.Vane

W.Water

X.Standard Penetration Test

Water Level Observations during boring
depths below ground level

Estimated
Seepage

Depth of Casing
when sealed
N.S. - Not Sealed

Water level in Cased/Uncased
Borehole on Completion
depth below ground level

depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.
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1.70	1.40	1.40	1.40	1.40
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[illegible]

Water Added to Assist Boring at:

Date	Water Level	Depth of Casing
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[illegible][illegible]

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[illegible]

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (45 mins)
Time Spent Re-instating: (15 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 7 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.5m	
			Site Wrexham	Client Morris Developments (North) Limited

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
18.01.05				Topsoil		1D	0.10			
			0.60	Sandy topsoil, stone, roots (MADE GROUND)		2D	0.80			
			1.20	Dark brown friable clayey SAND with organic zones onto very soft dark brown slightly organic sandy CLAY		3X	1.35	1.65	2	
						4X	1.95	2.25	1	
			2.50	Medium dense mottled brown clayey SAND AND GRAVEL		6X	2.65	2.95	26	
			2.70	Dense brown clayey SAND AND GRAVEL						
			3.50	Very dense brown SAND AND GRAVEL - occasional clay lenses		7X	3.65	3.95	52	
						8D	4.00			
						9X	4.65	4.95	73	
			5.50	Dense brown SAND and SAND AND GRAVEL		10X	5.65	5.95	34	
18.01.05	5.5		5.95			11W	1.80			

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.50	2.10	1.80	1.80	1.80	Fast				

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 30 mins)
Time Spent Re-instating: (15 mins)
Waiting water level rise - 20 minutes.

SUB SOIL	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 8 1 of 2
	Boring Method Light Cable Percussion		CASING 150mm to depth of 9.5m	
			Site Wrexham	Client Morris Developments (North) Limited

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
20.01.05			0.30	Topsoil		1D	0.10			
				Soft and firm clay, gravel, cobbles, organic zones (MADE GROUND)		2D	0.40			
						3D	1.10			
						4X	1.35	1.65	9	
						5X	1.95	2.10	51	
						6X	2.65	2.95	25	
			3.00	Very dense brown clayey SAND AND GRAVEL		7D	3.00			
						8X	3.65	3.95	67	
						9X	4.65	4.95	32	
			4.50	Dense brown clayey SAND AND GRAVEL		10D	5.00			
						11X	5.65	5.95	51	
			5.50	Very dense SAND AND GRAVEL - clayey zones						
						12X	6.65	6.95	39	
			6.50	Dense brown SAND AND GRAVEL		13D	7.00			
						14X	7.65	7.95	33	
			7.50	Very stiff dark brown very sandy poorly laminated CLAY with bands of sandy silt						
			8.00							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.40	2.00	1.70	1.50	1.50	Fast				

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (3 hrs)
Time Spent Re-instating: (30 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 8 2 of 2
	Boring Method Light Cable Percussion		CASING 150mm to depth of 9.5m	
			Site Wrexham	
Client Morris Developments (North) Limited				

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
20.01.05	9.5		8.30	Very stiff dark brown very sandy poorly laminated CLAY with bands of sandy silt						
				Dense brown SAND AND GRAVEL		15X	8.65	8.95	31	
						16X 17W	9.65 1.50	9.95	33	
			9.95							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing

Water Added to Assist Boring at:

REMARKS

SUB SOIL Surveys Ltd	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 9 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.5m	
		Site Wrexham		
		Client Morris Developments (North) Limited		

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
18.01.05			0.60	Sandy clayey topsoil with stone		1D	0.10			
				Soft brown sandy CLAY		2D	0.80			
18.01.05			1.2			3X	1.35	1.65	10	
19.01.05						4D	1.50			
			1.80	Medium dense brown and grey clayey SAND AND GRAVEL		5X	1.95	2.25	12	
			2.50	Very dense brown clayey SAND AND GRAVEL		6D 7X	2.30 2.65	2.95	55	
			3.50	Dense brown SAND AND GRAVEL with clayey zones		8X	3.65	3.95	35	
						9D	4.00			
						10X	4.65	4.95	46	
						11X 12W	5.65 1.40	5.95	35	
19.01.05	5.5		5.95							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
1.80	1.60	1.40	1.40	1.40	Fast				

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 15 mins)
Time Spent Re-instating: (15 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 10 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.5m	
		Site Wrexham		
		Client Morris Developments (North) Limited		

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
19.01.05				Sandy topsoil with ash, stone (MADE GROUND)		1D	0.10			
			0.70	Soft/firm brown very sandy CLAY/clayey SAND		2D	0.80			
						3X	1.35	1.65	13	
			1.40	Medium dense brown clayey SAND AND GRAVEL		4X	1.95	2.25	14	
						5D	2.30			
						6X	2.65	2.95	55	
			2.70	Very dense grey and brown clayey SAND AND GRAVEL						
						7X	3.65	3.95	35	
			3.50	Dense SAND AND GRAVEL with clayey zones		8D	4.00			
						9X	4.65	4.95	49	
19.01.05	5.5					10X	5.65			
			5.95			11W	1.50	5.95	34	

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.00	1.70	1.50	1.50	1.50	Fast				

Water Added to Assist Boring at:

REMARKS

Standpipe inserted to 3.0m, gravel response zone 1.0-3.0m
Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour)
Waiting water level rise - 20 minutes.

SUB SOIL	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 11 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.5m	
			Site Wrexham	Client Morris Developments (North) Ltd

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
06.01.05			0.10 0.20	Tarmac Stone hardcore Ash, brick, clay, organic clay, stone (MADE GROUND)		1D	0.30			
						2D	1.00			
			1.40	Soft grey organic CLAY		3X	1.35	1.65	4	
						4U	1.80	2.25		
			2.40	Dense brown clayey SAND AND GRAVEL		5D	2.20			
						6X	2.55	2.85	40	
						7X	3.65	3.95	48	
			4.50	Very dense brown SAND AND GRAVEL with clayey zones		8B	4.00	4.50		
						9X	4.65	4.95	59	
						10X	5.65			
						11W	1.80	5.95	76	
06.01.05	5.5		5.95							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.		
2.40	2.10	1.80	1.80	1.80	Fast	
Water Added to Assist Boring at:						

Water level in Cased/Uncased Borehole on Completion depth below ground level		
Date	Water Level	Depth of Casing

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 30 mins)
Time Spent Re-instating: (30 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 12 1 of 2
	Boring Method Light Cable Percussion		CASING 150mm to depth of 8.0m	
		Site Wrexham		
		Client Morris Developments (North) Ltd		

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
10.01.05			<							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.		
2.20	2.00	2.00	2.00	2.00	Fast	7.60
Water Added to Assist Boring at:						

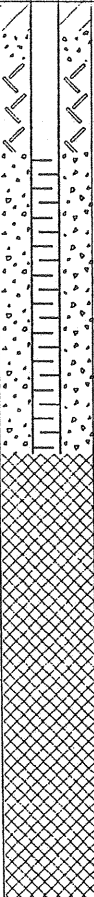
Water level in Cased/Uncased Borehole on Completion depth below ground level		
Date	Water Level	Depth of Casing

Water Added to Assist Boring at:

REMARKS

Standpipe inserted to 3.0m, gravel response zone 1.0-3.0m
Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 45 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 13 1 of 1
	Boring Method Light Cable Percussion		CASING 150mm to depth of 5.5m	
			Site Wrexham	
			Client Morris Developments (North) Ltd	

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Inst. Details	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log		
							From	To				
06.01.05	11.05 J1.05	1.6	0.10	Sandy topsoil		1D	0.10		6			
0.30			Stone hardcore (MADE GROUND)	2D		0.40						
			Stone, ash, clay (MADE GROUND)	3D		1.00						
				4X		1.35	1.65					
1.50 (Approx)				Soft and firm mottled grey and brown CLAY with a little gravel (POSSIBLE MADE OR DISTURBED GROUND)		5X	1.95	2.25			6	
2.25						6X	2.65	2.95			23	
2.40			Medium dense SAND AND GRAVEL	7D		3.00						
				8X		3.65	3.95	15				
				9X		4.65	4.95	31				
			Dense brown clayey SAND AND GRAVEL	10X		5.65	5.95	36				
	11W	2.20										
07.01.05	5.5		5.95									

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.		
2.40	2.20	2.20	2.20	2.20	Fast	NS
Water Added to Assist Boring at:						

Water level in Cased/Uncased Borehole on Completion depth below ground level		
Date	Water Level	Depth of Casing

Water Added to Assist Boring at:

REMARKS

Standpipe inserted to 3.0m, gravel response zone 1.0-3.0m
Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (45 mins)
Waiting water level rise - 20 minutes.

SUB SOIL <i>Surveys Ltd</i>	MANCHESTER M29 7LD 0942 883565	Ground Level	Site Reference 2004/294	Borehole No. 14 1 of 1
	Boring Method Light Cable Percussion	CASING 150mm to depth of 5.5m	Site Wrexham	Client Morris Developments (North) Ltd

Date	Depth of Casing Below G.L.	Water Level Morning & Evening	Depth of Strata Below G.L.	Description of Strata (all depths given in metres)	Reduced Level	No. & Type of Sample	Penetration of Sampler		Number of Blows	Symbolic Log
							From	To		
07.01.05				Clay, Topsoil, sand, brick, stone, concrete (MADE GROUND)		1D	0.10			
						2D	0.80			
						3X	1.35	1.65	2	
						4D	1.50			
						5X	1.95	2.25	12	
			2.30			6X	2.30	2.38	50	
			2.60	Concrete (MADE GROUND)		7X	2.75	3.05	38	
				Dense brown SAND AND GRAVEL with clayey zones						
						8X	3.65	3.95	32	
						9D	4.00			
			4.50			10X	4.65	4.95	36	
				Dense brown silty SAND and SAND AND GRAVEL - occasional clay lenses						
						11X 12W	5.65 1.80	5.95	40	
07.01.05	5.5		5.95							

Sample Key: B.Bulk D.Disturbed U.Open Tube V.Vane W.Water X.Standard Penetration Test

Water Level Observations during boring depths below ground level					Estimated Seepage	Depth of Casing when sealed N.S. - Not Sealed	Water level in Cased/Uncased Borehole on Completion depth below ground level		
depth observed	after 5 mins.	after 10 mins.	after 15 mins.	after 20 mins.			Date	Water Level	Depth of Casing
2.60	2.20	1.90	1.80	1.80	Fast	NS			

Water Added to Assist Boring at:

REMARKS

Time spent excavating by hand - 30 minutes
Time Spent Chiselling/Boring when N>30: (1 hour 30 mins)
Waiting water level rise - 20 minutes.



A P P E N D I X I

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Nicholls Colton Analytical
7 - 11 Harding Street
Leicester
LE1 4DH

Nicholls Colton Analytical

Cover Sheet

Analytical Test Report: 10873/GRM/001

Your Project Reference:	P4519	Samples Received on:	30.03.2012
Your Order Number:	GRM/P4519	Testing Instruction Received:	30.03.2012
Report Issue Number:	1	Sample Tested :	31.03.2012 to 12.04.2012
Samples Analysed	6 Soils	Report issued:	12.04.2012

Signed

James Gane
Manager - Data Logistics
Nicholls Colton Analytical

GRM Development Solutions Ltd
Laurus House
First Avenue, Centrum 100
Burton Upon Trent
Staffordshire
DE14 2WH

Note:

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 28 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with NCA method statement MS - CL - Sample Prep, oven dried at <105°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2.

Stone Content was determined in accordance with NCA method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

With the exception of Sulphate and pH which are crushed over the 2mm test sieve, Concentrations are reported as a percentage mass of the dry soil passing the 10mm BS test sieve, where appropriate these results have been corrected for moisture content but not stone content.

Samples were received in containers suitable for MCERTS analysis, this testing therefore is covered by MCERTS accreditation

Samples were provided by client.



10873/GRM/001

Project Reference - P4519

Analytical Test Results - Soil Samples

NCA Reference			12-6533	12-6534	12-6536	12-6537	12-6538	12-6539
Client Sample Reference			TP1	TP1	TP2	TP2	TP3	TP3
Client Sample Location			TP1	TP1	TP2	TP2	TP3	TP3
Depth (m)			0.1-0.2	0.4-0.6	0.1-0.2	0.3-0.5	0.4-0.6	0.8-1.0
Top of Sample (m)			0.10	0.40	0.10	0.30	0.40	0.80
Date of Sampling			26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012
Time of Sampling			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Sample Matrix			Sand	-	Sand	Sand	Sand	Sand
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	11.1	-	13.4	17.8	-	18.9
Cadmium	(mg/kg)	MCERTS	< 2.5	-	< 2.5	< 2.5	-	< 2.5
Chromium (Total)	(mg/kg)	MCERTS	16.1	-	40.8	26.4	-	25.3
Copper	(mg/kg)	MCERTS	18.4	-	48.7	68.0	-	36.6
Lead	(mg/kg)	MCERTS	39.4	-	262	1020	-	195
Mercury	(mg/kg)	UKAS	< 0.7	-	1.0	2.6	-	< 0.7
Nickel	(mg/kg)	MCERTS	17.6	-	26.5	26.1	-	26.5
Selenium	(mg/kg)	None	< 5	-	< 5	< 5	-	< 5
Zinc	(mg/kg)	MCERTS	171	-	341	827	-	236
Total Phenols	(mg/kg)	MCERTS	< 1.1	-	< 1.1	< 1.1	-	< 1.2
Chromium (Hexavalent)	(mg/kg)	None	1.5	-	3.9	2.3	-	5.8
Cyanide (Total)	(mg/kg)	None	< 1.1	-	< 1.1	< 1.1	-	< 1.2
pH	pH Units	UKAS	8.0	-	7.5	8.2	-	7.7
SOM	(%)	UKAS	3.3	-	7.3	7.3	-	9.4
Sulphate	(mg/l)	UKAS	16.5	-	15.5	19.7	-	12.4
Acenaphthene	(mg/kg)	MCERTS	<0.1	-	<0.1	<0.1	-	0.1
Acenaphthylene	(mg/kg)	UKAS	<0.1	-	<0.1	<0.1	-	<0.1
Anthracene	(mg/kg)	UKAS	<0.1	-	<0.1	0.1	-	0.9
Benzo (a) anthracene	(mg/kg)	MCERTS	0.8	-	0.4	0.8	-	2.8
Benzo (a) pyrene	(mg/kg)	MCERTS	1.3	-	0.5	0.8	-	3.3
Benzo (b) fluoranthene	(mg/kg)	MCERTS	1.6	-	0.7	1.1	-	4.0
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	1.1	-	0.4	0.7	-	2.3
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.5	-	0.2	0.3	-	1.3
Chrysene	(mg/kg)	MCERTS	0.9	-	0.5	1.0	-	3.1
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	0.2	-	<0.1	<0.1	-	0.4
Fluoranthene	(mg/kg)	MCERTS	1.3	-	0.9	1.7	-	5.9
Fluorene	(mg/kg)	MCERTS	<0.1	-	<0.1	<0.1	-	0.2
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	1.1	-	0.4	0.6	-	2.3
Naphthalene	(mg/kg)	MCERTS	0.1	-	0.4	0.2	-	0.3
Phenanthrene	(mg/kg)	MCERTS	0.4	-	0.5	0.7	-	3.2
Pyrene	(mg/kg)	MCERTS	1.3	-	0.9	1.5	-	5.3
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	10.9	-	6.3	9.8	-	35.4
Asbestos	-	UKAS	-	Chrysotile	-	Amosite	No asbestos detected	-

Key: UKAS - accredited to ISO 17025, MCERTS - accredited to ISO 17025 and environment agency soil standard

10873/GRM/001

Project Reference - P4519

Analytical Test Results - Soil Samples

NCA Reference			12-6540	12-6541	12-3543
Client Sample Reference			TP5	TP5	TP7
Client Sample Location			TP5	TP5	TP7
Depth (m)			0.2-0.4	0.5-0.7	0.1-0.25
Top of Sample (m)			0.20	0.50	0.10
Date of Sampling			26.03.2012	26.03.2012	26.03.2012
Time of Sampling			Not provided	Not provided	Not provided
Sample Matrix			-	Clay	Loam
Determinant	Units	Accreditation			
Arsenic	(mg/kg)	MCERTS	-	7.6	16.0
Cadmium	(mg/kg)	MCERTS	-	< 2.5	< 2.5
Chromium (Total)	(mg/kg)	MCERTS	-	24.7	28.9
Copper	(mg/kg)	MCERTS	-	16.9	39.4
Lead	(mg/kg)	MCERTS	-	48.0	611
Mercury	(mg/kg)	UKAS	-	< 0.7	< 0.7
Nickel	(mg/kg)	MCERTS	-	29.7	47.7
Selenium	(mg/kg)	None	-	< 5	< 5
Zinc	(mg/kg)	MCERTS	-	61.1	153
Total Phenols	(mg/kg)	MCERTS	-	< 1.1	< 1.3
Chromium (Hexavalent)	(mg/kg)	None	-	2.1	5.2
Cyanide (Total)	(mg/kg)	None	-	< 1.1	< 1.3
pH	pH Units	UKAS	-	7.5	6.9
SOM	(%)	UKAS	-	2.2	10.1
Sulphate	(mg/l)	UKAS	-	15.1	29.6
Acenaphthene	(mg/kg)	MCERTS	-	<0.1	<0.1
Acenaphthylene	(mg/kg)	UKAS	-	<0.1	<0.1
Anthracene	(mg/kg)	UKAS	-	<0.1	0.2
Benzo (a) anthracene	(mg/kg)	MCERTS	-	<0.1	0.6
Benzo (a) pyrene	(mg/kg)	MCERTS	-	<0.1	0.5
Benzo (b) fluoranthene	(mg/kg)	MCERTS	-	<0.1	0.7
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	-	<0.1	0.4
Benzo (k) fluoranthene	(mg/kg)	MCERTS	-	<0.1	0.2
Chrysene	(mg/kg)	MCERTS	-	<0.1	0.7
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	-	<0.1	<0.1
Fluoranthene	(mg/kg)	MCERTS	-	<0.1	1.6
Fluorene	(mg/kg)	MCERTS	-	<0.1	<0.1
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	-	<0.1	0.3
Naphthalene	(mg/kg)	MCERTS	-	<0.1	0.1
Phenanthrene	(mg/kg)	MCERTS	-	<0.1	1.3
Pyrene	(mg/kg)	MCERTS	-	<0.1	1.4
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	-	<1.6	8.4
Asbestos	-	UKAS	No asbestos detected	-	-

Key: UKAS - accredited to ISO 17025, MCERTS - accredited to ISO 17025 and environment agency soil standard

10873/GRM/001

Project Reference - P4519

Analytical Test Results - Soil Samples

NCA Reference			12-6534	12-6535	12-6538	12-3541	12-6542	12-6544
Client Sample Reference			TP1	TP1	TP3	TP5	TP6	TP7
Client Sample Location			TP1	TP1	TP3	TP5	TP6	TP7
Depth (m)			0.4-0.6	1.1-1.3	0.4-0.6	0.5-0.7	0.5-0.7	0.3-0.5
Top of sample (m)			0.40	1.10	0.40	0.50	0.50	0.30
Date of Sampling			26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012
Time of Sampling			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Sample Matrix			Sand	Clay	Sand	Clay	Clay	Clay
Determinant	Units	Accreditation						
Aliphatics								
>C ₅ to C ₆	(mg/kg)	None	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
>C ₆ to C ₈	(mg/kg)	None	< 0.03	0.22	< 0.03	< 0.03	< 0.03	0.14
>C ₈ to C ₁₀	(mg/kg)	None	1.40	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
>C ₁₀ to C ₁₂	(mg/kg)	None	207	< 13	< 11	< 11	< 11	< 13
>C ₁₂ to C ₁₆	(mg/kg)	None	785	< 13	< 11	14.0	< 11	< 13
>C ₁₆ to C ₂₁	(mg/kg)	None	674	< 13	< 11	< 11	< 11	< 13
>C ₂₁ to C ₃₅	(mg/kg)	None	363	< 13	< 11	13.0	< 11	< 13
Aromatics								
>C ₅ to C ₇	(mg/kg)	None	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
>C ₇ to C ₈	(mg/kg)	None	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
>C ₈ to C ₁₀	(mg/kg)	None	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
>C ₁₀ to C ₁₂	(mg/kg)	None	51	< 13	< 11	< 11	< 11	< 13
>C ₁₂ to C ₁₆	(mg/kg)	None	237	< 13	< 11	< 11	< 11	< 13
>C ₁₆ to C ₂₁	(mg/kg)	None	1026	< 13	< 13	< 11	< 11	< 13
>C ₂₁ to C ₃₅	(mg/kg)	None	< 11	21	44	16	13.0	15



10873/GRM/001

Project Reference - P4519

Sample Descriptions

NCA Reference	Client Sample Reference	Sample Depth	Description	Moisture Content (%)	Stone Content (%)
12-6533	TP1	0.1-0.2	Brown gravelly sand with organic material	10	2.3
12-6534	TP1	0.4-0.6	Brown-black silty sandy crushed rock	7.6	61
12-6535	TP1	1.1-1.3	Brown silty clay with some organic material	30	0.0
12-6536	TP2	0.1-0.2	Brown gravelly sand with organic material	11	11
12-6537	TP2	0.3-0.5	Brown silty gravelly sand with crushed brick and some organic matter (Fill)	14	20
12-6538	TP3	0.4-0.6	Brown clayey gravelly sand	12	17
12-6539	TP3	0.8-1.0	Dark brown silty gravelly sand with organic material	18	4.2
12-6540	TP5	0.2-0.4	Soil	-	-
12-6541	TP5	0.5-0.7	Brown gravelly silty clay with some organic material	13	5.2
12-6543	TP7	0.1-0.25	Brown sandy clayey silt with organic material	32	2.1
12-6544	TP7	0.3-0.5	Brown gravelly silty clay with some organic material	27	2.9



10873/GRM/001

Project Reference - P4519

Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Soil	Metals	Air Dried	In house method statement - MS - CL - ICP metals
Soil	PAH	Air Dried	In house method statement - MS - CL - PAH
Soil	Phenols	As Received	In house method statement - MS - CL - Phenols (Skalar)
Soil	Chromium (hexavalent)	As Received	In house method statement - MS - CL - Chromium (Hexavalent)
Soil	Cyanide	As Received	In house method statement - MS - CL - Cyanide by Skalar
Soil	pH	Air Dried	BS 1377, Part 3, 1990
Soil	SOM	Air Dried	In house method statement - MS - CL - TOC
Soil	Sulphate	Air Dried	In house method statement - MS - CL - Anions
Soil	CWG	As Received	In house method statement - MS - CL - EPH and VPH
Soil	Asbestos	-	Analysis subcontracted to Lucion

LABORATORY RESULTS - Chemical Analysis

Project: Wrexham

Project No: 2004/294

[illegible]

Chemistry Laboratory Certificate

Client: Sub Soil Consultancy Services Limited

Kennedy Road, off Chaddock Lane, Astley, Manchester, M29 7LD

Site: Wrexham 2004/294

Date Tested: 28/01/05, 31/01/05, 01/02/05, 03/02/05, 04/02/05, 07/02/05

Methodology: CTP01, CTP07, CTP09c, CTP11a, CTP11b, CTP11h, CTP11i, CTP12, CTP15a, CTP21a,
PAH(part sp), Stones

Date Reported: 7 February, 2005

Date Received: 25 January, 2005

Sample Type: Solid

Certificate No: 05/0384/50/C1

File No: 05/0384/50

Client Ref: 2005/621/Chem/HA
B/2004/294

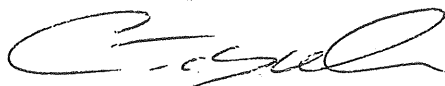
Lab sample ref	N261742	N261743	N261744	N261745	N261746	N261747
Client sample ref	BH1 - D1 - 0.1m	BH2 - D1 - 0.1m	BH3 - D2 - 1.1m	BH4 - D1 - 0.1m	BH5 - D1 - 0.1m	BH6 - D2 - 0.4m
Date sampled						
Sample matrix (see notes page)	S	S	S	S	S	S

Analyte	Units	ISO17025	MCERTS	LOD						
pH		Y	Y		5.2	5.2	7.4	4.9	7.3	6.6
Sulphate (water soluble) _s	g/l	Y	Y	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total) _s	mg/kg	N	N	1	1	35	<1	<1	2	<1
TPH (FT-IR) _{SM}	mg/kg	N	N/A	10	24	83	<10	15	13	<10
Arsenic _s	mg/kg	Y	Y	5	13	18	7	15	10	10
Boron (water soluble) _s	mg/kg	Y	N	1	<1	<1	<1	<1	<1	<1
Cadmium _s	mg/kg	Y	N	0.5	0.6	0.9	<0.5	0.6	<0.5	0.8
Chromium (total) _s	mg/kg	Y	Y	5	22	26	19	21	11	28
Chromium (VI) _s	mg/kg	Y	N/A	10	-	<10	-	-	-	<10
Copper _s	mg/kg	Y	Y	5	32	80	14	35	42	22
Lead _s	mg/kg	Y	Y	5	254	252	72	310	69	53
Mercury _s	mg/kg	Y	N	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Nickel _s	mg/kg	Y	Y	5	29	108	24	36	19	38
Selenium _s	mg/kg	Y	N	5	<5	<5	<5	<5	<5	<5
Zinc _s	mg/kg	Y	N	5	91	191	40	101	80	64

Notes

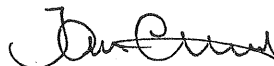
- Analyses suffixed 'S' were performed on the sample dried at 35°C.
- Analyses suffixed 'SM' were performed on the sample as received.
- Natural stones (pebbles, gravels etc.) which do not pass a 10mm sieve are excluded from air dried analyses and results corrected accordingly.
- # indicates separate report appended.
- Tests marked * indicate subcontracted analyses.

Prepared by:



C Tarbuck
Account Manager

Approved by:



J Gustafson
Laboratory Manager

Chemistry Laboratory Certificate

Client: Sub Soil Consultancy Services Limited
Kennedy Road, off Chaddock Lane, Astley, Manchester, M29 7LD

Site: Wrexham 2004/294

Date Tested: 28/01/05, 31/01/05, 01/02/05, 03/02/05, 04/02/05, 07/02/05

Methodology: CTP01, CTP07, CTP09c, CTP11a, CTP11b, CTP11h, CTP11i, CTP12, CTP15a, CTP21a,
PAH(part sp), Stones

Date Reported: 7 February, 2005

Date Received: 25 January, 2005

Sample Type: Solid

Certificate No: 05/0384/50/C1

File No: 05/0384/50

Client Ref: 2005/621/Chem/HA
B/2004/294

Lab sample ref	N261748	N261749	N261750	N261751	N261752	N261753
Client sample ref	BH7 - D2 - 0.8m	BH8 - D2 - 0.4m	BH9 - D1 - 0.1m	BH10 - D2 - 0.8m	BH11 - X3 - 1.2-1.65m	BH12 - D2 - 1.0m
Date sampled						
Sample matrix (see notes page)	S	S	S	S	S	S

Analyte	Units	ISO17025	MCERTS	LOD						
pH		Y	Y		6.8	7.1	7.5	6.5	8.2	7.7
Sulphate (water soluble) _s	g/l	Y	Y	0.1	<0.1	<0.1	<0.1	<0.1	0.6	1.3
PAH (total) _s	mg/kg	N	N	1	2	<1	2	<1	8	9
TPH (FT-IR) _{SM}	mg/kg	N	N/A	10	<10	<10	16	<10	29	216
Arsenic _s	mg/kg	Y	Y	5	11	9	12	5	9	11
Boron (water soluble) _s	mg/kg	Y	N	1	<1	<1	<1	<1	<1	<1
Cadmium _s	mg/kg	Y	N	0.5	0.9	0.6	0.6	<0.5	<0.5	0.6
Chromium (total) _s	mg/kg	Y	Y	5	17	19	16	15	21	24
Copper _s	mg/kg	Y	Y	5	46	24	54	20	30	55
Lead _s	mg/kg	Y	Y	5	288	210	96	675	421	127
Mercury _s	mg/kg	Y	N	0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.3
Nickel _s	mg/kg	Y	Y	5	114	30	22	21	23	16
Selenium _s	mg/kg	Y	N	5	<5	<5	<5	<5	<5	<5
Zinc _s	mg/kg	Y	N	5	138	64	119	58	67	127

Notes

- Analyses suffixed 'S' were performed on the sample dried at 35°C.
- Analyses suffixed 'SM' were performed on the sample as received.
- Natural stones (pebbles, gravels etc.) which do not pass a 10mm sieve are excluded from air dried analyses and results corrected accordingly.
- # indicates separate report appended.
- Tests marked * indicate subcontracted analyses.

Prepared by:



C Tarbuck
Account Manager

Approved by:



J Gustafson
Laboratory Manager

Chemistry Laboratory Certificate

Client: Sub Soil Consultancy Services Limited
Kennedy Road, off Chaddock Lane, Astley, Manchester, M29 7LD

Site: Wrexham 2004/294

Date Tested: 28/01/05, 31/01/05, 01/02/05, 03/02/05, 04/02/05, 07/02/05

Methodology: CTP01, CTP07, CTP09c, CTP11a, CTP11b, CTP11h, CTP11i, CTP12, CTP15a, CTP21a, PAH(part sp), Stones

Date Reported: 7 February, 2005

Date Received: 25 January, 2005

Sample Type: Solid

Certificate No: 05/0384/50/C1

File No: 05/0384/50

Client Ref: 2005/621/Chem/HA
B/2004/294

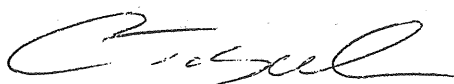
Lab sample ref	N261754	N261755	N261756
Client sample ref	BH13 - D3 - 1.0m	BH14 - D2 - 0.8m	BH14 - D4 - 1.5m
Date sampled			
Sample matrix (see notes page)	S	S	S

Analyte	Units	ISO17025	MCERTS	LOD			
pH		Y	Y		7.8	8.7	8.0
Sulphate (water soluble) _s	g/l	Y	Y	0.1	0.4	0.2	0.2
PAH (total) _s	mg/kg	N	N	1	48	<1	1
TPH (FT-IR) _{SM}	mg/kg	N	N/A	10	390	12	28
Arsenic _s	mg/kg	Y	Y	5	9	9	10
Boron (water soluble) _s	mg/kg	Y	N	1	<1	<1	<1
Cadmium _s	mg/kg	Y	N	0.5	0.7	<0.5	<0.5
Chromium (total) _s	mg/kg	Y	Y	5	14	15	21
Copper _s	mg/kg	Y	Y	5	38	22	30
Lead _s	mg/kg	Y	Y	5	132	79	302
Mercury _s	mg/kg	Y	N	0.1	0.3	0.4	0.2
Nickel _s	mg/kg	Y	Y	5	15	15	26
Selenium _s	mg/kg	Y	N	5	<5	<5	<5
Zinc _s	mg/kg	Y	N	5	97	76	76

Notes

- Analyses suffixed 'S' were performed on the sample dried at 35°C.
- Analyses suffixed 'SM' were performed on the sample as received.
- Natural stones (pebbles, gravels etc.) which do not pass a 10mm sieve are excluded from air dried analyses and results corrected accordingly.
- # indicates separate report appended.
- Tests marked * indicate subcontracted analyses.

Prepared by:



C Tarbuck
Account Manager

Approved by:



J Gustafson
Laboratory Manager



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7 - 11 Harding Street
Leicester
LE1 4DH

Nicholls Colton Analytical

Cover Sheet

Analytical Test Report: 10874/GRM/001

Your Project Reference:	P4519	Samples Received on:	30.03.2012
Your Order Number:	GRM/P4519	Testing Instruction Received:	30.03.2012
Report Issue Number:	1	Sample Tested :	31.03.2012 to 12.04.2012
Samples Analysed	9 Soils	Report issued:	12.04.2012

Signed

James Gane
Manager - Data Logistics
Nicholls Colton Analytical

GRM Development Solutions
Laurus House
First Avenue, Centrum 100
Burton on Trent
Staffordshire
DE14 2WH

Note:

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 28 days after issue of this report unless otherwise requested.

Stone Content was determined in accordance with NCA method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Samples were provided by client



10874/GRM/001

Project Reference - P4519

Analytical Test Results - Soil Samples

NCA Reference			12-6545	12-6546	12-6547	12-6548	12-6549	12-6550
Client Sample Reference			TP1	TP2	TP3	TP3	TP4	TP5
Client Sample Location			TP1	TP2	TP3	TP3	TP4	TP5
Depth (m)			1.5-1.7	2.3-2.5	1.7-2.0	2.3-2.5	1.2-1.4	1.2-1.4
Date of Sampling			26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012	26.03.2012
Time of Sampling			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Determinant	Units	Accreditation						
Water soluble sulphate	mg/l	UKAS	18.6	72.8	43.5	62.4	24.2	< 10
pH Value	pH Units	UKAS	7.8	7.7	7.7	7.5	7.6	8.0



10874/GRM/001

Project Reference - P4519

Analytical Test Results - Soil Samples

NCA Reference			12-6551	12-6552	12-6553
Client Sample Reference			TP6	TP6	TP7
Client Sample Location			TP6	TP6	TP7
Depth (m)			1.0-1.2	2.1-2.3	0.9-1.1
Date of Sampling			26.03.2012	26.03.2012	26.03.2012
Time of Sampling			Not provided	Not provided	Not provided
Determinant	Units	Accreditation			
Water soluble sulphate	mg/l	UKAS	26.3	10.4	10.7
pH Value	pH Units	UKAS	7.5	7.9	7.7



10874/GRM/001

Project Reference - P4519

Sample Descriptions

NCA Reference	Client Sample Reference	Sample Depth	Description
12-6545	TP1	1.5-1.7	Brown slightly sandy slightly gravelly clay
12-6546	TP2	2.3-2.5	Brown sandy gravelly clay
12-6547	TP3	1.7-2.0	Brown slightly clayey gravelly silty sand with organic material
12-6548	TP3	2.3-2.5	Brown sandy gravelly clay
12-6549	TP4	1.2-1.4	Grey/brown gravelly sand
12-6550	TP5	1.2-1.4	Brown slightly gravelly silty sand
12-6551	TP6	1.0-1.2	Brown/grey sandy clay
12-6552	TP6	2.1-2.3	Brown sandy gravel
12-6553	TP7	0.9-1.1	Brown slightly gravelly sandy clay



10874/GRM/001

Project Reference - P4519

Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Soil	pH	Air Dried	BS 1377, Part 3, 1990
Soil	Sulphate	Air Dried	In house method statement - MS - CL - Anions



Nicholls Colton Analytical
7 - 11 Harding Street
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Nicholls Colton Analytical

Cover Sheet

Analytical Test Report: 11065/GRM/001

Your Project Reference:	P4519 Wrexham	Samples Received on:	26.04.2012
Your Order Number:	GRM/P4519	Testing Instruction Received:	26.04.2012
Report Issue Number:	1	Sample Tested :	27.04.2012 to 02.05.2012
Samples Analysed	6 Waters	Report issued:	02.05.2012

Signed

James Gane
Manager - Data Logistics
Nicholls Colton Analytical

GRM Development Solutions Ltd
Laurus House, First Avenue
Centrum 100
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Note:

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 28 days after issue of this report unless otherwise requested.

Samples were provided by client

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Project Reference - P4519 Wrexham

Analytical Test Results - Waters

NCA Reference			12-8558	12-8559	12-8560	12-8561	12-8562	12-8563
Client Sample Reference			WS3	WS2	BH8	BH3	Upstream	Downstream
Client Sample Location			WS3	WS2	BH8	BH3	Upstream	Downstream
Depth (m)			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Date of Sampling			23.04.2012	23.04.2012	23.04.2012	23.04.2012	23.04.2012	23.04.2012
Time of Sampling			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Sample Matrix			Water	Water	Water	Water	Water	Water
Determinant	Units	Accreditation						
Arsenic	(µg/l)	None	29.8	62.3	54.1	41.7	4.0	< 2.5
Cadmium	(µg/l)	None	< 2.5	< 2.5	< 2.5	6.2	< 2.5	< 2.5
Chromium (Total)	(µg/l)	None	< 2.5	< 2.5	< 2.5	6.4	< 2.5	< 2.5
Copper	(µg/l)	None	5.6	12.2	10.3	98.6	7.1	< 1
Iron	(µg/l)	None	1980	795	224	329	78.9	128
Lead	(µg/l)	None	< 1	10.3	< 1	47.3	< 1	< 1
Mercury	(µg/l)	None	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	(µg/l)	None	< 2.5	12.5	< 2.5	19.6	< 2.5	< 2.5
Selenium	(µg/l)	None	< 1	< 1	< 1	< 1	< 1	< 1
Zinc	(µg/l)	None	6.1	9.7	< 1	51.2	< 1	< 1
Phenol	(µg/l)	None	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cyanide	(mg/l)	None	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
pH	pH Units	UKAS	7.2	7.0	7.3	7.2	7.7	8.0
Chloride	(mg/l)	None	91.5	70.1	130	82.8	94.6	68.4
Sulphate	(mg/l)	None	94.4	105	67.8	80.3	115	110
Ammonical Nitrogen	(mg/l)	None	0.43	8.74	0.20	<0.10	<0.10	<0.10
Alkalinity	(mg/l)	None	313	398	307	288	183	191
Hardness	(mg/l)	None	325	425	350	275	220	223
Benzo (a) pyrene	(µg/l)	None	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo (b) fluoranthene	(µg/l)	None	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo (g, h, i) perylene	(µg/l)	None	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo (k) fluoranthene	(µg/l)	None	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno (1, 2, 3,-cd) pyrene	(µg/l)	None	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	(µg/l)	None	0.20	0.56	0.22	0.02	0.15	0.23
Total TPH	(µg/l)	None	< 10	-	< 10	-	-	-

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Project Reference - P4519 Wrexham

Analytical Test Results - Waters

NCA Reference			12-8559	12-8561	12-8562	12-8563
Client Sample Reference			WS2	BH3	Upstream	Downstream
Client Sample Location			WS3	BH4	Upstream	Downstream
Depth (m)			Not provided	Not provided	Not provided	Not provided
Top of sample (m)			Not provided	Not provided	Not provided	Not provided
Date of Sampling			23.04.2012	23.04.2012	23.04.2012	23.04.2012
Time of Sampling			Not provided	Not provided	Not provided	Not provided
Sample Matrix			Water	Water	Water	Water
Determinant	Units	Accreditation				
Aliphatics						
>C ₅ to C ₆	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₆ to C ₈	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₈ to C ₁₀	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₀ to C ₁₂	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₂ to C ₁₆	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₆ to C ₂₁	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₂₁ to C ₃₅	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
Aromatics						
>C ₅ to C ₆	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₆ to C ₈	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₈ to C ₁₀	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₀ to C ₁₂	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₂ to C ₁₆	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₁₆ to C ₂₁	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1
>C ₂₁ to C ₃₅	(µg/l)	None	< 0.1	< 0.1	< 0.1	< 0.1

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Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Water	Metals	As Received	In house method statement - MS - CL - ICP Water
Water	PAH	As Received	In house method statement - MS - CL - PAH Water
Water	Phenols	As Received	Analysis subcontracted
Water	pH	As Received	BS 1377, Part 3, 1990
Water	Cyanide	As Received	In house method statement - MS - CL - Cyanide
Water	Sulphate	As Received	In house method statement - MS - CL - Anions
Water	Chloride	As Received	In house method statement - MS - CL - Anions
Water	Hardness	As Received	In house method statement - MS - CL - Calcium and Hardness
Water	Alkalinity	As Received	In house method statement - MS - CL - Alkalinity
Water	Ammonical Nitrogen	As Received	In house method statement - MS - CL - AQ Ammonia
Water	TPH	As Received	Analysis subcontracted
Water	TPHCWG	As Received	Analysis subcontracted

LABORATORY RESULTS-Classification, Strength, U100 Descriptions

Project: Wrexham

Project No: 2004/294

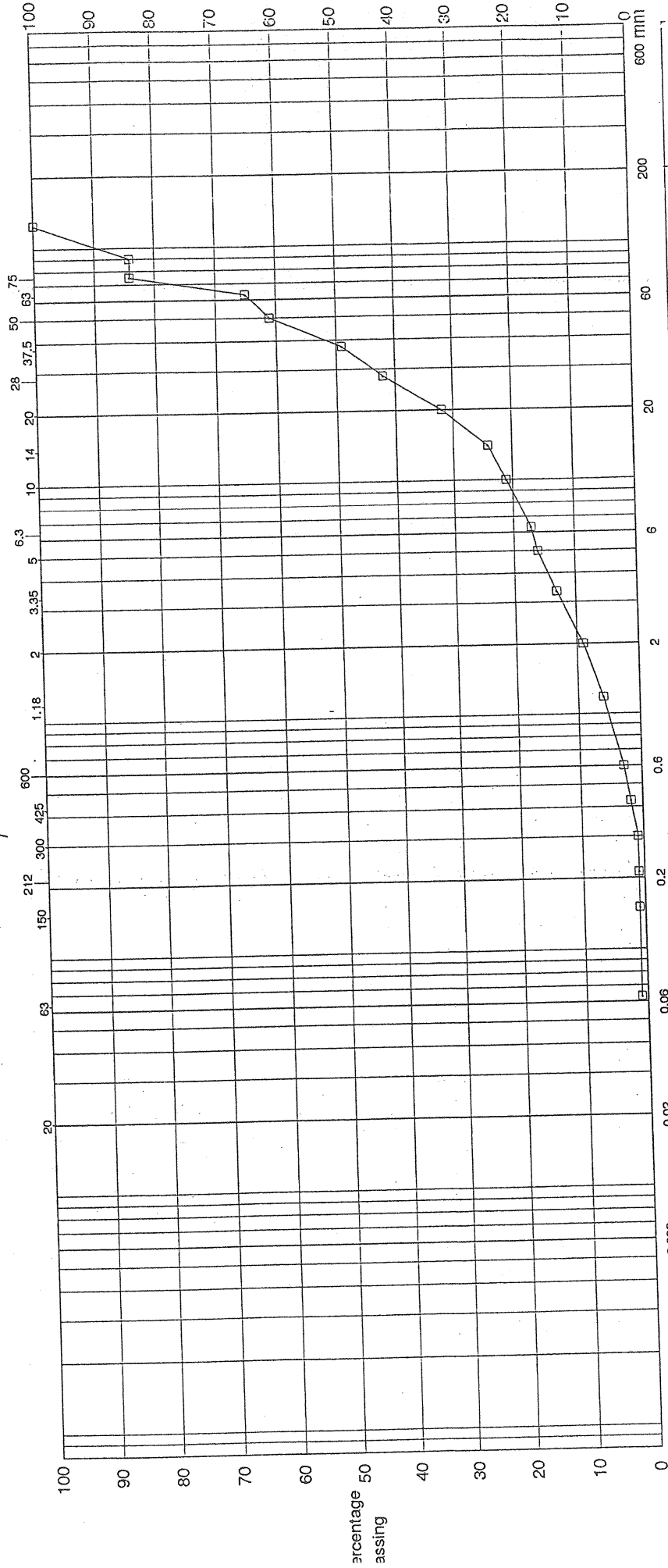
Sample				Classification					Strength					
Hole	Depth	Type	Description	% pass. .425 mm	I _P	W _L	W _P	W%	Test	γ_b Mg/m ³	σ_3 kN/m ²	$\sigma_1 \cdot \sigma_3$ kN/m ²	c kN/m ²	ϕ deg
6	1.20	4U	Firm light grey and brown mottled very sandy CLAY with some gravel, sand lenses, roots and organic fibres					23	U2	2.05	138	142	73	0
	1.65										414	148		
12	7.50	12U	Very stiff brown sandy CLAY with a little gravel and sand lenses					14	U2	2.23	138	518	249	0
	7.95										414	477		
	8.50	14U	Very stiff brown laminated CLAY with a little gravel					14	U3	2.22	138	705	433	0
	8.95										276	983		
											414	908		
	9.50	16U	Very stiff brown laminated CLAY					14	U3	2.23	138	583	463	0
	9.95										276	1013		
											414	1184		
Remarks														

SUB SOIL

PARTICLE SIZE DISTRIBUTION

Sieve Size Percentage by Mass Passing Sieve	Size (microns)										Size (mm)										
	63	150	212	300	425	600	1.18	2.00	3.35	5.0	6.3	10	14	20	28	37.5	50	63	75	90	125
	1	1	1	1	2	3	6	9	13	16	17	21	24	32	42	49	61	65	84	84	100

$\mu\text{m} \leftarrow \rightarrow \text{mm}$

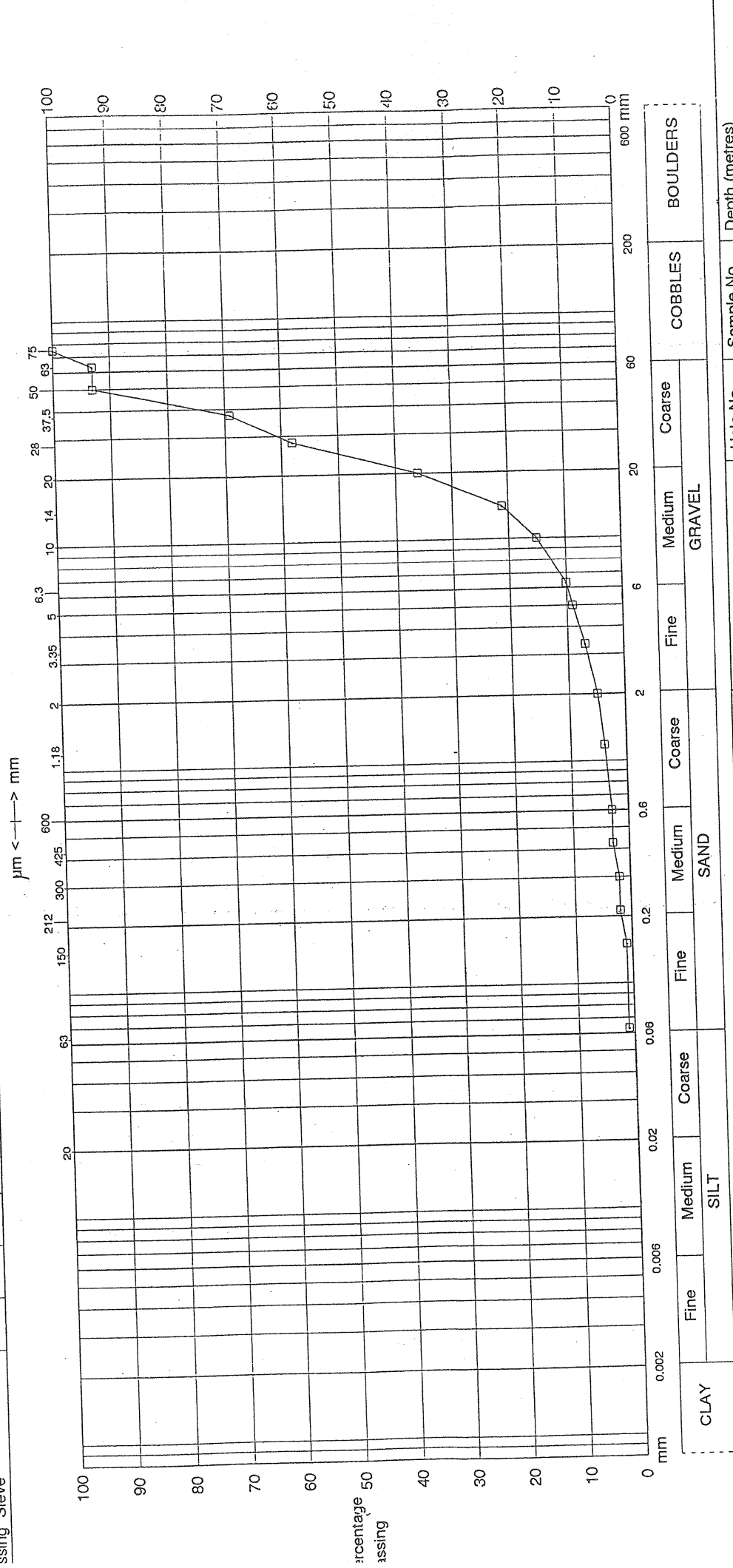


CLAY			SAND			GRAVEL			COBBLES			BOULDERS		
Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

Description of Sample Brown sandy GRAVEL with some cobbles	Remarks		Method BS1377:Part 2:1990:9.2		Hole No. 1		Sample No. 8B		Depth (metres) 4.00 - 4.50	
			Site Wrexham							

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size (microns)										Size (mm)									
	63	75	150	212	300	425	600	1.18	2	3.35	5	6.3	10	15	20	28	37.5	50	63	75
Percentage by Mass passing Sieve	1	-	1	2	2	3	3	4	5	7	9	10	15	21	36	58	69	93	93	100



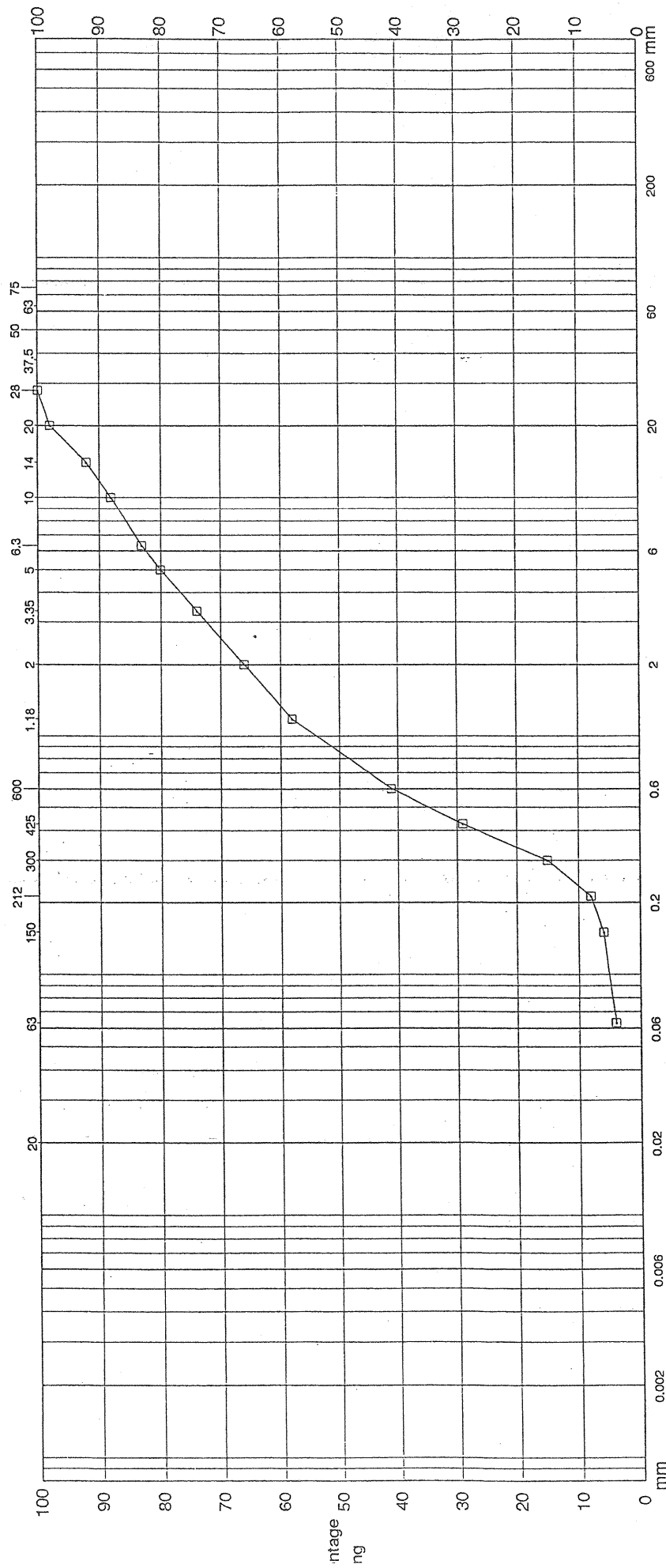
PARTICLE SIZE DISTRIBUTION

Size (microns)

Size (mm)

Size	63	75	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75
Percentage by Mass	4	-	6	8	15	29	41	58	66	74	80	83	88	92	98	100	-	-	-	-
Retaining Sieve																				

$\mu\text{m} \leftarrow \rightarrow \text{mm}$



CLAY	SILT			SAND			GRAVEL			BOULDERS		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS	

Description of Sample light brown very gravelly SAND	Remarks		Method BS1377:Part 2:1990:9.2	Hole No. 5	Sample No. 9&10X	Depth (metres) 4.50 - 5.00
	Site Wrexham		2004/294			

LABORATORY RESULTS - Chemical Analysis

Project: Wrexham

Project No: 2004/294

[illegible]



A P P E N D I X L

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	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Residential with Plant Uptake		
CONTAMINANT	1%	2.50%	6%
^a Arsenic	32	32	32
^a Cadmium	10	10	10
^b Chromium III	614	614	614
^b Chromium VI	4.15	4.15	4.15
^c Lead	450	450	450
^d Mercury	170	170	170
^a Selenium	350	350	350
^a Nickel	130	130	130
^b Phenols	184	290	415
^b Copper	2330	2330	2330
^b Zinc	3,750	3750	3750
^e Cyanide	34	34	34
^b Benzene	0.08	0.157	0.332
^b Toluene	119	270	611
^b Ethylbenzene	65	154	354
^b <i>o</i> - xylene	45	106	246
^b <i>m</i> - xylene	44	103	240
^b <i>p</i> - xylene	42	98.2	228
^{b/r} Acenaphthene	210(326)	480	1000
^{b/r} Acenaphthylene	168	400	850
^{b/r} Anthracene	2300	4900	9200
^b Benzo(a)anthracene	3.1	4.7	5.9
^b Benzo(a)pyrene	0.83	0.94	1
^b Benzo(b)fluoranthene	5.6	6.5	7
^b Benzo(ghi)perylene	40	46	47
^b Benzo(k)fluoranthene	8.5	9.6	10
^b Chrysene	6	8	9.3
^b Dibenzo(ah)anthracene	0.76	0.86	0.9
^b Fluoranthene	260	460	670
^{b/r} Fluorene	160	380	780
^b Ideno(1,2,3-cd)pyrene	3.2	3.9	4.2
^b Napthalene	1.5	3.7	8.7
^{b/r} Phenanthrene	92	200	380
^b Pyrene	560	1000	1600
ALIPHATIC HYDROCARBONS			
^{b/r} C5-C6	30	55	110
^{b/r} C6-C8	73	160	370
^{b/r} C8-C10	19	46	110
^{b/r} C10-C12	93(48)	230(118)	540(283)
^{b/r} C12-C16	740(24)	1700(59)	3000(142)
^f C16-35	45,000	64,000	76,000
AROMATIC HYDROCARBONS			
^{b/r} C5-7 (benzene)	65	130	280
^{b/r} C7-8 (toluene)	120	270	611
^{b/r} C8-C10	27	65	151
^{b/r} C10-C12	69	160	346
^{b/r} C12-C16	140	310	593
^f C16-C21	250	480	770
^f C21-C35	890	1110	1230

Notes

- a SGV (2009)
- b LQM/CIEH values or derived using CLEAv1.06 with LQM/CIEH Data.
- c 2002 SGV values used until further guidance is published
- d SGV for inorganic Hg used (ref.2009 SGV, Pg5, Para.4)
- e Atkins ATRISKsoil Value
- f Oral, dermal and inhalation exposure compared with Oral HCV
Values in brackets present TAC exceeding solubility & vapour saturation limits

GRM.TAC.03.11

UKDWS			EQS for List 1 & 2 Dangerous Substances (µg/l)	WRAS Values (mg/kg)
Parameter	Concentration	Units		
Acrylamide	0.1	µg/l		
Aluminium	200	µgAl/l		
Ammonium	0.5	mgNH4/l	15 (NH3)	
Antimony	5	µgSb/l		10
Arsenic	10	µgAs/l		10*
Benzene	1	µg/l	30	
Benzofluoranthene	0.01	µg/l		
Boron	1	mgB/l	2000	
Bromate	10	µgBrO3/l		
Cadmium	5	µgCd/l	5	3
Chromium	50	µgCr/l	32.8	25/600 (CrVI/Total)
Chloride (l)	250	mgCl/l		
Conductivity (l)	2500	µS/cm at 20°C		
Copper(II)	2	mg/l		
Cyanide	50	µgCN/l		25/ 250 (Free/Complex)
1, 2 dichloroethane	3	µg/l		
Epichlorohydrin	0.1	µg/l		
Fluoride	1.5	mgF/l		
Hydrogen Ion	10	pH value		
Iron	200	µgFe/l	1000	
Lead (II)	25	µgPb/l		500
Manganese	50	µgMn/l		
Mercury	1	µgHg/l	1	1
Mineral Oil (TPH)	10	µg/l		100/10/1000 (diesel/petrol/mineral)
Nickel (I)	20	µgNi/l		
Nitrate (II)	50	mgNO3/l		
Nitrite (II)	0.5	mgNO2/l		
Phenol	0.5	µg/l		5
Polycyclic Aromatic Hydrocar	0.1	µg/l	10 (Naphthalene)	50
Selenium	10	µgSe/l		
Sodium	200	mgNa/l		3
Suphate (I)	250	mgSO4/l		2000
Tetrachloroethene and Trich	10	µg/l		
Tetrachloromethane	3	µg/l		
Toluene/Xylene (m, p, o)		µg/l	50/30	
Vinyl chloride	0.5	µg/l		
Zinc	5000	µg/l		

Pesticides		
Aldrin	0.03	µg/l
Dieldrin	0.03	µg/l
Heptachlor	0.03	µg/l
Heptachlor epoxide	0.03	µg/l
other pesticides	0.1	µg/l
Pesticides- Total (v)	0.5	µg/l
		Endrin 0.005, Totaldrins 0.03

Reference

UK Water Supply (Water Quality) Regulations 2000
 * PAHs - sum of specified compounds:
 - benzo(b)fluoranthene
 - benzo(k)fluoranthene
 - benzo(a)pyrene
 - indeno(1,2,3-cd)pyrene

EQS for Hardness Related List 2 Dangerous Substances						
Substance	EQS type	EQS (ug/l) for Hardness bands (mg/l CaCO3)				
		0-50	>50-100	>100-150	>150-200	>200-250
Freshwaters, suitable for all fishlife						
Copper (dissolved)	Annual average	1	6	10	10	10
Copper (dissolved)	95th percentile	5	22	40	40	40
Nickel (dissolved)	Annual average	50	100	150	150	200
Vanadium (dissolved)	Annual average	20	20	20	20	60
Freshwaters, suitable for						
Salmonid (game) fish	Annual average	5	10	20	20	50
Chromium (dissolved)	Annual average	4	10	10	20	20
Lead (dissolved)	Annual average	8	50	75	75	125
Zinc (total)	Annual average	30	200	300	300	500
Freshwaters, suitable for						
Cyprinid (coarse) fish	Annual average	150	175	200	200	250
Chromium (dissolved)	Annual average	20	125	125	250	250
Lead (dissolved)	Annual average	75	175	250	250	500
Zinc (total)	Annual average	300	700	1000	1000	2000
Zinc (total)	95th percentile					

Contaminant Thresholds for Subsurface Water Pipes

Contaminant	Thresholds (mg/kg)
Corrosion	
Wrapped Steel	pH<7 Cond >400µS/cm
Wrapped Ductile Iron	pH<5 Cond >400µS/cm, he not neutral
Copper	pH<5 >8 and Eh +ve
Toxic Substances	
Chromium (total) (Cr)	Applies to above pipe materials
Organic Contaminants	
VOC's	0.5 PE/0.125 PVC
BTEX & MTBE	0.1 PE/0.03 PVC
SVOC	2 PE/1.4 PVC
Phenols	2 PE/0.4 PVC
Cresols & Chlorinated Phenols	2 PE/0.04 PVC
Mineral Oil C11-C20	10 PE
Mineral Oil C21 - C40	500
Ether/Ketone/Amines, Nitrobenzene/Aldehydes	0.5 PE/0.02-1 PVC

Notes.

It is not recommended that water pipes should be laid in sites where these substances are identified or suspected

Local Utility Companies should be consulted prior to pipe specifications being finalised.

Ref: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. UKWIR Ref. No. 10/WM/03/21. 2010.



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